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An empirical analysis of corporate sustainability bonds

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Abstract

This study examines the performance of worldwide corporate sustainability bonds issued from 2014 to 2020. Unlike traditional bonds, the proceeds of sustainability bonds are utilised for financing projects to bring about environmental and socio-economic benefits. We analyse the short-term market reaction to announcements of sustainability and traditional bond issuance and document that the stock market reaction to an announcement of sustainability bonds is stronger than that for traditional bonds. We also find that multiple issuers of sustainability bonds achieve a more favourable market reaction than single issuers. Finally, we examine if environmental, social and governance (ESG) scores can positively and significantly impact the corporate performance of firms through the lens of sustainability bond issuances. We find that ESG scores are the primary performance drivers for firms, and the effect is more pronounced for firms that issue sustainability bonds. Overall, the results suggest that issuers of sustainability bonds show their commitment towards environmental and societal goals and thus benefit from favourable stock market reactions.

KEYWORDS
corporate sustainability bonds, ESG, market performance, sustainable finance, traditional bonds

JEL CLASSIFICATION
G1, G3, G30, G39

1 | INTRODUCTION

Financial economists find that sustainable investing through various asset classes, such as equities and bonds, is increasingly gaining momentum. Environment, social and governance (ESG)-related investments are expected to increase to $33.9 trillion by 2026 from $18.4 trillion in 2021 (PwC report, 2022). The global fixed-income market plays a crucial role in transforming the world economy into a sustainable one (Maltais & Nykvist, 2020). The green, social, sustainability and, more recently, the transition bond markets are experiencing a significant boom. The primary drivers for this boom in the fixed-income market can be attributed to stronger environmental legislation, increasing awareness of social impact and a shift in investor perception towards a more sustainable allocation of their wealth with reasonable returns. An intense growth in sustainability bonds began with the Paris Climate Accord and the publication of the United Nations Sustainability Development Goals (UN SDGs[1] hereafter). Gutterman (2021) suggests that the UN SDGs require innovative financing models that allow potential investors to participate in high growth, albeit risky and uncertain, opportunities. International Monetary Fund (IMF) head Kristalina Georgieva emphasised that '… if our world is to

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[1]See https://unsdg.un.org/about/who-we-are for more details on the 17 United Nations Sustainability Development Goals.

become more resilient—we must do everything in our power to promote a "green recovery"' (IMF, 2020).

This study tackles an important financing solution that has only begun to be of interest in recent years, that is, sustainability bonds. According to the International Capital Markets Association (ICMA, 2020), the proceeds of sustainability bonds are exclusively applied to financing or re-financing a combination of green and social projects such as climate change action, gender diversity and the impact of firms on communities. Given the UN SDGs and net carbon zero goals, sustainability bonds have become increasingly prominent. In 2016, Starbucks became the first US company to issue corporate sustainability bonds. It raised a debt of $500 million to obtain ethically sourced coffee (Starbucks, 2016). In May 2021, Amazon announced its sustainability bond issuance of $1 billion for climate and social causes (Reuters, 2021).

However, little is known about the stock market reaction to sustainability bond announcements, whose proceeds are primarily used for environmental and social causes. Furthermore, most of the empirical research in the field of sustainable investing focuses on equities (Barber et al., 2021; Juddoo et al., 2023), green bonds (Flammer, 2021) and ethical fund performance (Madhavan & Sobczyk, 2020). Hence, this study attempts to fill the gap by analysing the performance of sustainability bonds. To our knowledge, this study provides the first evidence of stock market reaction to corporate sustainability bonds using a global sample. The main objectives of this study are as follows:

a. To empirically test the short-term market reaction to corporate sustainability bond announcements relative to traditional bonds[2];
b. To analyse the market reaction to multiple versus single issuances of sustainability bonds; and
c. To evaluate if ESG and sustainability bond issuances are key drivers of firm performance.

This study uses traditional bonds as a benchmark for analysing the market reaction to sustainability bond issuances. Sustainability bonds are inherently similar to traditional bonds in how they work and are structured. The critical difference between the two financing instruments is the purpose of the proceeds. Traditional bonds are debt instruments whose proceeds are not explicitly linked to green or social causes. In contrast, the proceeds of sustainability bonds are specifically used for green or social purposes and integrate ESG criteria. For example, a firm could issue sustainability and traditional bonds with similar structures in terms of coupon, maturity, rating, value and yield. However, the market reaction to the two debt issuances will be different. This is because the proceeds of sustainability bonds are earmarked for the dual purposes of environmental and social causes that explicitly aim to contribute to ESG-related goals, and this appeals to impact investors. Second, unlike traditional investors, impact investors integrate non-traditional sources of risks, such as societal and environmental risks that the market may not price. Thus, this could lead to a positive market reaction to sustainability issuances relative to traditional bonds.

Sustainability bond issuances demonstrate the firm's dedication and commitment to sustainable development, and investing in such projects can be valuable to firms in the long run and lead to higher ESG scores. This commitment becomes more attractive for an environmentally and socially conscious investor. Thus, enhanced ESG scores arising from firms delivering a positive impact for the environment and society through sustainability issuances are very likely to increase a firm's investor base, improve a firm's reputation, place the firm in a more favourable position to take advantage of business opportunities and serve as a credible signal of the firm's commitment to the environment and society. Thus, as firms and investors increasingly incorporate ESG in financial decision-making, and because ESG is a key firm performance driver, we hypothesise that enhanced ESG scores due to sustainability bond issuances will have a significant and positive impact on the performance of firms.

We compile a dataset of international corporate sustainability bonds using Bloomberg's fixed-income database. The dataset covers the entire universe of corporate sustainability bonds from 2014. First, we find that investors respond more positively to the issuance of sustainability bonds than traditional bonds. Multiple issuers of sustainability bonds achieve a more favourable market reaction than single issuers. Finally, we observe that ESG scores of firms can positively and significantly impact corporate performance through the lens of sustainability bond issuances. Overall, the results suggest that issuers of sustainability bonds show their commitment towards environmental and societal goals and thus benefit from favourable stock market reactions.

The study makes several contributions: First, using a global sample in the sustainable investing literature, we provide new evidence on the market response to a recent financing instrument, that is, sustainability bonds whose proceeds are used for green and social causes. Corporate sustainability bond announcements signal a firm's commitment to environmental and societal causes, which echoes Hoffman's (2018) findings. He reports that sustainable investing has changed the corporate landscape, wherein it was observed that the firm's commitment to ESG causes was highlighted in almost a fifth of earnings announcements. Second, we contribute to the extant literature by providing evidence of the impact of ESG scores on corporate performance through the lens of sustainability bond issuances. In recent times, ESG criteria are increasingly considered important drivers of corporate performance. Our findings reveal that issuances of sustainability bonds enhance firms' environmental and social criteria, leading to higher ESG scores that translate into enhanced firm performance. Our findings corroborate the results in recent studies by Welch and Yoon (2022) and Banker et al. (2023), who reveal the importance of ESG on performance. Third, the findings of this paper indicate that corporate sustainability bonds will attract an investor clientele that values environmental and societal causes. Increased investor awareness will make sustainability bonds a popular investment opportunity. This finding supports previous studies that examine investors who integrate ESG criteria into their investments (Juddoo

[2]Traditional bonds are also referred to as conventional bonds.

et al., 2023; Mocanu et al., 2021; Starks et al., 2018). For firms, the findings of this study will inform them on how sustainability issuances would make the firms more appealing and attractive to ESG investors, thus enabling firms to expand their investor base. The findings of this study will also serve as a guide to policymakers who can frame policies on how sustainability issuances will progress the agenda on the environmental and societal objectives of a country and contribute to the 2030 agenda for sustainable development. For example, policymakers can evaluate if the proceeds of sustainability issuances contribute to supporting climate action (SDG 13).[3] Finally, this study provides evidence of the market reaction to sustainability bonds and compares the results to traditional bonds. This contributes to the growing literature on sustainable finance and impact investing (Baker et al., 2022; Cunha et al., 2021; Flammer, 2021; Hachenberg & Schiereck, 2018; Hong et al., 2020; Juddoo et al., 2023; Park, 2018; Secinaro et al., 2020; Yu et al., 2016).

The remainder of the paper is organised as follows: Section 2 provides the background; Section 3 presents the literature review, while in Section 4, we describe the data. Section 5 presents the methods and our findings are discussed in Section 6. Section 7 concludes the paper.

2 | BACKGROUND

A vital global issue going forward is sustainable development, which enables economic development without depleting natural resources while promoting social inclusion.[4] According to the United Nations (UN) (UNCTAD, 2022), there is a gap in financing of $2.5–$3 trillion per year in developing countries alone if UN SDGs are to be achieved by 2030. The UN SDGs are a robust framework for investors, corporations, policymakers and regulatory bodies to facilitate their decision-making purposes in sustainable finance-related matters. The global fixed-income market plays a crucial role in transforming the world economy into a sustainable one (Maltais & Nykvist, 2020). Schoenmaker and Schramade (2019) state that 'sustainable finance looks at how finance (investing and lending) interacts with economic, social, and environmental issues' (p. 4). The allocation of finance facilitates strategic decision-making on the trade-offs between sustainable goals.

The primary driver for sustainable finance is based on environmental, social and governance (ESG) principles (Edmans & Kacperczyk, 2022; Shiller, 2013). Various legislations have been introduced to ensure that the interests of all stakeholders are protected while engaging in sustainable finance activities. For example, the Financial Stability Board in the United Kingdom created the Task Force on Climate-related Financial Disclosures (TCFD) to improve and increase the reporting and disclosure of climate-related financial information (TCFD, 2023), while in January 2023, the European Union (EU) introduced new rules on corporate sustainability reporting called the Corporate Sustainability Reporting Directive (EU Press release, 2023). Such regulations provide investors' confidence in investing in sustainable finance.

Sustainability bonds were essentially non-existent prior to 2013. In 2020, Luxembourg became the first European country to launch a Sustainability Bond Framework (SBF Luxembourg, 2020). Due to pressures to attain net-zero targets and a more equitable and resilient society, firms are transitioning to a green economy, which can improve 'human well-being and social equity while significantly reducing environmental risks and ecological scarcities' (UNEP, 2019). To accelerate this process, the Organisation for Economic Co-operation and Development (OECD, 2011) has a green economy policy framework and guide called 'Towards Green Growth', and the European Commission has issued a policy called 'Europe 2020' (EU, 2020) to enable smart, sustainable and inclusive growth. The socio-political environment is such that society, governments and regulators embed sustainability into regulation and policy. Geels (2014) explains that markets exert selection pressure on firms, and therefore, they adapt through innovation to enable them to compete in the socio-political and economic environment. The author posits that firms are selected based on social legitimacy and economic competitiveness. Firms that do not fit this environment receive fewer resources and could fail.

The United Nations Conference on Trade and Development (UNCTAD, 2022) reports increased sustainability-related financial products. In this study, we focus on sustainability bonds, the market for which is growing. Proceeds from sustainability bonds can be assigned to either green or social goals, while the issuance of green bonds is dedicated to environmental projects and the proceeds of social bond are allocated to improving societal outcomes; social impact bonds and sustainability-linked bonds work differently in that the coupon yields are linked to the social and/or environmental objective.

Figure 1 shows the overall sustainability bond issuance of $225 billion dollars in 2022. Eccles et al. (2014) and Serafeim and Yoon (2023) report that companies worldwide adopt sustainable strategies, business model processes and structures.

Furthermore, increased investor awareness about ESG issues has made sustainability bonds a popular investment opportunity. More investors want to align their financial returns with internationally recognised sustainability goals such as The Paris Agreement or UN SDGs (Paetzold et al., 2022). Moreover, as the use of the proceeds of these bonds' issues is reported, it makes it more transparent for responsible investors to assess the outcomes from an environmental or social perspective and helps to allay fears over 'greenwashing'. Moreover, the ICMA (2022a) advises issuers to obtain second-party opinions (SPOs hereafter). The primary aim of these SPOs is to scrutinise and validate whether the core principles of the sustainability/green bond issuance have been adhered to.

Firms issue sustainability bonds to fund initiatives and projects that will help the firm to meet environmental standards (in reducing energy use, waste, water and CO_2 emissions) and aim to improve

[3] https://sdgs.un.org/goals/goal13.

[4] The future we want, United Nations conference on sustainable development, https://wedocs.unep.org/bitstream/handle/20.500.11822/13662/N1238164.pdf?sequence=1&amp%3BisAllowed=.

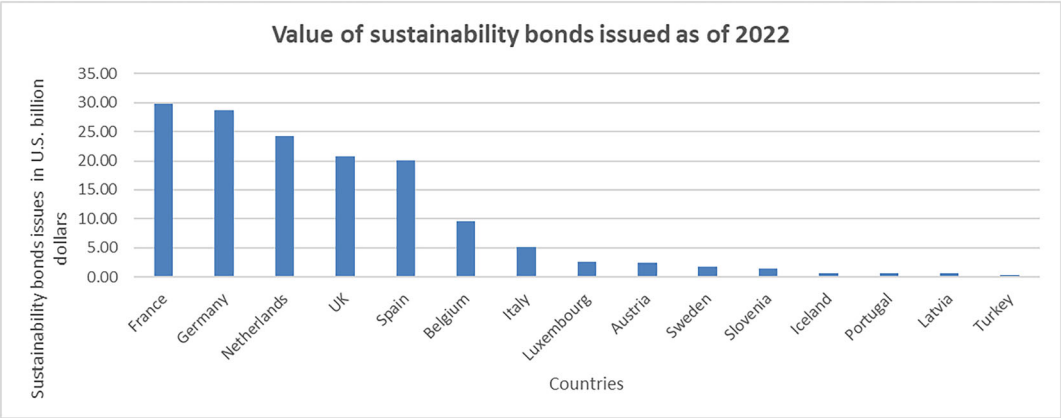

FIGURE 1 Sustainability bonds issuances. *Source*: Statista.

social issues (improve diversity, health and safety and address other social inequalities) helping them to transition to a green economy.

More recently, there has been a momentum within the global capital markets to establish a link between investments and achieving the SDGs; therefore, the ICMA (2022b) has issued guidance for issuers and investors to review sustainability bond issuances and investments against the UN SDGs, which is discussed below.

2.1 | Taxonomy

The proceeds of sustainability bonds are exclusively applied to financing or re-financing a combination of green and social projects, such as climate change action, gender diversity and the impact of firms on communities. The International Capital Market Association (ICMA) (2021) introduced a framework to ensure that these projects are aligned with the Sustainability Bond Guidelines (SBGs), which include four core principles: (a) use of proceeds; (b) process for project evaluation and selection; (c) the management of proceeds; and (d) reporting of information.

The market participants need additional assessment systems to determine whether economic activities are sustainable (in terms of 'green-ness' or other sustainability-related aspects). Broadly, sustainability taxonomies (coherent sets of sustainability criteria) define if an industrial activity, product, process, etc., is sustainable, green or social and also assess the extent of sustainability/green-ness/social-ness. According to the ICMA, the EU Taxonomy[5] offers the best taxonomy for sustainable finance.

Frameworks of sustainable finance are developed to enable issuers, investors, regulators, policymakers, banks and other stakeholders to understand and define sustainable finance. This can enable stakeholders to comply with the taxonomy, and countries can develop their classification based on environmental and societal objectives. In 2020, the EU produced its taxonomy for the environmental agenda, which includes climate change mitigation and adaptation, the sustainable use and protection of water and marine resources, the protection and restoration of biodiversity and ecosystems, the transition to a circular economy and pollution prevention and control (EU, 2020). Similarly, for societal objectives, the social projects should aim to address or mitigate a specific social issue and/or seek to achieve positive social outcomes, especially but not exclusively for a target population. It is stated that a social issue is one that threatens, hinders or damages the well-being of society or a specific target population (ICMA, 2022).

The International Platform on Sustainable Finance (IPSF)[6] aims to enable international cooperation on sustainable finance-related matters. The EU–China Common Framework was developed through the IPSF to assess the similarities and differences in the approaches of both taxonomies (UNDP, 2022). This helped ensure the comparability and interoperability of taxonomies across jurisdictions to help issuers and investors.

More recently, the ICMA (2022a) has recommended taxonomies for broader use that include UN SDGs, the United Nations Central Framework of the System of Environmental Economic Accounting (CF-SEEA) or the Green Industry Guiding Catalogue for China (2020). Across countries, UN SDGs can now be used where the threshold for the sustainable project is to include some sub-UN SDGs.

3 | RELATED LITERATURE

Sustainability bonds[7] aim to raise capital to finance projects with the dual objective of improving the environment and benefiting society. There has been a growing demand in the green and social bonds market; sustainability bonds are a mixture of both. Firms recognise the importance of allocating capital budget and finance for sustainability issues as they can recognise a possible increase in their competitive

[5]See https://www.icmagroup.org/assets/documents/Sustainable-finance/ICMA-Overview-and-Recommendations-for-Sustainable-Finance-Taxonomies-May-2021-180521.pdf.

[6]https://finance.ec.europa.eu/system/files/2021-12/211104-ipsf-common-ground-taxonomy-instruction-report-2021_en.pdf.

[7]Sustainability bonds are different from sustainability-linked bonds. Sustainability-linked bonds are a new financial instrument that are linked to performance of the firm in meeting the UN SDG goals (Giráldez and Fontana, 2022).

advantage by attracting investors and other stakeholders (AlAhbabi & Nobanee, 2020; Balboa, 2016). This financial instrument would be in demand if it were to be invested in successful social and environmental projects and provide a reasonable rate of return to the investor.

More investors are choosing to invest in products such as sustainability bonds despite the risks involved and lower returns. Krueger et al. (2020) surveyed institutional investors to find that climate risks are considered when making investment decisions, as they may have significant financial implications for investment portfolios. At the same time, Cornell (2020) suggests that investors in companies with a high ESG score receive lower expected returns on their investments. He argues that lower expected returns imply a lower discount rate, leading to more significant investment in green projects and higher market values for green companies.

There is limited literature that examines sustainability bonds (Mocanu et al., 2021). Mocanu et al. (2021) use an event study methodology around the announcement date of sustainability bond issuance and find that there is a negative stock market reaction in the short term. They argue that this may be due to uncertainties about profitability outcomes. However, the authors do not use a benchmark to compare their results. This study bridges the gap by analysing the short-term market responses relative to traditional bonds.

3.1 | Sustainability bonds versus traditional bonds

Several corporate finance studies analyse how the stock market responds to the issuance of securities by using an event study approach. For example, using this approach, Nayar and Stock (2008) find negative abnormal returns for non-callable bonds and positive returns for callable bonds. On the other hand, Barclay and Litzenberger (1988) find a positive abnormal return on new equity announcements. Similarly, this study investigates how the stock market responds to sustainability bond issuances. The proceeds of sustainability bonds are used primarily for environmental (green) and societal benefits, which differ significantly from traditional bonds. Proceeds from traditional bonds are primarily used for specific business projects. Thus, we investigate how the market reacts to sustainability bonds vis-à-vis traditional bond issuance.

Bond issuance announcements disclose information to investors. Ross (1977) argues that since managers have inside information about the firm, any change in the financial structure of the firm signals to the market that actual cash flows are better than the forecasts. Investors constantly look for these types of signals. The signalling theory assumes managers are better informed about their firms than investors. A positive cumulative abnormal return would indicate that an increase in debt positively affects stock prices. For example, Chin and Abdullah (2013) and Martel and Padron (2006) find a positive reaction to bond issuance announcements for signalling reasons. Conversely, Eckbo (1985) finds that the stock market reaction to a traditional bond issue is associated with a negative return.

There are limited studies that investigate sustainability bonds. This is pointed out by AlAhbabi and Nobanee (2020), who document that the existing literature seems to overemphasise green or environmental initiatives. They argue that examining environmental and societal objectives is critical as both initiatives will impact firm performance. A recent study by Mocanu et al. (2021) investigates a sample of sustainability bonds. They find a small and adverse reaction to the sustainability bond issue announcement. However, they limit their sample to 27 firms listed on 15 stock exchanges, concluding that their findings may not necessarily represent sustainability bond issuances. Additionally, they do not undertake a comparison of their results with a benchmark. In this study, the sample includes all corporate sustainability bond issuances worldwide, and we compare the stock market reaction to traditional bond issuances. Compared to traditional bond announcements, the sustainability bond announcements reveal critical information: first, that a firm is raising debt specifically for environmental and societal issues, and second, that the green and societal purposes for which the proceeds will be used. It demonstrates a firm's obligation to green and social causes, which changes investors' perceptions of the firm and serves as a credible market signal.

Previous studies show that firms' engagement with green and/or social responsibility initiatives appeals to stakeholders, and they respond positively to such initiatives. For example, Krüger (2015) provides evidence that when announcements of improvements to the social responsibility of firms are made, it can lead to value-enhancing benefits to shareholders. Flammer (2015) shows a positive stock market reaction to shareholder proposals for environmentally friendly policies. Furthermore, Klassen and McLaughlin (1996) show a strong link between strong environmental management to stock market performance.

Investors react to firms in the news (Barber & Odean, 2008; DellaVigna & Pollet, 2009). Capelle-Blancard and Petit (2019) find that firms gain nothing from positive ESG news announcements but can mitigate their loss from negative ESG news when these firms previously had positive ESG news. They find that investors are more responsive to the media than firm disclosure. Similarly, this study posits that firms that issue sustainability bonds can solicit an investor reaction as it signals the firm's commitment to environmental and societal objectives, and this will appeal to investors who prefer ESG investments.

There are several empirical approaches to examining the relationship between corporate social performance and corporate financial performance. The first approach uses the portfolio methodology (Capelle-Blancard & Monjon, 2014); the second considers the relationship between corporate social performance and accounting measures of financial performance (Guenster et al., 2011); the third involves the event study approach. This study will adopt an event study approach to examine the short-term stock market reaction to sustainability bond issues. We analyse the stock market reaction to sustainability and traditional bond issuances by studying short-term event windows. A sustainability bond announcement conveys essential information because it indicates, firstly, corporate initiative towards sustainable causes and, secondly, the environmental and social effect for which the proceeds of the issue will be used. It serves as a credible signal of a firm's commitment towards environmental

and social causes and attracts investors passionate about the environment and social causes to profit maximisation goals.

Sustainability bond issuance can be treated as an environmental and/or social reward to investors who care about sustainable causes. Thus, we posit that investors will respond more positively when firms announce their sustainability bond issuances than traditional ones. We predict sustainability bonds will have a stronger stock market reaction than traditional bonds.

> **H1.** The short-run market reaction to sustainability bond announcements will be stronger than that for traditional bonds.

3.2 | ESG and sustainability bond issuances

Various factors, such as macroeconomic factors (Nucera, 2017; Shynkevich, 2016) or firm-specific factors (Baker & Wurgler, 2012), drive the performance of traditional bonds. The traditional bond market provides firms with a vital source of external financing, and studies show that the predictability of bond returns premia depends on various factors, such as default risk and interest rate risk and varies according to maturities (Shynkevich, 2016). There is a plethora of literature on the return predictability of assets.[8]

Several years ago, the notion that firms have an equitable role in and responsibility to society and the environment beyond their primary goal of maximising shareholder wealth was dismissed and frowned upon by businesses and scholars (Friedman, 1970). Lately, this concept of social responsibility of businesses has gained in popularity; Huang et al. (2021), who undertake a detailed review of studies investigating the relationship between ESG performance measured by the ESG scores and corporate financial performance, find a positive and statistically significant relationship. Similarly, Dixon-Fowler et al. (2012) also find a strong and positive relationship between ESG and firm performance. In recent times, ESG criteria are increasingly considered important drivers of corporate performance. This is because of the integration of ESG in financial decision-making (Edmans & Kacperczyk, 2022). Firms instrumental in positively impacting society are likely to have higher ESG scores and to be attractive to investors, policymakers and fund managers. Moreover, these firms would be better positioned to seize business opportunities (Edmans & Kacperczyk, 2022). Thus, higher ESG scores will lead to a positive impact on firm performance. Larcker and Watts (2020) note that ESG and corporate social responsibility (CSR, hereafter) of firms will impact asset prices and future firm profitability. This argument is consistent with the literature that shows a positive relationship between ESG and firm performance (Edmans, 2011, 2012; Flammer, 2015). Starks et al. (2018) show that investors with a longer investment horizon prefer to hold high ESG firms and behave more patiently when incurring a loss. Shareholders recognise and welcome firms' commitment towards the ESG agenda and regard it as value-enhancing. Furthermore, impact investors who value the ESG commitment of firms will be drawn towards instruments issued by firms that aim to enhance the ESG initiatives alongside offering a financial return (Barber et al., 2021; Juddoo et al., 2023).

Other studies find that disclosure of information, sustainability reporting and ESG score can influence firm value. Khan et al. (2016) investigate the materiality concept of sustainability reporting and find that firms with good ratings on material sustainability issues significantly outperform those with poor ESG scores. Matsumura et al. (2014) use carbon emissions data from 2004 to 2008 to investigate the impact of carbon emissions and the act of disclosure on firm value. They find that investors integrate both factors in their valuations. Aouadi and Marsat (2018) show that a higher ESG score impacts the firm value for high-attention firms based in countries with greater press freedom and improved corporate social reputation. Serafeim and Yoon (2022) document that if firm announcements are related to ESG information, they will impact firm value. Hou et al. (2015) find that the environmental component in the ESG score significantly impacts firm performance. In contrast, Busch and Friede (2018) report a more substantial social and governance impact on firm performance.

Studies show that firms with a high ESG score experience better performance (Kiessling et al., 2016) and experience a lower cost of debt (Oikonomou et al., 2014). Due to disclosure requirements, firms highlight these initiatives in their annual reports, which helps firms communicate their sustainability narrative. Thus, this enhances the firm's reputation through its sustainability commitments. Firms want to be part of the green economy, and the issuance of sustainability bonds is part of this narrative. This narrative and disclosure can lead to higher ESG scores for firms. A meta-analysis of sustainability investing research by Fulton et al. (2012) finds that 100% of the academic studies agree that companies with a high CSR or ESG score have a lower cost of capital in terms of debt (loans and bonds) and equity; this can be because these companies are seen to be at lower risk than other companies, and they are rewarded accordingly.

Agliardi and Agliardi (2019) suggest that improving credit quality can lead to a lower cost of capital for green bond issuers. Secinaro et al. (2020) find that adopting environmental practices reduces environmental risks, lowering production costs and increasing profits for firms. These studies provide evidence that the ESG scores for firms impact firm performance. Investors are increasingly integrating the ESG criteria in their investment decisions.

However, Cicchiello et al. (2023) state that the lack of universally agreed ESG reporting standards makes it difficult for investors to evaluate and compare the ESG performance of firms. Due to the lack of standardisation in the reporting and disclosure of ESG criteria, the ICMA (2022a) advises issuers to obtain SPOs. These opinions examine whether the core principles of the sustainability/green bond issuance have been adhered to. This feature of using external reviews is not mandatory, and data availability is scarce (Bachelet et al., 2019). Thus, in this study, we also use SPOs as a robustness measure for ESG scores.

[8]See Ibbotson and Siegel (1984); Pesaran and Timmermann (1997); Kandel and Stambaugh (1996); Baker and Wurgler (2012); Shynkevich (2016); and Nucera (2017).

Firms have increasingly been incorporating ESG principles into their policies in order to be perceived as firms that seek value maximisation for all their stakeholders. Based on the discussion, we hypothesise that ESG scores of firms can positively and significantly impact the corporate performance of firms through the lens of sustainability bond issuances. Sustainability bond issuances can be considered a proxy for firms to make environmentally and socially friendly investments and change their ESG profiles significantly. Previous studies show that higher ESG performances are associated with superior financial performance (Chava, 2014; El Ghoul et al., 2011; Goss & Roberts, 2011).

Firms that issue sustainability bonds aim to use the capital raised for projects that improve the environment and benefit society. Other stakeholders such as bondholders (public, institutional investors, sovereign wealth funds, insurance firms and more), fund managers, accounting and supranational bodies, public authorities, investment advisors and stock exchanges benefit from sustainability bond issuances via improved disclosure of information and reporting on ESG (Kerste, 2011). Sustainability bond issuers explicitly indicate their use of proceeds in the prospectus and reveal their ongoing or future environmental and socially beneficial projects. SPOs further validate whether the sustainability bond issuance core principles have been adhered to. As a result, investors will benefit from additional information that the issuer discloses when issuing a sustainability bond that would appeal to the investors whose sustainability mandate covers environmental and social causes will be satisfied, thus boosting firms' ESG scores. On the other hand, in the case of traditional bonds, the disclosure of information will not be as significant as when issuing sustainability bonds.

From the stakeholder theory point of view, sustainability bonds can be viewed as internalising environmental and societal externalities and catering to the appetite of a particular class of investors with a sustainability mandate. Thus, these investors who consider sustainable growth and environmentally friendly projects, in addition to traditional risk and return, will appeal to the sustainability bond market. From the issuers' perspective, sustainability bonds can increase the breadth of ownership, expand their investor base and potentially obtain a lower cost of capital relative to traditional bonds.

Sustainability bond issuances demonstrate the firm's dedication and commitment to sustainable development, and investing in such projects can be valuable to firms in the long run and lead to higher ESG scores. This commitment becomes more attractive for an environmentally and socially conscious investor. Thus, enhanced ESG scores arising from firms delivering a positive impact for the environment and society through sustainability issuances are very likely to increase a firm's investor base, improve a firm's reputation, place the firm in a more favourable position to take advantage of business opportunities and serve as a credible signal of the firm's commitment to the environment and society. Thus, as firms and investors increasingly incorporate ESG scores in financial decision-making, we posit that ESG scores can positively impact firm performance, and this effect is more pronounced for firms that issue sustainability bonds.

H2. ESG scores positively and significantly impact the corporate performance of firms through the lens of sustainability bond issuances.

4 | DATA

We identify all sustainability bond issuances over the period 2014–2020. The first corporate sustainability issuance was in 2014. Data regarding sustainability bonds are collected from Bloomberg. In their methodology glossary, Bloomberg[9] states that the benchmark they adopted to classify sustainability bonds is governed by the ICMA Green Bond, Social Bond and Sustainability Bond Principles and Guidelines. Thus, the authors are convinced and assured that the sample of sustainability bonds used in the study does not suffer the risk of misclassification or slippage. Second, Bloomberg provides pertinent information about corporate bonds, including announcement date, issue amount, coupon and maturity, which is essential for the analysis in this study.

We obtained a sample of 632 sustainability bonds, of which we excluded 234 bonds because they lacked issuance data. We dropped a further 180 issuances with incomplete returns data, duplicate issuances and terminated issuances. The total sample consists of 218 sustainability bonds issued by development banks, sovereign, municipal, state-backed, commercial and sustainability asset-backed securities and corporate bonds. The study uses a global database where different countries have differing legislation for reaching net zero; for example, only Japan, Canada and the EU have passed legislation and committed to legally binding net-zero targets (UK Parliament, 2021). Hence, we control for this effect in the study.

Table 1a presents the distribution of the sustainability bond sample according to issuer type and year. Corporations issuing sustainability bonds represent 40% of our sample, followed by sovereigns at 20% and development banks at 17%. We further break down our sample according to countries. Country-wise distribution is presented in Table 1b, which shows that the United States has the most significant number of sustainability issuances at 36, which constitutes 41.4%, followed by China at 27 (31%). The focus of our study will primarily cover the global corporate sustainability bond issuances of 87 firms.

Next, we classify the distribution according to single and multiple corporate issuances. Firms with single issuances are 51, and multiple issuances comprise 36. US corporates have the most significant single and multiple issuers, followed by China. Table 1c shows the distribution according to sectors; the financial sector represents the highest proportion at 41%, followed by sectors such as energy and power, healthcare, retail, consumer products and services at 6%. Financial institutions lead in issuing sustainability bonds since these institutions fund several sustainability-linked projects.

Table 2a presents the summary statistics for both the sustainability and traditional bond samples used in the study. We collect firm

[9]For further information, see https://www.icmagroup.org/sustainable-finance/theprinciples-guidelines-and-handbooks.

TABLE 1a Distribution of sustainability bond by issuer type.

	Issuer type							
Year	Development bank	Sovereign	Municipal	Corporate	State-backed	Commercial bank	ABS	All
2014	4	5	1	10	1	2	1	24
2015	3	4	1	7	1	2	1	19
2016	1	1	0	2	0	1	0	5
2017	6	7	2	15	2	3	2	37
2018	5	6	1	12	2	3	2	31
2019	10	12	3	24	3	5	3	60
2020	7	8	2	17	2	4	2	42
Total	36	43	10	87	11	20	11	218

Notes: This table provides data on the distribution of sustainability bond issues according to year and issuer type. The total number of sustainability bond issues for the period 2014–2020 is 218.

TABLE 1b Distribution of corporate sustainability bonds by country.

Country	Full sample	Multiple issuance	Single issuance
Supranational	15	6	9
China	27	11	16
UK	9	4	5
USA	36	15	21
Total	87	36	51

Note: This table presents data on the country distribution of sustainability bond issues.

TABLE 1c Distribution of sustainability bond by corporate sector.

Sector	No. of bonds	In %
Consumer products and services	6	6.42
Industrials	5	5.96
Financials	36	40.83
Energy and power	6	6.42
Consumer staples	2	2.75
Health care	6	6.42
Material	3	3.44
High technology	5	5.96
Media and entertainment	5	5.96
Real estate	5	5.96
Telecommunications	2	2.75
Retail	6	6.42
Total	87	100%

Note: Data on the distribution of corporate sustainability bond issues classified according to GIC industry sector.

(issuer) and corporate governance characteristics data from the Refinitiv database. The variables are defined in Appendix A. The corporate governance variables are key since sustainability bond issuances are strategic decisions made at the board level, where the structure and composition of the board can influence the decision-making process. Board diversity, high institutional ownership, particularly relating to mutual fund managers and investment advisers, and board independence are found to be positively related to improved monitoring and firm performance (Bhagat & Bolton, 2008; Erhardt et al., 2003; Ferreira & Matos, 2008).

We find that the coupon rate of a sustainability bond has a mean of 2.09% compared to 1.87% for a traditional bond. We also find that sustainability bonds have a more extended maturity period and issuance amount than traditional bonds. The mean credit rating of sustainability bonds is higher (4.89) than traditional bonds (3.28). Firms may issue a higher coupon rate to make the bonds attractive to the investor and compensate the investor for any default risk, as reflected in the bonds' higher credit ratings and longer maturity.

Next, we analyse the issuer (firm) characteristics for sustainability and traditional bonds. Corporations that issue sustainability bonds are larger in terms of assets and market value, take more risk, have better growth opportunities and are marginally more profitable than firms that issue traditional bonds. Interestingly, sustainability bond issuers have higher ESG and credit ratings than traditional bond issuers. Finally, with regard to corporate governance characteristics, we find that firms that issue sustainability bonds have better monitoring as indicated by a higher number of non-executive directors (NEDs), improved board diversity and a higher percentage of institutional investors compared to corporates that issue traditional bonds.

Table 2b presents the sample's detailed spread of credit ratings of both sustainability and traditional bonds. Our analysis reveals that 22% of the sustainability bonds issued are AAA-rated compared to 9.76% of traditional bonds. A high credit rating makes sustainability bonds attractive for investors to diversify their portfolios (Caramichael & Rapp, 2022).

5 | METHODS

In the corporate finance literature, the event study methodology is widely adopted to examine the stock price reaction around the announcement of an event (Brown & Warner, 1980, 1985). Several

TABLE 2a Summary statistics.

	Sustainability bond			Traditional bond			
	Mean	Median	SD	Mean	Median	SD	*t*-test
Panel A: Bond characteristics	(1)	(2)		(3)	(4)		(1) versus (3)
Coupon rate	2.09	1.71	1.57	1.87	1.59	1.40	4.79***
Maturity	6.89	5.34	0.8976	6.15	4.95	0.80	2.45**
Amount	473.12	201.19	0.4982	422.50	186.50	0.4434	3.88***
Credit rating	4.89	3.13	0.7349	3.28	2.90	0.8939	5.36***
Panel B: Issuer (firm) characteristics							
ESG score	18.78	17.09	10.8927	16.77	15.84	9.69	8.73***
Leverage	37.06	30.01	0.9832	33.09	27.82	0.88	11.94***
Firm size	477.12	321.89	1.2812	426.07	298.39	1.14	7.40***
ROE	0.09	0.08	0.5682	0.08	0.07	0.51	4.39***
Market to book	1.23	0.88	0.5912	1.10	0.82	0.53	2.56**
Risk	0.05	0.04	1.8216	0.04	0.04	1.62	2.38**
Total assets	1,720.93	986.78	1.7539	1,536.79	914.75	1.56	6.54***
Credit rating	5.76	4.53	0.7437	3.78	2.90	0.6836	4.37***
Panel C: CG characteristics of issuer							
Board independence (% NEDs)	61.51	57.14	2.1987	54.93	52.97	1.96	8.74***
Gender diversity (% women)	20.53	18.19	1.7821	18.33	16.86	1.59	3.91***
Institutional ownership (5% and more block ownership)	36.21	30.11	0.3451	32.34	27.91	0.31	7.53***

Notes: This table provides the summary statistics for corporate sustainability bonds and traditional bonds for the period 2014–2020. Panel A provides the bond characteristics. Coupon rate is the rate of interest paid by bond issuers on the bond's face value. Maturity is the period during which its owner will receive interest payments on the investment (in years). Amount is the issuance amount (in $M). Credit rating is the credit worthiness of the bond. Panel B presents the issuer (firm) characteristics. ESG score is an overall company score based on self-reported information in the environmental, social and corporate governance pillars. Leverage is the ratio of total debt to market value of assets. Firm size is share price multiplied by the number of shares outstanding. Return on equity (ROE) is the ratio of operating income before depreciation to the book value of equity. Market to book is the ratio of the market price to the book value. Risk, the market risk measure, is the beta coefficient (β), which is estimated over a 5-year period in a rolling window, using monthly data. Total Assets is the book value of total assets (in US dollars). Credit rating is the credit worthiness of the issuer or firm. Panel C presents the corporate governance characteristics of the issuer (firm). Board independence is the percentage of non-executive directors on the board. Gender diversity is the percentage of female directors on the board and institutional ownership represents 5% or more shares held by block shareholders. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

studies adopt an event study methodology to analyse issues related to CSR (Capelle-Blancard & Laguna, 2010; Deng et al., 2013; Flammer, 2013). Mocanu et al. (2021) document that the event study methodology is the most suitable method to assess the impact of selected events. Accordingly, we use this methodology to assess how the stock market responds to the announcement of corporate sustainability bonds and traditional bonds. Following Flammer (2021), we use the announcement date as the event date. In line with Berkman and Truong (2009), Krüger (2015), Tang and Zhang (2020) and Flammer (2021), this study accounts for the possibility that some information may be common knowledge to the public prior to the announcement and also accounts for the possibility of a staggered response post announcement. Thus, our short-term analysis covers event windows of 3 days (−1, 1), 11 days (−5, 5) and 21 days (−10, 10) around the announcement date. Confounding events, such as earnings announcements, rights issues, mergers, etc., are not included in the sample.

The market model is used to estimate abnormal returns. Brown and Warner (1985) document that event studies based on the market model and the market-adjusted returns model are potent in detecting abnormal returns. We use the Morgan Stanley Capital International (MSCI) World Index as our reference market index (Col & Errunza, 2015). This index is used as a common benchmark for global stocks as it represents a comprehensive cross section of global markets. Abnormal returns (ARs) are computed as follows:

$$AR_{it} = R_{it} - R_{mt} \quad (1)$$

where AR_{it} is the difference between the return of security *i* at time *t* and R_{mt} is the return on the MSCI for day *t*. Thus, the AR directly measures any unanticipated change in the share prices associated with the event.

The individual ARs are cumulated from the beginning to the subsequent period to determine the cumulative abnormal return (CAR). The CAR measures how much the stock price diverges from its expected value in an event window. We use CAR to analyse the market reaction to short-term performance.

TABLE 2b Credit ratings of sustainable and traditional bonds.

Rating	Sustainability bond (%)	Traditional bond (%)	*t*-test
AAA	22.7	9.76	24.93***
AA+	4.96	2.13	18.84***
AA−	5.67	2.44	11.60***
AA	9.57	4.12	12.89***
A+	9.57	4.12	13.58***
A−	10.99	4.73	17.63***
A	8.87	3.81	7.90***
BBB+	9.22	3.96	13.74***
BBB−	3.55	1.52	5.64***
BBB	8.16	3.51	8.39***
BB+	1.06	0.46	2.43**
BB−	2.13	0.91	3.85***
BB	0.71	0.3	8.47***
B+	1.06	0.46	6.25***
B	1.42	0.61	4.68***
CCC	0.35	0.15	4.81***

Notes: This table provides the credit rating for all corporate sustainability bonds and traditional bonds in the sample for the period 2014–2020. Bond credit rating is the measure of the credit worthiness of the bond with AAA being the most creditworthy. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

$$CAR(t_1,t_2) = \sum_{t=t_1}^{t_2} AR_t \tag{2}$$

In an event study, there are three possible outcomes: First, a non-significant CAR indicates that the investors do not react to a sustainability bond announcement; second, a statistically significant and positive CAR denotes a positive reaction to stock returns. It shows that the investors react positively to a sustainability bond issue that leads to an increase in debt to be utilised for green and social causes; finally, a statistically significant and negative CAR shows that investors have a negative outlook on the issuer's performance, resulting in lower-than-expected return. We use *t*-tests (Brown & Warner, 1985; Campbell et al., 1997) for differences from zero using the following equation:

$$t = \frac{CAR_t}{s(CAR)_t} \tag{3}$$

where s $(CAR_t) = s\ (AR_t)/(t+1)^{1/2}$ and s (AR_t) is the variance over *t* months.

To analyse the short-term market reaction, we use a control group of traditional corporate bond issuing firms to compare their market reaction with sustainability bonds (treatment group). To build the matched control group of firms, we first formed a sample of firms that have issued traditional bonds over the same period as the sample of sustainability bonds (2014–2020). We then match the country, sector and issuer characteristics (firm size, leverage, return on equity, market to book, ESG score, risk, credit rating and total assets) such that control firms are similar to the treatment firms. After the matching process, we have 66 corporate sustainability bonds matched to 66 traditional corporate bonds.

For the post-announcement performance of firms issuing sustainability and traditional bonds, we also use the event study approach for the analysis. We calculate the buy and hold abnormal returns (BHAR hereafter) across different event windows post announcements. Following Lee et al. (2019), we use the event windows of Day 1 to Day 120, Day 121 to Day 240, Day 241 to Day 360 and Day 361 to Day 480. BHAR is a measure of an investor's actual investment performance in the long run (Kothari & Warner, 2006) and provides a better measure of shareholder wealth changes around an event in the long run and is less likely to suffer from measurement errors (Barber & Lyon, 1997). We measure BHAR using the following formula:

$$BHAR_i = \prod_{t=1}^{T}(1+R_{it}) - \prod_{t=1}^{T}(1+R_{benchmarkt}) \tag{4}$$

where R_{it} is the stock return of firm i during period *t* and $R_{Benchmark,t}$ is the benchmark index's return. The MSCI World Index is again used as the reference index. BHARs are calculated from the day after the announcement date until the end of the event window.

The next step is to analyse the firm performance drivers in the full sample over four estimation periods following the sustainability bond issuance announcements. The estimation periods are 1–120 days, 121–240 days, 241–360 days and 360–480 days. The study includes firm[10] and corporate governance characteristics[11] that are known performance drivers as explanatory variables. The study estimates Equation (5) using firm and country fixed effects. It includes an interaction term to assess the relationship between ESG scores and sustainability bond issuances.

$$\begin{aligned} BHAR_{it} = {} & \alpha + ESG_{it} + Sustainability\ bond_{it} + Credit\ Ratings_{it} + Leverage_{it} \\ & + Size_{it} + MB_{it} + Risk_{it} + BIND_{it} + Gender_{it} \\ & + Institutional\ Ownership_{it} + DZERO_t + DOPINION_{it} + ESG_{it} \\ & * Sustainability\ bond_{it} + \varepsilon_t \end{aligned} \tag{5}$$

where $BHAR_{it}$ is the BHAR of firms in the estimation period and represents the firm performance measure. The interaction term is between ESG and sustainability bond issuances. The definitions of all the explanatory variables can be found in Appendix A.

6 | RESULTS AND DISCUSSION

6.1 | Short-term market reaction

Table 3 presents the findings of the short-term market reaction to traditional and sustainability bond issuance over the event window intervals of (−1, +1), (−5, +5) and (−10, +10) days.

[10]See Fama and French (1992) and Fama and French (1993) for known firm characteristics as drivers of firm performance.

[11]See Bhagat and Bolton (2008) for known governance characteristics that affect firm performance.

TABLE 3 Short-term market reaction.

Sustainability bond versus traditional bond				
Event window in days		**Sustainability bond**	**Traditional bond**	***t*-test**
AD −1 to AD 1	Mean (%)	−1.18	−3.34	3.45***
	Median (%)	−0.93	−2.56	
	SRT	(−7.84)***	(−4.35)***	
AD −5 to AD 5	Mean (%)	−1.03	−2.45	4.58***
	Median (%)	−0.72	−2.01	
	SRT	(−8.45)***	(−9.11)***	
AD −10 to AD 10	Mean (%)	0.18	−1.95	5.67***
	Median (%)	0.09	−1.89	
	SRT	(2.34)**	(−3.67)***	
	Sample	66	66	

Notes: This table reports the cumulative abnormal return (CAR) for event windows in days around the announcement of traditional bond issues and sustainability bond issues. The sample consists of 66 matched traditional bond issues with sustainability bond issues. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

The CAR for sustainability bond announcements in the event window (−10, +10) days is positive (0.18%) and significant, while the other event windows of (−1, +1) and (−5, +5) days are negative and significant. The positive CAR in the longer event window of 21 days suggests that the stock market responds positively to the announcement of sustainability bonds. On the other hand, consistent with the previous literature on traditional bonds, the stock market reaction to the announcement of traditional bonds over all the event windows is negative (Eckbo, 1985). The positive reaction to sustainability bonds relative to traditional bonds supports our first hypothesis.

The results suggest that sustainability bond announcements are viewed positively by the market as they indicate a bond issuance and reflect the increasing demand for socially responsible investments that integrate both green and social aspects. The findings also offer evidence that sustainability bond issues can serve as a credible signal of a firm's commitment towards the environment and social causes, thus supporting the signalling proposition of Ross (1977).

Thus, the positive market reaction in the short run to sustainability bond issues can be attributed to the likely response by the market to the firm's commitment to benefit the environment and society. In the post-announcement performance analysis,[12] we observe that sustainability bonds deliver more robust and positive performance than traditional bonds. A possible reason for this superior performance post-announcement could stem from investors finding that their green and social criteria objectives are being met in the projects where the proceeds are used.

To summarise, in the short run, we find that the market response to sustainable bond announcements is positive. Thus, this finding supports our first hypothesis, where we postulate that the market reaction to sustainable bonds will be stronger than traditional ones.

[12]Results available upon request from authors.

6.2 | Single versus multiple issuance

We further analyse the market reaction to firms that are single and multiple issuers of sustainability bonds over the short and post-announcement periods, similar to previous studies (Flammer, 2021; Tang & Zhang, 2020). We argue that the stock market reacts positively to CSR initiatives that firms adopt. Therefore, announcements of multiple issuances of sustainability bonds would be well received by the market, reflected in the market response to issuance announcements.

Table 4 presents the results of the stock market reaction to multiple sustainability bond issuance announcements in the short run. The CARs in the event window (−10, +10) days are positive (0.54%) and significant for firms that make multiple sustainability bond issuance announcements compared to 0.19% for single issuers of sustainability bonds. In contrast, the other event windows of (−1, +1) and (−5, +5) days are negative for both single and multiple issuers of sustainability bonds. Overall, in the short run, our results indicate that the market favourably receives multiple issuances of sustainable bonds.

In the post-announcement period our results suggest that multiple issuers of sustainability bonds in the post-announcement period continue to perform well. A plausible reason for our findings could be that the proceeds of sustainable bonds are used for both green and social objectives. Thus, the market reacts more positively to subsequent issues of sustainable bonds due to the dual objectives of the bonds. It reflects the continuing commitment of the firm towards environmental and social objectives.

6.3 | ESG, sustainability bonds and firm performance

Following the short-term positive market response to sustainable bond announcements, we investigate the key firm performance

TABLE 4 Short-term market reaction to single vs multiple issuances.

Single versus multiple issuance				
Event window in days		**Single issuance**	**Multiple issuance**	***t*-test**
AD −1 to AD 1	Mean (%)	−1.54	−1.09	2.34**
	Median (%)	−1.20	−0.89	
	SRT	(−5.49)***	(−3.25)***	
AD −5 to AD 5	Mean (%)	−1.33	−0.84	2.45**
	Median (%)	−0.93	−0.76	
	SRT	(−5.28)***	(−7.34)***	
AD −10 to AD 10	Mean (%)	0.19	0.54	2.56***
	Median (%)	0.11	0.22	
	SRT	(3.27)***	(2.88)***	
	Sample	38	28	

Notes: This table reports the cumulative abnormal return (CAR) for different event windows in days around the announcement of sustainability bond issues. The sample consists of 38 single and 28 multiple sustainability bond issuance events. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

drivers using the overall sample. We posit that issuances of sustainability bonds will enhance firms' environmental and social criteria, leading to higher ESG scores that would translate into enhanced firm performance. Sustainability bond issuances signal the firm's commitment to environmental and social causes, and this would appeal to environmentally and socially conscious investors. This commitment leads to enhanced performance as engaging in ESG activities improves a firm's reputation and leads to superior firm performance (Ng et al., 1999).

Panel A of Table 5 presents the determinants of firm performance for the full sample in the post-announcement period. The aim is to explain which firm characteristics are associated with a more robust response of equity returns to the issuance of sustainability bonds. The estimated coefficients of ESG are positive for all periods, indicating that the market gradually incorporates the information conveyed by ESG-related initiatives. This is consistent with the previous literature, which documents a positive relationship between ESG and firm performance (Eccles et al., 2014; Flammer et al., 2019). Fombrun and Shanley (1990) argue that a firm can improve its relationships with its stakeholders through a good reputation, as reflected in its ESG scores. Improved relationships with stakeholders will enhance a firm's sustainability and financial performance (Whitehouse, 2006). Based on these arguments, we suggest that firms that issue sustainability bonds show their commitment to the environment and society, enhancing their ESG scores and increasing firm performance.[13] We find that the coefficient estimates of sustainability bonds are positive and significant across all time periods, indicating that they are key in driving firm performance. Our findings indicate that sustainability bond issuances signal to responsible investors the firm's environmental and social commitments, leading to increased returns.

The coefficient estimate for DZERO is positive and significant. DZERO is a dummy variable, where 1 represents countries with legally binding legislation on net-zero targets. This positive and significant result indicates that firms in countries with legally binding legislation on net-zero targets have a positive impact on firm performance. The coefficient estimate for second-party opinion (DOPINION) as a performance driver is not significant, which means that ESG scores are predominantly the primary drivers.

Table 5 also reports the coefficient estimates for the control variables in the study. We control for the known firm and corporate governance characteristics. Our results are robust to the inclusion of these control variables. This reinforces the fact that ESG scores and sustainability bond issuances are key firm performance drivers.

We employ an interaction variable in panel B to further assess the relationship between ESG score and sustainability bonds. This analysis shows that sustainability bond issuances and high ESG scores lead to higher returns. Overall, the results show that ESG scores and sustainability bond issuances play an important role in terms of determinants of firm performance. We confirm our second hypothesis that ESG scores positively and significantly impact the corporate performance of firms through the lens of sustainability bond issuances.

We conduct further tests using the propensity matching method (PSM)[14] to confirm the results. We conclude that ESG plays a critical role in determining the performance of firms. Higher ESG scores would signal to impact investors on the social commitment of firms to the environment and social causes. This would then benefit firms and further drive their performance positively and significantly.

[13]We use lagged variables and estimate the model to test for endogeneity and the untabulated results confirm the finding.

[14]Results available upon request from the authors.

TABLE 5 ESG, sustainability bonds and firm performance.

Panel A				
	AD 1 to AD 120	**AD 121 to AD 240**	**AD 241 to AD 360**	**AD 361 to AD 480**
ESG	0.1915	0.1355	0.0984	0.0898
	(2.76)***	(1.98)**	(1.89)*	(1.73)*
Sustainability bond	0.0719	0.0674	0.0731	2.0971
	(2.48)**	(2.20)**	(2.55)**	(2.64)**
DZERO	0.2749	0.2900	0.2972	0.2795
	(3.38)***	(3.44)***	(3.74)***	(3.56)***
DOPINION	0.0363	0.0342	0.0347	0.0417
	(0.88)	(0.50)	(0.54)	(0.91)
Credit rating	0.1369	0.1250	0.1166	0.1572
	(2.95)***	(2.35)**	(2.17)**	(3.74)***
Leverage	0.0169	0.0294	0.0304	0.0194
	(2.29)**	(2.82)***	(2.98)***	(2.42)**
Firm size	0.0060	0.0030	0.0032	0.0069
	(6.04)***	(3.68)***	(4.11)***	(6.42)***
MB	−0.0008	−0.0009	−0.0009	−0.0009
	(−1.09)	(−0.88)	(−0.98)	(−1.26)
Risk	−0.0811	−0.0763	−0.0747	−0.0931
	(−2.91)***	(−2.24)**	(−1.99)**	(−3.01)***
BIND	0.0170	0.0194	0.0214	−0.0111
	(2.09)**	(2.17)***	(2.57)**	(−1.90)*
Gender	0.1216	0.1138	0.1308	0.1396
	(3.58)***	(3.12)***	(4.41)***	(4.92)***
Institutional ownership	0.0152	0.0158	0.0162	0.0174
	(4.70)***	(4.74)***	(4.93)***	(4.98)***
Constant	0.0594	0.0367	0.0553	0.0682
	(20.92)***	(15.70)***	(21.70)***	(24.66)***
Country effects	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
R^2	0.4122	0.4080	0.3968	0.3953
N	144	144	144	144
Panel B				
ESG * sustainability bond	0.0152	0.0139	0.0130	0.0148
	(3.44)***	(2.86)***	(2.52)**	(2.97)***
Constant	0.0648	0.0401	0.0604	0.0687
	(22.87)***	(17.13)***	(22.66)***	(23.91)***
Control variables	Yes	Yes	Yes	Yes
Firm and country fixed effects	Yes	Yes	Yes	Yes
R^2	0.4129	0.4088	0.4004	0.3958
N	144	144	144	144

Notes: This table reports the panel regression of the drivers of firm performance in the full sample. Firm performance is represented by the buy-and-hold abnormal returns over the period. Panel A shows the variables used. ESG score is based on self-reported information on the environmental, social and corporate governance pillars. Sustainability bond represents a dummy variable to indicate sustainability bond issuances. Credit rating is the measure of the creditworthiness of the issuer or firm. Leverage is the ratio of total debt to the market value of assets. Firm size is share price multiplied by the number of shares outstanding. Market to book is the ratio of the market price to the book value. Risk is the beta coefficient (β), estimated over a 5-year period in a rolling window using monthly data. Board independence is the percentage of non-executive directors on the board. Gender diversity is the percentage of female directors on the board. DZERO is a dummy variable for net-zero commitments. DOPINION is a dummy variable representing second-party opinion. Institutional ownership represents 5% or more shares held by block shareholders. Panel B presents the regression results with the interaction variables. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

7 | CONCLUSION

This study's primary objective is to explore sustainability bonds, a relatively new financial instrument in the fixed-income markets, as well as in sustainable finance. The primary aim of issuing sustainability bonds is to use the proceeds for environmental and societal benefits. The paper documents that sustainability bonds have been gaining momentum since 2014. We also find that the United States and China are two of the largest issuers of sustainability bonds globally, and the financial sector leads in the issue of sustainability bonds. The empirical analysis compares the stock performance of issuers of sustainability bonds to the stock performance of issuers of traditional bonds. Thus, the paper compares issuing bonds which finance social or environmental activities to issuing bonds that finance activities that are not categorised as social or environmental.

First, we analyse the performance of sustainability bonds relative to traditional bonds by examining the short-term market reaction to the announcement. Over the short term, we find a positive market reaction to the announcement of sustainability bonds. The positive market reaction to sustainability bond issuance signals the firm's commitment to green and social causes. This would appeal immensely to responsible investors who integrate ESG criteria into their investments. Thus, investors will respond more positively when firms announce their sustainability bond issues than when they announce traditional ones whose proceeds do not have a specific purpose.

Next, we analyse the post-announcement performance of sustainable bonds versus traditional bonds; once again, the results show that sustainability bonds have superior performance relative to traditional bonds. We also find that seasoned issuers of sustainability bonds experience a more positive reaction.

Following on from the finding that indicates the superior performance of sustainability bonds relative to traditional bonds as indicated above, we next analyse how ESG scores of firms can positively and significantly impact corporate performance through the lens of sustainability bond issuances. Since the proceeds of sustainability bonds are explicitly earmarked for environmental and social purposes, issuing corporate sustainability bonds would signify these firms' environmental and social commitment. Corporate sustainability bond issuances will enhance these firms' environmental and social criteria, thus improving ESG scores and positively affecting corporate performance. Indeed, we find that ESG scores are the primary drivers of firm performance, and the impact is stronger for firms that issue sustainability bonds. This finding corroborates that of Huang et al. (2021), Dixon-Fowler et al. (2012) and Hoobler et al. (2018), who show that ESG concerns are primary drivers of firm performance.

Our findings have several valuable implications. First, the results can inform fund and asset managers and the investment community who seek responsible investments that offer higher risk-adjusted returns with greater diversification benefits. The findings can also provide insights into firms on the importance of disclosure of their environmental and societal responsibilities, which contributes to improving their reputation and performance. Finally, the study outcomes highlight to policymakers the significance of improving transparency and consistency of information provided by firms, enabling investors to understand firms' responsibilities better.

Future research that falls outside the scope of this study can examine the differences in the yield of sustainability and traditional bonds. The results will indicate if the premium ('sustium') exists for sustainability versus traditional bonds. The proceeds for sustainability bonds are primarily used for environmental and social objectives; however, there are currently data limitations on the specific purpose for which the proceeds are earmarked. The scope for future study in this area can be to analyse the purpose for which the proceeds are raised and if the purpose of the bond can impact firm performance.

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REFERENCES

Agliardi, E., & Agliardi, R. (2019). Financing environmentally sustainability projects with green bonds. *Environment and Development Economics*, *24*, 608–623.

AlAhbabi, R. & Nobanee, H. (2020). Sustainability bonds: A mini-review. Available at SSRN 3540119.

Aouadi, A., & Marsat, S. (2018). Do ESG controversies matter for firm value? Evidence from international data. *Journal of Business Ethics*, *151*(4), 1027–1047.

Bachelet, M. J., Becchetti, L., & Manfredonia, S. (2019). The green bonds premium puzzle: The role of issuer characteristics and third-party verification. *Sustainability*, *11*(4), 1098.

Baker, M., Bergstresser, D., Serafeim, G., & Wurgler, J. (2022). The pricing and ownership of US green bonds. *Annual Review of Financial Economics*, *14*, 415–437. https://doi.org/10.1146/annurev-financial-111620-014802

Baker, M., & Wurgler, J. (2012). Comovement and predictability relationships between bonds and the cross-section of stocks. *The Review of Asset Pricing Studies*, *2*(1), 57–87.

Balboa, C. (2016). Accountability of environmental impact bonds: The future of global environmental governance? *Global Environmental Politics*, *16*, 33–41. https://doi.org/10.1162/GLEP_a_00352

Banker, R. D., Ma, X., Pomare, C., & Zhang, Y. (2023). When doing good for society is good for shareholders: Importance of alignment between strategy and CSR performance. *Review of Accounting Studies*, *28*(2), 1074–1106.

Barber, B. M., & Lyon, J. D. (1997). Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics*, *43*(3), 341–372.

Barber, B. M., Morse, A., & Yasuda, A. (2021). Impact investing. *Journal of Financial Economics*, *139*, 162–185. https://doi.org/10.1016/j.jfineco.2020.07.008

Barber, B. M., & Odean, T. (2008). All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. *The Review of Financial Studies*, *21*(2), 785–818.

Barclay, M. J., & Litzenberger, R. H. (1988). Announcement effects of new equity issues and the use of intraday price data. *Journal of Financial Economics*, *21*(1), 71–99.

Berkman, H., & Truong, C. (2009). Event day 0? After-hours earnings announcements. *Journal of Accounting Research*, *47*(1), 71–103.

Bhagat, S., & Bolton, B. (2008). Corporate governance and firm performance. *Journal of Corporate Finance*, *14*, 257–273.

Brown, S. J., & Warner, J. B. (1980). Measuring security price performance. *Journal of Financial Economics*, *8*, 205–258.

Brown, S. J., & Warner, J. B. (1985). Using daily returns: The case of event studies. *Journal of Financial Economics*, *14*, 3–31.

Busch, T., & Friede, G. (2018). The robustness of the corporate social and financial performance relation: A second-order meta-analysis. *Corporate Social Responsibility and Environmental Management*, *25*, 583–608.

Campbell, J. Y., Lo, A. W., & MacKinlay, C. (1997). *The econometrics of financial markets* (pp. 149–178). Princeton University Press.

Capelle-Blancard, G., & Laguna, M. A. (2010). How does the stock market respond to chemical disasters? *Journal of Environmental Economics and Management*, *59*(2), 192–205.

Capelle-Blancard, G., & Monjon, S. (2014). The performance of socially responsible funds: Does the screening process matter? *European Financial Management Journal*, *20*(3), 494–520.

Capelle-Blancard, G., & Petit, A. (2019). Every little helps? ESG news and stock market reaction. *Journal of Business Ethics*, *157*(2), 543–565.

Caramichael J. & Rapp A. (2022). The green corporate bond issuance premium. International Finance Discussion Papers 1346. Washington: Board of Governors of the Federal Reserve system. https://doi.org/10.17016/IFDP.2022.1346

Chava, S. (2014). Environmental externalities and cost of capital. *Management Science*, *60*(9), 2223–2247.

Chin, S. K., & Abdullah, N. A. (2013). Announcements effect of corporate bond issuance and its determinants. *Contemporary Economics*, *7*(1), 5–18.

Cicchiello, A. F., Marrazza, F., & Perdichizzi, S. (2023). Non-financial disclosure regulation and environmental, social, and governance (ESG) performance: The case of EU and US firms. *Corporate Social Responsibility and Environmental Management*, *30*(3), 1121–1128.

Col, B., & Errunza, V. (2015). Corporate governance and state expropriation risk. *Journal of Corporate Finance*, *33*, 71–84.

Cornell, B. (2020). ESG investing: Conceptual issues. *The Journal of Wealth Management*, *23*, 61–69.

Cunha, F. A. F. D. S., Meira, E., & Orsato, R. J. (2021). Sustainability finance and investment: Review and research agenda. *Business Strategy and the Environment*, *30*(8), 3821–3838.

DellaVigna, S., & Pollet, J. M. (2009). Investor inattention and Friday earnings announcements. *Journal of Finance*, *64*(2), 709–749.

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

Dixon-Fowler, H. R., Slater, D. J., Johnson, J. L., Ellstrand, A. E., & Romi, A. M. (2012). Beyond 'does it pay to be green?' A meta-analysis of moderators of the CEP–CFP relationship. *Journal of Business Ethics*, *112*, 353–366.

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, *60*, 2381–2617. https://doi.org/10.1287/mnsc.2014.1984

Eckbo, B. (1985). Valuation effects of corporate debt offerings. *Journal of Financial Economics*, *15*, 119–151. https://doi.org/10.1016/0304-405X(86)90052-8

Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics*, *101*, 621–640. https://doi.org/10.1016/j.jfineco.2011.03.021

Edmans, A. (2012). The link between job satisfaction and firm value, with implications for corporate social responsibility. *Academy of Management Perspectives*, *26*, 1–19. https://doi.org/10.5465/amp.2012.0046

Edmans, A., & Kacperczyk, M. (2022). Sustainable finance. *Review of Finance*, *26*(6), 1309–1313. https://doi.org/10.1093/rof/rfac069

El Ghoul, S., Guedhami, O., Kwok, C. C., & Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital? *Journal of Banking & Finance*, *35*(9), 2388–2406. https://doi.org/10.1016/j.jbankfin.2011.02.007

Erhardt, N. L., Werbel, J. D., & Shrader, C. B. (2003). Board of director diversity and firm financial performance. *Corporate Governance: an International Review*, *11*, 102–111. https://doi.org/10.1111/1467-8683.00011

EU. (2020). Europe 2020. https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf

EU Press Release. (2023). Corporate sustainability reporting. https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en#:~:text=EU%20law%20requires%20all%20large,on%20people%20and%20the%20environment

Fama, E. F., & French, K. (1992). The cross-section of expected stock returns. *Journal of Finance*, *47*(2), 427–466.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3–56.

Ferreira, M. A., & Matos, P. (2008). The colors of investors' money: The role of institutional investors around the world. *Journal of Financial Economics*, *88*, 499–533.

Flammer, C. (2013). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management journal*, *56*(3), 758-781.

Flammer, C. (2015). Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Management Science*, *61*(11), 2549–2568.

Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*, *142*, 499–516.

Flammer, C., Hong, B., & Minor, D. (2019). Corporate governance and the rise of integrating corporate social responsibility criteria in executive compensation: Effectiveness and implications for firm outcomes. *Strategic Management Journal*, *40*, 1097–1122.

Fombrun, C., & Shanley, M. (1990). What's in a name? Reputation building and corporate strategy. *Academy of Management Journal*, *33*, 233–258. https://doi.org/10.2307/256324

Friedman, M. (1970). The social responsibility of business is to increase its profits. *The New York Times Magazine*, *32*(13), 122–126.

Fulton M., Kahn B., & Sharples C. (2012). Sustainability investing: Establishing long-term value and performance https://doi.org/10.2139/ssrn.2222740

Geels, F. W. (2014). Regime resistance against low-carbon transitions: Introducing politics and power into the multi-level perspective. *Theory, Culture and Society*, *31*, 21–40.

Giráldez, J., & Fontana, S. (2022). Sustainability-linked bonds: The next frontier in sovereign financing. *Capital Markets Law Journal*, *17*(1), 8–19.

Goss, A., & Roberts, G. S. (2011). The impact of corporate social responsibility on the cost of bank loans. *Journal of Banking & Finance*, *35*, 1794–1810.

Green Industry Guiding Catalogue for China. (2020) China's new green catalogue. https://www.sbfnetwork.org/wp-content/assets/policy-library/481_China_Chinas-new-green-catalogue.pdf

Guenster, N., Derwall, J., Bauer, R., & Koedijk, K. (2011). The economic value of corporate eco-efficiency. *European Financial Management*, *17*(4), 679–704.

Gutterman, A. S. (2021). *Sustainability finance and impact investing*. Business Expert Press.

Hachenberg, B., & Schiereck, D. (2018). Are green bonds priced differently from conventional bonds? *Journal of Asset Management*, *19*, 371–383. https://doi.org/10.1057/s41260-018-0088-5

Hoffman, A.J. (2018). The next phase of business sustainability. https://ssir.org/articles/entry/the_next_phase_of_business_sustainability

Hong, H., Karolyi, A. G., & Scheinkman, J. A. (2020). Climate finance. *The Review of Financial Studies*, *33*, 1011–1023. https://doi.org/10.1093/rfs/hhz146

Hoobler, J. M., Masterson, C. R., Nkomo, S. M., & Michel, E. J. (2018). The business case for women leaders: Meta-analysis, research critique, and path forward. *Journal of Management*, *44*, 2473–2499.

Hou, M., Liu, H., Fan, P., & Wei, Z. (2015). Does CSR practice pay off in east Asian firms? A meta-analytic investigation. *Asia Pacific Journal of Management*, *33*, 195–228.

Huang, W., Karolyi, G.A. and Kwan, A. (2021). Paying attention to ESG matters: Evidence from big data analytics. Working paper.

Ibbotson, R. G., & Siegel, L. B. (1984). Real estate returns: A comparison with other investments. *Real Estate Economics*, *12*, 219–242.

ICMA. (2020). Sustainability bonds guidelines. https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/Sustainability-Bonds-Guidelines-June-2018-270520.pdf

ICMA. (2021). Green and social bond principles and sustainability bond guidelines. https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Sustainability-Bond-Guidelines-June-2021-140621.pdf

ICMA (2022a). Guidance Handbook. ICMA Paris. https://www.icmagroup.org/assets/GreenSocialSustainabilityDb/The-GBP-Guidance-Handbook-January-2022.pdf

ICMA (2022b). Mapping to the sustainable development goals. https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/mapping-to-the-sustainable-development-goals/

International Monetary Fund. (2020). Opening remarks at the Petersberg climate dialogue XI, by Kristalina Georgieva. https://www.imf.org/en/News/Articles/2020/04/29/sp042920-md-opening-remarks-at-petersberg-event

Juddoo, K., Malki, I., Mathew, S., & Sivaprasad, S. (2023). An impact investment strategy. *Review of Quantitative Finance and Accounting*, *61*(1), 177–211.

Kandel, S., & Stambaugh, R. F. (1996). On the predictability of stock returns: An asset-allocation perspective. *Journal of Finance*, *51*, 385–424.

Kerste, M. (2011). *Financing sustainability: Insights for investors, corporate executives, and policymakers*. VU Uitgeverij.

Khan, M., Serafeim, G., & Yoon, A. (2016). Corporate sustainability: First evidence on materiality (November 9, 2016). *The Accounting Review*, *91*(6), 1697–1724.

Kiessling, T., Isaksson, L., & Yasar, B. (2016). Market orientation and CSR: Performance implications. *Journal of Business Ethics*, *137*, 269–284.

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

Kothari, S. P., & Warner, F. B. (2006). Econometrics of event studies. In *Handbook of corporate finance: Empirical corporate finance* (Vol. A). Handbooks in Finance Series. Elsevier/North-Holland).

Krueger, P., Sautner, Z., & Starks, L. T. (2020). The importance of climate risks for institutional investors. *The Review of Financial Studies*, *33*, 1067–1111. https://doi.org/10.1093/rfs/hhz137

Krüger, P. (2015). Corporate goodness and shareholder wealth. *Journal of Financial Economics*, *115*(2), 304–329.

Larcker, D. F., & Watts, E. M. (2020). Where's the greenium. *Journal of Accounting and Economics*, *69*, 101312.

Lee, C. M. C., Qu, Y., & Shen, T. (2019). Going public in China: Reverse mergers versus IPOs. *Journal of Corporate Finance*, *58*, 92–111.

Madhavan, A., & Sobczyk, A. (2020). On the factor implications of sustainability investing in fixed-income active funds. *The Journal of Portfolio Management Ethical Investing*, *46*, 141–152.

Maltais, A. & Nykvist, B. (2020). Understanding the role of green bonds in advancing sustainability. *Journal of sustainable finance & investment*. https://doi.org/10.1080/20430795.2020.1724864

Martel, M. C. V., & Padron, Y. G. (2006). Debt and information content: Evidence in the Spanish stock market. *International Research Journal of Finance and Economics*, *4*, 202–208.

Matsumura, E. M., Prakash, R., & Vera-Munoz, S. C. (2014). Firm-value effects of carbon emissions and carbon disclosures. *The Accounting Review*, *89*(2), 695–724.

Mocanu, M., Constantin, L. G., & Cernat-Gruici, B. (2021). Sustainability bonds. An international event study. *Journal of Business Economics and Management*, *22*(6), 1551–1576.

Nayar, N. N., & Stock, D. (2008). Make-whole call provisions: A case of "much ado about nothing". *Journal of Corporate Finance*, *14*(4), 387–404.

Ng, C. K., Smith, J. K., & Smith, R. L. (1999). Evidence on the determinants of credit terms used in interfirm trade. *Journal of Finance*, *54*, 1109–1129.

Nucera, F. (2017). Unemployment fluctuations and the predictability of currency returns. *Journal of Banking and Finance*, *84*, 88–106.

OECD. (2011). Towards green growth. https://www.oecd.org/greengrowth/48012345.pdf

Oikonomou, I., Brooks, C., & Pavelin, S. (2014). The effects of corporate social performance on the cost of corporate debt and credit ratings. *The Financial Review*, *49*, 49–75.

Paetzold, F., Busch, T., Utz, S., & Kellers, A. (2022). Between impact and returns: Private investors and the sustainability development goals. *Business Strategy and the Environment*, *31*(7), 1–16.

Park, S. B. (2018). Multinationals and sustainability development: Does internationalization develop corporate sustainability of emerging market multinationals? *Business Strategy and the Environment*, *27*, 1514–1524.

Pesaran, M. H., & Timmermann, A. (1997). Predictability of stock returns: Robustness and economic significance. *Journal of Finance*, *50*, 1201–1228.

PwC Report. (2022). Asset and wealth management revolution 2022: Exponential expectations for ESG. https://www.pwc.com/gx/en/industries/financial-services/asset-management/publications/asset-and-wealth-management-revolution-2022.html

Reuters. (2021). Amazon raises $1 billion sustainability bond for climate, social causes. https://www.reuters.com/business/sustainable-business/amazon-raises-1-billion-sustainable-bond-climate-social-causes-2021-05-10/

Ross, S. A. (1977). The determination of financial structure: The incentive-signalling approach. *The Bell Journal of Economics*, *8*, 23–40.

SBF Luxembourg. (2020). Luxembourg – First European country to launch a sustainability bond framework. https://gouvernement.lu/en/actualites/toutes_actualites/communiques/2020/09-septembre/02-cadre-obligations-durables.html

Schoenmaker, D., & Schramade, W. (2019). *Principles of sustainable finance*. Oxford University Press.

Secinaro, S., Brescia, V., Calandra, D., & Saiti, B. (2020). Impact of climate change mitigation policies on corporate financial performance: Evidence-based on European publicly listed firms. *Corporate Social Responsibility and Environmental Management*, *27*, 2491–2501.

Serafeim, G., & Yoon, A. (2022). Which corporate ESG news does the market react to? *Financial Analysts Journal*, *78*(1), 59–78.

Serafeim, G., & Yoon, A. (2023). Stock price reactions to ESG news: The role of ESG ratings and disagreement. *Review of Accounting Studies*, *28*, 1500-1530.

Shiller, R. J. (2013). Reflections on finance and the good society. *American Economic Review*, *103*(3), 402–405.

Shynkevich, A. (2016). Predictability in bond returns using technical trading rules. *Journal of Banking and Finance*, *70*, 55–69.

Starbucks. (2016). Starbucks issues the first U.S. corporate sustainability bond. https://stories.starbucks.com/press/2016/starbucks-issues-the-first-u-s-corporate-sustainability-bond/

Starks, L. T., Venkat, P., & Zhu, Q. (2018). Corporate ESG profiles and investor horizons https://doi.org/10.2139/ssrn.3049943

Tang, D. Y., & Zhang, Y. (2020). Do shareholders benefit from green bonds? *Journal of Corporate Finance*, *61*, 101427. https://doi.org/10.1016/j.jcorpfin.2018.12.001

TCFD. (2023) Task force on climate related financial disclosures. https://www.fsb-tcfd.org/

UK Parliament. (2021). Global net zero commitments. https://commonslibrary.parliament.uk/global-net-zero-commitments/

UNCTAD. (2022) United Nations conference on trade and development: Trade and development report 2022. https://unctad.org/tdr2022

UNDP. (2022). Building a common framework of sustainable finance taxonomies in Latin America and the Caribbean. https://www.undp.org/latin-america/press-releases/building-common-framework-sustainable-finance-taxonomies-latin-america-and-caribbean

UNEP. (2019). About green economy. https://www.unep.org/explore-topics/green-economy/about-green-economy

Welch, K., & Yoon, A. (2022). Do high-ability managers choose ESG projects that create shareholder value? Evidence from employee opinions. *Review of Accounting Studies*, *28*(4), 2448–2475.

Whitehouse, L. (2006). Corporate social responsibility: Views from the frontline. *Journal of Business Ethics*, *63*, 279–296.

Yu, Y., Wang, D. W., Li, S., & Shi, Q. (2016). Assessment of U.S. firm-level climate change performance and strategy. *Energy Policy*, *92*, 432–443.

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APPENDIX A

DEFINITIONS OF VARIABLES

Variables	Definitions
Sustainability bonds	Sustainability bonds are bonds where the proceeds will be exclusively applied to financing or re-financing a combination of green and social projects such as climate change action, gender diversity and the impact of firms on communities (ICMA)
Traditional bonds	Debt that is raised for business purposes and not earmarked for environmental and social purposes
Single issuances	Firms that issue sustainability bonds only once in the sample during the study period
Multiple issuances	Firms that issue sustainability bonds more than once in the sample during the study period
Event	To analyse the market reaction to a corporate event, this study classifies sustainability bond issuance announcements as an event. This is because sustainability bond issuances signals, to the market, the intent of the firm to raise debt for environmental and social causes
CARs	CAR represents the cumulative abnormal returns. Abnormal returns are cumulated from the beginning of the sample period to the subsequent period to determine CAR
BHARs	Buy and hold abnormal returns represent a measure of firm performance in the long run
DZERO	DZERO is a dummy variable for a country that has legal net-zero commitments
DOPINION	DOPINION is a dummy variable that represents second-party opinion
Bond characteristics	
Coupon rate	Rate of interest paid by bond issuers on the bond's face value
Amount	Value of the bonds issued by the firm
Maturity	The period during which its owner will receive interest payments on the investment
Bond credit rating	The rating of the bond, which measures the creditworthiness of the bond
Firm characteristics	
ESG	ESG score is an overall company score based on the self-reported information in the environmental, social and corporate governance pillars
Leverage	Ratio of total debt to market value of assets
Firm size	Share price multiplied by number of shares outstanding
Return on equity (ROE)	Ratio of operating income before depreciation to the book value of equity
Market to book (MB)	Ratio of the market price to the book value
Risk	Market risk measure is the beta coefficient (β), which is estimated over a 5-year period in a rolling window, using monthly data
Total assets	Book value of total assets (in US dollars)
Credit rating	Credit rating of the firm, which measures the credit worthiness of the issuer
Corporate governance characteristics	
Board Independence (BIND)	Percentage of non-executive directors on the board
Gender diversity (GENDER)	Percentage of female directors on the board
Institutional ownership	Represents 5% or more shares held by block shareholders