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DO INVESTORS GET AN ADVANTAGE FROM CORPORATE GREEN BOND ISSUANCE? A CROSS-COUNTRY STUDY

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Abstract: This study examines the stock's response to corporate green bond issuance announcements. Analyzing a dataset of 230 global corporate green bond issuers from 38 countries between 2013 and 2022 through an event study, the findings reveal a positive market reaction, especially within the non-financial corporate sector. Green bonds in this sector are primarily used to fund their own eco-friendly projects, signaling a commitment to environmental sustainability, and generating investor confidence. Variation in market reactions across countries is noted, with developed countries exhibiting a significantly more positive response. This suggests that environmental initiatives hold greater value in these regions, highlighting the alignment between sustainable practices and investor sentiment. These results emphasize the potential advantages of integrating green bonds and their environmental commitments into investment strategies, particularly for portfolio diversification and attracting investors seeking sustainable opportunities.

Keywords: Green bonds; Signaling theory; Investor attention; Event study.

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1. Introduction

Climate change, stemming from global warming, is a major critical problem facing humanity in the twenty-first century. Moreover, it has financial consequences for the business world. There is currently an increasing awareness of the financial hazards caused by global climate change (Network for Greening the Financial System, 2019). Previous work describes the three primary categories of climate-associated financial risks: physical risks, liability risks, and transitional risks (Campiglio et al., 2022). Physical risks involve potential disruptions caused by weather and climate-related events, such as storms and floods, which can adversely impact trade (CFRF, 2021). Liability risks emerge when parties incur damages or losses due to climate change (Barker et al., 2021). Lastly, transitional risks refer to the risks that arise while transitioning to a green economy. For instance, the value of financial assets tied to fossil fuels may decline as individuals and organizations shift away from these energy sources, leading to substantial losses for investors who hold such assets (CFRF, 2021).

The costs associated with these risks can vary between organizations. For example, 250 out of the world's 500 largest companies could face a $1 trillion loss due to climate change within five years (Forbes). The world economy has been seriously impacted by climate change as well, with a projected decrease of $23 trillion by 2050 due to rising global temperature (Swiss Reinstitute, 2021). Moreover, climate change may induce major disasters, affecting the stock market. Researchers discover the negative effects of natural disasters on volatility and returns. (Nguyen & Chaiechi, 2021; Tavor & Teitler-Regev, 2019). Similarly, environmental disasters also appear to have a negative impact on stock market returns (Seetharam, 2015).

For successfully managing and benefiting from financial hazards caused by climate change, including physical, liability, and transitional risks, financial expertise are essential. To lessen the climate related detrimental effects, it is crucial to take large-scale and rapid actions to reduce carbon emissions, fossil fuel consumption, and other environmentally damaging factors. Governments and environmental scientists aim to achieve a green economy, which promotes economic development, social justice and the well-being of people while abating climate and environmental risks (United Nations Environment Programme).

Policymakers are becoming more concentrated on establishing a green economy by offering environmentally conscious instruments (e.g., green bonds) in the financial markets. Green bonds (GB) are seen as a notable approach to funding green projects, allowing environmentally dedicated organizations to raise funds through financial instruments that support sustainable initiatives (Park, 2018). Green bonds have

emerged as a novel debt instrument for funding projects that contribute to the implementation of a green economy (Banga, 2019). According to the most recent research, green bonds are beneficial as an instrument in combating climate change because their issuance reduces carbon emissions (Fatica & Panzica, 2021).

The "Climate Awareness Bond" released by the "European Investment Bank (EIB)" in 2007 indicated the beginning of green bonds' growth in regards to issuance and geographical coverage (Climate Bonds Initiative, 2023). From 2008 through May 2023, green bonds totaling USD 2.334 trillion were issued. Figure 1 shows the green bonds' issuance, showing a continuous increase from 2014 to 2021, with a decline observed in 2022 due to challenging macroeconomic conditions affecting international bond issuance (Climate Bonds Initiative, 2023).

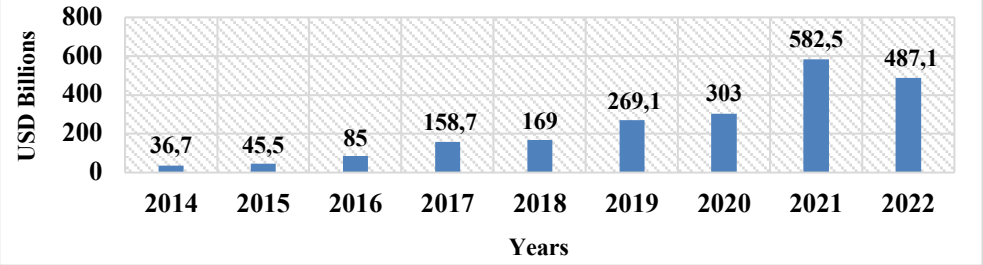

Figure 1 Total green bonds issuance volume
Source: Climate Bonds Initiative

The rapid growth of green bonds demonstrates how capital markets are utilizing private capital to address climate change and promote a resilient economy (MacAskill et al., 2021). The trend towards environment-friendly investment by bond issuers and ethical investors is evident in the flourishing global green bond market.

Green bonds, like conventional bonds, are debt instruments; however, the proceeds from their sale generate funds for projects that safeguard the environment and lessen the damaging effect of financial activities on the environment. Mihálovits & Tapaszti (2018) emphasize that green bonds fund projects directly or indirectly supporting environmental preservation. They aid in preserving natural resources, reducing environmental change, and minimizing environmental pollution (Broadstock & Cheng, 2019). Green bonds differ from conventional bonds in their purpose, aiming to increase investment in environmentally beneficial projects that provide long-term social and environmental benefits beyond mere profit targets. For instance, Manate et al., (2023) observed the growing demand for green buildings to remove the carbon factor from the building industry and found that the ease of selling and low additional cost is shown to be more significant considerations in the decision to establish a

green project as people become more familiar with the ideas of green buildings. Figure 2 illustrates the allocation of green bond proceeds.

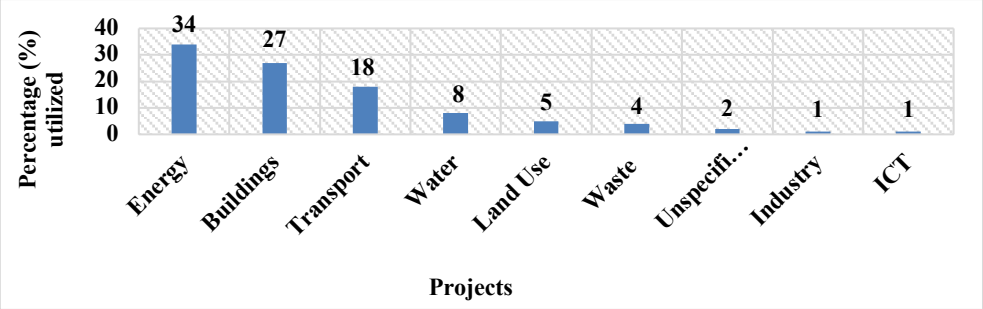

Figure 2 Use of green bonds proceeds
Source: Climate Bonds Initiative

Green finance makes substantial progress towards sustainable financing, as demonstrated by the invention of green bonds. Green bonds have emerged as a novel segment in global financial markets, attracting increasing interest from market participants. Streimikiene et al. (2023) observed that nations with greater sustainable financial practices showed superior performance regarding sustainable development goals. The green bond is one of the most creative and well-known innovations in sustainable finance during the past decade. The explosive growth of green bonds has been the focus of a growing corpus of research on green and energy finance (Flammer, 2020; Zhang, 2020).

When the first green bond was issued in 2007, the Climate Bonds Initiative was the only organization capable of certifying bonds as "climate-aligned," working to mobilize financial markets for climate change solutions. Since then, green bond issuance has increased, but predominantly from only supranational bodies, development banks, and agencies.

The initial iteration of the Green Bond Principles (GBP) was issued by the "International Capital Market Association (ICMA)" in 2014., which helped to establish a common definition of a "green asset or project" eligible for financing through green bonds. The GBP also outlined communication requirements for issuers concerning choosing and evaluating green initiatives, administration of income generated throughout the bond lifecycle, and reporting on green projects' distribution of earnings. Since the adoption of these standards, green bonds have gained recognition as a respected financing option for environmentally beneficial projects. This is particularly significant as businesses increasingly prioritize environmental factors in response to the realities of accelerated climate change.

Therefore, there is a need for in-depth research into green bond financing, particularly in the corporate setting.

Corporate green bonds, specifically, have gained prominence in corporate finance. These bonds allocate their earnings to fund green initiatives for example resource conservation, renewable energy, and green buildings. Examples include Unilever's £250 million green bond issued in 2014 to reduce waste, water usage, and greenhouse gas emissions, Apple's $1 billion green bond in 2017 to support renewable energy and energy-efficient practices, and Toyota's use of green bond earnings to finance car loans for hybrid and electric vehicles. By leveraging green bond earnings, companies can enhance efficiency, reduce costs, and minimize their impact on the climate. The popularity of corporate green bonds has surged, with a significant increase in issuance since 2013. In 2021, the corporate sector alone issued corporate green bonds worth $287.5 billion. Figure 3 provides an overview of corporate green bond issuance over the years.

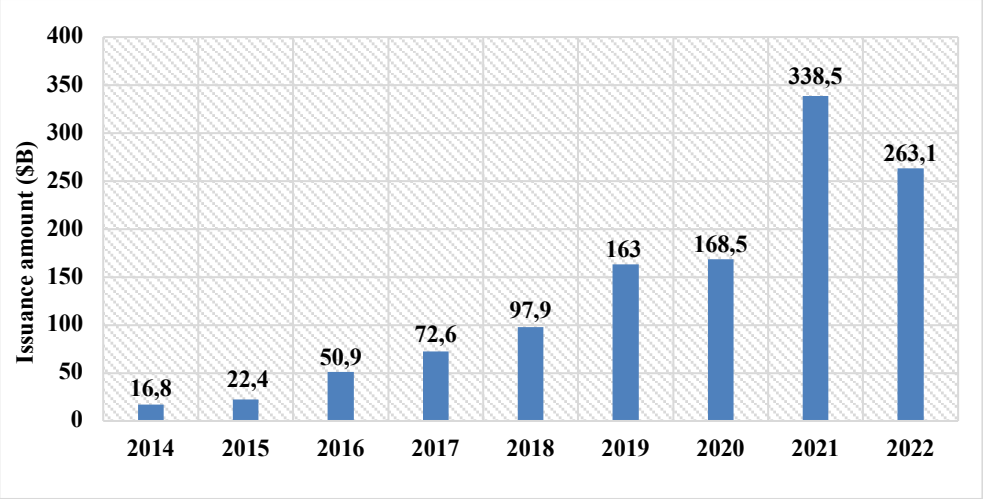

Figure 3 Corporate green bonds issuance volume
Source: Climate Bonds Initiative

Figure 4 visualizes the breakdown of corporate green bond issuance into the financial and corporate sectors.

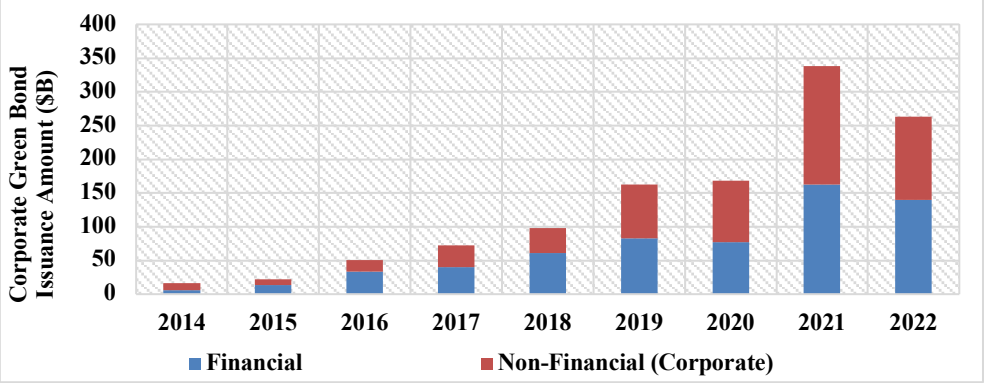

Figure 4 Sector-wise breakdown of corporate green bonds issuance
Source: Climate Bonds Initiative

Although corporate green bonds are being used more and more frequently in practice, little is known about this new financial innovation. Instinctively, it may seem contradictory for businesses to decide to issue green bonds rather than traditional bonds given that the funds from these bonds must be used for green initiatives, which limits the investment strategies of businesses. Additionally, for a bond to be declared a "certified" green bond, corporations must also go through independent verification to show that the revenues are going to environmental initiatives, which boosts administrative and regulatory costs. Considering the restrictive feature of green bonds, it would seem like a preferable option to release conventional bonds and then use these earnings to support green initiatives if those initiatives are determined to be more financially viable than others.

What justifies the corporate green bonds' issuance and what are the results? The signaling notion justifies the offer of corporate green bonds, which says that through corporate green bond issuance, firms send a signal to the market about their dedication to the natural environment. This signal seems to be reliable due to subsequent reasons. First, green bonds might be a trustworthy sign of a company's commitment to environmental preservation. Perhaps this signal may be useful because investors rarely have adequate awareness of an organization's green commitment. (Lyon & Montgomery, 2015; Lyon & Maxwell, 2011). Secondly, the green bonds are certified by an impartial third party to ensure that the amount from the corporate green bonds' issuance is consumed to fund environment-friendly initiatives mentioned in the green bond catalog. The certification process can be time-consuming and expensive for first-time issuers; determining whether selling green bonds benefits the current shareholders is essential. This question would benefit greatly by understanding the growth of the green bond market and how it affects investments.

Issuing corporate green bonds has the potential to increase corporate worth and have a beneficial impact on the stock exchange. (Flammer, 2021; Tang & Zhang, 2020; Wang et al., 2020; Baulkaran, 2019; Mohd Roslen et al., 2017). An improved environmental rating also contributes to the overall performance of organizations (Flammer, 2020). Previous studies in the literature have shown that firms can reduce their debt costs through green bond announcements, as investors are enthusiastic about environmentally focused investments (Tang & Zhang, 2020; Flammer, 2020). However, it is important to consider the investor's perspective, as green bonds primarily attract funds from investors with ESG criteria. For instance, in 2013, 60 percent of Electricite de France's (EDF) green bonds were issued to those investors who believe in ESG standards. The increase of wealth is not the primary ruling approach for investment in organizations among these investors. Therefore, if green bond issuers adopt a new financing approach, a negative or neutral impact on the market can be expected, with a potentially negative response to the green bonds' issuance (Wu et al., 2022). However, it is worth noting that the reaction is not the same for all countries (Lebelle et al., 2020).

Several studies have examined the potential drawbacks of green bonds, such as the problem of greenwashing and the provision of misleading information regarding environmental prosperity (Bazillier & Vauday, 2013). Nonetheless, green bonds remain attractive as a modest financial instrument to fund environmentally responsive projects. This is driven by the growing concerns of firms regarding environmental issues due to climate change.

Recently, several enterprises have turned to green bonds as a funding source, benefiting both their operations and shareholders. Their issuance has been found to boost stock prices, thus benefiting investors (Flammer, 2021; Maltais & Nykvist, 2020; Tang & Zhang, 2020; Baulkaran, 2019). However, empirical evidence regarding the stock market reaction is minimal and mixed. Some studies have shown a decline in stock prices after the green bonds' issuance announcements, but the market response varies across countries, with different reactions observed in developed and developing markets (Lebelle et al., 2020; Wu et al., 2022). Hence, this calls for further research to comprehensively understand the diverse responses of stocks to green bond announcements. Conducting a cross-country analysis is essential to examine the varying reactions of stocks to corporate green bonds' issuance announcements, and whether doing so creates an advantage for investors.

To examine these objectives, this study used a comprehensive dataset of global corporate green bond issuers. After applying event study methodology, analysis of different categories of the sample was conducted, based on the country and different sectors, across shorter and longer event windows. The results of this study contribute a wide range of new ideas to the literature. First off, it increases the amount of knowledge regarding the market for green bonds (Wu et al., 2022; Flammer, 2021;

Verma & Bansal, 2021; Wang et al., 2020; Tang & Zhang, 2020; Lebelle et al., 2020; Baulkaran, 2019). It expands on this body of information by examining how investor wealth changes across nations after the issuing of green bonds. This research also adds knowledge on impact investing (as discussed in Geczy et al., 2021; Barber et al., 2021). In contrast to conventional fund flow, socially responsible investing (SRI) fund flow exhibits higher rates of growth and more consistency (Białkowski & Starks, 2016). A relatively new class of securities known as "impact investing" aims to produce "social and environmental impact along with financial return". This study looks at corporate green bonds across the country, a relatively new impact investment tool. Furthermore, this study contributes by creating a comprehensive corporate green bond dataset using the "Climate Bonds Initiative (CBI)" and the "International Capital Market Association (ICMA)". This is the first time (to the author's knowledge) that both databases are employed in similar analyses of corporate green bond issuers.

Focusing on corporate green bonds, this study brings interesting contributions for various stakeholders. It offers advantages for existing shareholders in terms of resource allocation and portfolio construction (Tang & Zhang, 2020). Kelly et al. (2015) proposed that investors can 50 percent protect themselves from climate change risk through strategic portfolio construction. From the management perspective, this study can assist corporate financing strategies. Additionally, it highlights the potential for governments to revise their policies to encourage low-carbon and environmentally friendly practices among businesses. For instance, Lyu and Liu, (2023) observed that governments' micro-level environmental regulations can contribute to achieving the broader goal of a low-carbon business society.

2. Literature review

Green bonds are often seen as a breakthrough for institutional investors seeking to increase their investments in sustainable development (Merk et al., 2012). To date, there is no regulation regarding the greenness of a bond and what makes a bond green can be decided from the "use of proceeds from green bonds" clause of green bonds principles (GBPs). Financial players have created and promoted these principles through "International Capital Market Associations". These principles identify various project types eligible for funding, including pollution reduction, conservation, renewable energy, water and waste management, energy and resource efficiency, and climate adaptation (ICMA, 2018).

Kila (2019) gives a full description and explanation of green bonds, pointing out how important they are to fund projects for fighting against climate change. Green bonds resemble conventional bonds in terms of interest payments and principal amount payments at maturity, but the key distinction lies in their utilization of capital for environmentally friendly and sustainable projects (Flammer, 2020). The initiatives

are accredited by an independent third party, reassuring investors while decreasing the possibility of greenwashing.

Green bonds represent a novel approach to sustainable finance. It has sparked diverse responses within the investor community, and their effectiveness in addressing climate change remains a topic of debate. Most research on green bonds has been conducted by private organizations, but academic research on green bonds is still in its infancy. The availability of data and increased collaboration between academia and industry have led to a surge in research publications on these novel financial instruments in the last three years. Existing literature on green bonds has covered different aspects, therefore a particular focus of this paper is to assess how the stock market reacts to the issuance of green bonds. To acquire a deeper comprehension of investor response, an in-depth examination of the present literature must be undertaken.

Theoretical background on stock market response can be effectively explained using signaling theory. Signaling theory is applied to situations where there is an information asymmetry between two parties, such as organizations and investors. Usually, the sender, the one party, must select whether and in what way to convey (or signal) that information, and the receiver, the other party, must select in what way to interpret the signal. Companies have more knowledge about their abilities than investors do, and this information asymmetry makes it costly for investors to identify organizations with desirable features (Edward & Williamson, 1985; Akerlo, 1970). To minimize this information asymmetry, companies can provide a "signal" that effectively conveys their favorable attributes. According to the signaling theory, a signal is reliable if it is difficult for organizations with fewer desirable features to replicate it (Riley, 1979; Spence, 1973).

Signaling theory can be used to explain why corporate green bonds are issued. Investors often lack the necessary knowledge to assess a company's environmental commitment (Lyon & Montgomery, 2015; Lyon & Maxwell, 2011). From the investors' perspective, it becomes important to differentiate between companies that are genuinely dedicated to the environment and those that are not. By releasing green bonds, companies can show that they care about the environment, and this is a safe sign for several reasons. First, issuing green bonds involves significant financial commitments to environmentally friendly projects. Secondly, green bonds are usually evaluated by third parties to make sure the money goes to the projects listed in the bond prospectus that is good for the environment. In conclusion, a company's decision to sell "green bonds" can be taken as a reliable sign that it cares about protecting the environment. Anecdotal evidence supports the signaling function of corporate green bonds, with examples like Unilever's CFO stating that the company's £250 million green bond offering is "another step intended to demonstrate to the financial community the centrality of sustainability to the group's business model."

This signaling concept has testable implications. Previous studies have highlighted that stock markets positively react to firms' involvement regarding the preservation of the environment. Numerous research investigations revealed that companies' environmentally friendly action result in positive abnormal returns. (Krüger, 2014; Flammer, 2013). Likewise, Flammer (2015) discovers positive reactions to the adoption of environmental policies. Therefore, one would anticipate a positive response from the stock to the corporate green bond issuance, because it communicates a trustworthy commitment of the company towards the environment. Several literatures have focused on the potential financial advantage that shareholders could experience from holding green bonds. For instance, a researcher has explored the behavior of the stock market against green bond issuance announcements on 72 organizations globally. A significant rise in cumulative abnormal return (CAR) was seen by using an event study (event window of -10 to +10 days), indicating that investors responded positively to the announcements (Baulkaran, 2019).

Another study was conducted by Tang & Zhang (2020). Using the conventional event study technique on a sample comprising 132 issuers globally, it is evidenced that the green bonds' offering had a positive influence on equity prices. A stronger response was found with the first-time issuer, compared to the repeated issuance. A strong response was also seen from the corporate issuer of green bonds as opposed to the financial issuer. Similar research to explore the relationship between green bonds' offerings and firms' performance of 70 Chinese listed enterprises discovered a positive influence of green bonds' offerings on firm equity prices (Zhou & Cui, 2019).

Mohd Roslen et al. (2017) looked at how investors reacted to the news that green bonds had been issued. The event study revealed that investors responded positively on the day following the green bond announcements. Another similar study was conducted in Europe to evaluate the effect of green bond offerings on the stock market. It was shown that returns on shares increased after the announcements of green bond issuance (Laborda & Sánchez-Guerra, 2021).

Flammer (2021) discovered that green bond offerings have been welcomed by investors through positive stock market reactions It was also demonstrated that this response was more significant for companies issuing green bonds for the first time as well as for bonds that were third-party certified. Interestingly, it was found that the environmental performance of companies improved after issuing green bonds, where CO2 emission is reduced, higher environmental ranking, and increase in ownership of green investors. Wang et al. (2020) carried out research in China to inspect the debt and stock market reactions to the issuing of green bonds. This was the first study that attempted to document the debt and stock market reaction simultaneously. It is found that the offering of green bond has been welcomed by

investors through positive stock market reactions in both the debt and equity markets. Additionally, a price premium for corporate green bonds over traditional bonds was established, where the price premium was more pronounced for new issuers of green bonds. The price premium was similarly higher for institutional long-term investors that hold less ownership concentration.

Similar research of event study on 20 Indian listed companies was conducted, with a 21-day [-10 and +10 days] event window. It was observed that stock value has increased after the green bond issuance, which reflects investors' positive attitudes toward the issuance of green bonds (Verma & Bansal, 2021). Pedersen and Thun (2019) explored the influence of the issuance of green bonds on European stock markets from 2013-2019. A sample of 54 companies from Europe was selected and evidenced a cumulative average abnormal return (CAAR) of 0.13% in a two-day event window surrounding the event day, indicating positive behavior of stock returns in response to green bond issuance.

Glavas (2019) observed investors' reactions before and after the Paris Agreement regarding the green bonds offering. The study sample consisted of 780 announcements from 18 countries between 2013 and 2018. The study showed that investors respond positively to green bond announcements in general. Additionally, the entire sample was split into two time periods: before and after the Paris Agreement. More positive stock market reactions significantly increased after the Paris Agreement, signifying investors' trust in environmental commitment.

Nevertheless, variations in the reaction of stock markets to the issue of green bonds were discovered across different regions in Europe. It was discovered that northern Europe experienced a higher stock market return with a CAAR of 0.67%, whereas no significant returns were seen for the rest of the continent. Similarly, Lebelle et al. (2020) investigation of green bond issuances of 145 unique firms globally has found a negative reaction to the stock. Compared to developing countries, the reaction of developed countries to the first-time issuer was overwhelmingly negative. In this case, investors might view green bonds in the same light as convertible or traditional bonds.

Additionally, Wu et al. (2022) performed research to evaluate the effect of green bond issuance and so concluded that it has reduced the stock value of the issuer. The decrease in stock returns after the green bond issuance reflects a negative investor response to green bond issuance.

The overall body of literature is inconclusive about the possible reaction to green bonds' issuance announcements. The basic interpretation draws attention to the fact that there is no consensus among academics about this response, both from a financial and a non-financial point of view. Despite the evidence of negative investor reaction to green bonds issuance by Lebelle et al. (2020) and Wu et al., (2022), most of the studies evidenced that green bond issuance increased firm equity values

(Flammer, 2021; Verma & Bansal, 2021; Wang et al., 2020; Tang & Zhang, 2020; Baulkaran, 2019; Glavas, 2019). The positive response appears in conflict with the evidence from the conventional (non-green) bond market, which shows that green bond offering causes a decrease in the firm's share price (Hemmingson & Ydenius, 2017; Ammann et al., 2011; Dann & Mikkelson, 1984). As the majority of research in the literature demonstrates a positive response, therefore exposing this positive reaction is necessary. The rationale for the positive response lies in the fact that the offering of corporate green bonds can serve as a credible indication of the company's commitment to environmental sustainability. The firm's demonstrable commitment to environmental sustainability serves as a reliable indicator, resulting in a positive response in the stock market (Flammer, 2021; Castro et al., 2021). Consequently, one would anticipate that the stock market will respond positively to the issuance of corporate green bonds. Therefore, in the light of above debate following hypothesis is proposed:

H1: Investors respond positively to the announcements of corporate green bonds' issuance.

Furthermore, the above literature also highlights that investor response may vary across countries or regions. For example, a negative reaction was prominent for the first-time issuer of green bonds in developed markets as compared to developing market (Lebelle et al., 2020). Moreover, differences in the stock's response to the issuance of green bonds were found in regional differences in Europe. It was discovered that northern Europe experienced a higher stock market return with a CAAR of 0.67%, whereas no significant returns were seen for the rest of the continent (Pedersen & Thun, 2019). Therefore, for a better understanding of the investor reaction to green bond issuance across the countries, deeper investigation is required. Hence, this debate postulates the second hypothesis of the study:

H2: Investors' response to the announcements of corporate green bonds' issuance differs across the countries.

3. Data and methodology

Most market players have created their own dataset of green bonds. For example, institutional shareholders possess their own dataset on green bonds. Correspondingly, because of its leading position in the primary bond market, large commercial banks that participate as underwriters in the issuance of green bonds typically possess their own list of green bonds. These organizations are regarded as forerunners in gathering and using green bond data.

In recent years, there has been a proliferation of other organizations engaged in similar data collection efforts. There are various recognized sources of green bond data, which vary from each other in terms of accessibility, geographic scope, and the kinds of information offered. The Climate Bonds Initiative (CBI), Bloomberg, and

the International Capital Market Association (ICMA) are widely recognized as the leading green bond databases.

3.1 Corporate green bond data

There isn't a single, consolidated database regarding green bonds, and the many data sources used today are very different from one another. The primary objective of this paper is to compile a thorough list of globally issued green bonds, spanning from the inception of the market, to provide a true picture of the market's current standing. Here are the many actions we took to accomplish this goal.

Focusing only on corporate green bonds, a comprehensive corporate green bond data set is constructed by using the ICMA and CBI. Among all existing data sources, CBI, ICMA, and Bloomberg labeled green bonds are the most organized green bond data sources having similar selection criteria, including selection of projects, use of green bond proceeds, verification of eligibility, and reporting. ICMA and CBI databases are selected due to the following reasons: CBI has large coverage on green bonds. CBI is the only database that covers the first climate awareness bond released in 2007 by the European Investment Bank (EIB), among others. Whereas the ICMA database contains the issuers who have complied with the recommendations of the green bond principles by either publicly disclosing their external review reports or by completing the pertinent templates or forms. ICMA database is more user-friendly and fast-tracking. Users may comprehensively view the entire list by the issuer, nation, jurisdiction, and external review provider, which is helpful for a cross-country study.

The period covered by this study is from June 2013 to December 2022. The first green bond was released in 2007, but there were no corporate green bonds until 2013. In 2013, 16 corporate green bonds were issued by different companies (Flammer, 2021; Tang & Zhang, 2020). CBI defines the corporate green bond as a financial instrument issued by corporations to fund initiatives that have favorable climate advantages.

In the past few years, green bonds from companies have become more popular. Table 1 shows how company green bonds have changed over time. It demonstrates the recent expansion of the corporate green bond market over the years. The amount that was issued increased dramatically from $5 billion in 2013 to $734.1billion in 2021.

Table 1 Corporate green bonds issuance

Year	Corporate green bonds issuance value ($B)
2013	5
2014	16.8
2015	22.4

2016	50.9
2017	72.6
2018	97.9
2019	163
2020	168.5
2021	338.5
2022	263.1
Total	**1193.7**

Source: Climate Bonds Initiative (CBI)

Table 2 describes the breakdown of corporate green bonds into financial and non-financial sectors over time (corresponding data are displayed in Figure 3).

Table 2 Sector-wise corporate green bond issuance.

Year	Financial Corporation	Non-financial Corporations
2013	1.4	3.6
2014	6	10.8
2015	13.8	8.6
2016	33.3	17.6
2017	39.7	32.9
2018	61.4	36.5
2019	82.5	80.5
2020	77.2	91.3
2021	162.3	176.2
2022	139.9	123.2
Total	**616.1**	**577.6**

Source: Climate Bonds Initiative (CBI)

As of 31st December 2022, this study obtained a total of 872 corporate green bond issuers. These green bond issuers have publicly disclosed their external review report in accordance with green bond principles. Some screening requirements applied. This study has excluded those corporate issuers who are not listed in the stock market and added only public listed stock. If not, it is determined whether the bond issuer's parent company is publicly traded. The stock is included in the sample if the green bond is offered in a similar country as the public stock. If not, the country where the company is located uses its principal stock market. As this study sample includes the international green bond market, so there is a need to use data from different international stock markets.

Out of 872 corporate green bond issuers, 256 publicly listed green bond issuers are considered after the screening. This study further excluded those firms having a

market capitalization of less than $5 million due to the penny stock or small firm effect. Firms with missing relevant information are also removed from the sample. The final sample comprised 230 green bond issuers, and all were corporations. This paper considered only issuers' first-time issuance of green bonds and ignored the subsequent issuance because all previous studies have conclusively evidenced that stock markets do not react to subsequent issuance (Flammer, 2021; Tang & Zhang, 2020; Lebelle et al., 2020). So, for this study each green bond issuer has only one issuance in the sample. The collected green bond data for this study covers bond ID, entity, bond type, domicile of the issuer, jurisdiction, external review report, amount issued, currency, issue date and maturity date.

Table 3 provides the breakdown of the sample across countries. Green bonds are particularly widespread in China, Europe (France, Germany and Sweden have the higher number of issuers), and the United States of America.

Table 3 Study sample across countries

Country	Full Sample	Non-Corporate Issuer	Corporate Issuer	Public Issuer (Corporate/non-corporate)	Final sample of a public issuer
Supranational	19	NA	NA	NA	NA
Argentina	1	1	0	0	0
Australia	8	1	7	5	5
Austria	6	0	6	4	4
Belgium	19	1	18	6	6
Benin	1	1	0	0	0
Brazil	9	0	9	3	3
Canada	25	8	17	11	9
Chile	2	1	1	1	1
China	136	0	136	27	22
Hong Kong	1	0	1	0	0
Colombia	6	0	6	2	2
Czech Republic	2	0	2	0	0
Denmark	8	1	7	3	3
Egypt	1	1	0	0	0
Estonia	1	0	1	0	0
Fiji	1	1	0	0	0
Finland	11	1	10	6	6
France	87	8	79	23	20
Georgia	1	0	1	0	0
Germany	62	4	58	15	12
Greece	2	0	2	2	2

Guernsey	1	0	1	0	0
Honduras	1	0	1	0	0
Hong Kong	9	1	8	8	8
Hungary	5	1	4	1	1
Iceland	6	1	5	0	0
India	7	0	7	7	7
Indonesia	3	1	2	0	0
Ireland	3	1	2	0	0
Israel	2	1	1	0	0
Italy	22	1	21	9	9
Japan	47	0	47	21	17
Kazakhstan	1	0	1	0	0
Korea	6	0	6	3	3
Latvia	2	0	2	0	0
Lithuania	2	1	1	1	1
Luxembourg	5	0	5	0	0
Malaysia	3	0	3	0	0
Mexico	6	0	6	0	0
New Zealand	1	1	0	0	0
Nigeria	3	1	2	1	1
Norway	20	1	19	7	7
Pakistan	1	1	0	0	0
Peru	1	0	1	0	0
Philippines	5	0	5	5	5
Poland	5	1	4	2	2
Portugal	4	0	4	1	1
Romania	1	0	1	0	0
Saudi Arabia	1	0	1	1	1
Serbia	1	1	0	0	0
Singapore	4	0	4	3	3
Slovakia	1	0	1	0	0
Slovenia	1	0	1	0	0
South Africa	4	1	3	2	2
Spain	21	0	20	8	8
Sweden	68	2	66	18	16
Switzerland	17	1	16	6	6
Taiwan	1	0	1	1	1
Thailand	4	0	4	2	2
Netherland	26	1	25	3	3
Turkey	2	0	2	2	2
UAE	3	0	3	1	1
UK	20	1	19	9	9

USA	117	23	94	26	19
Total	**872**	**73**	**799**	**256**	**230**

Source: International Capital Market Association (ICMA) and Climate Bonds Initiative (CBI)

3.2 Event selection of corporate green bonds

This study needs the date when the corporate green bond issue was announced to figure out how the stock market reacted to the news, as it highlights the day on which the market received the new information (Flammer, 2021). For this study, the green bond issuance announcement date is gathered from the green bond database (CBI/ICMA) or any reliable news report for example official press release. For corporate green bonds whose issuance announcement date is not available on the database, a search from the companies' official website, media release, newspaper and press conferences were conducted. Tang & Zhang (2020) also used the same event selection method in their research.

Security Data: This study needs the daily stock price information of corporations' issued green bonds which is collected from Datastream. For this, each company that is added to the sample must have: (1) daily stock price data before and after the event day for the event day and estimation window, (2) available returns to compute the expected returns during the estimation window, and (3) available returns to compute the cumulative abnormal return during the event window. In addition to companies' stock price information, this study also gathered the stock market index data for pertinent countries from the same database.

3.3 Data Analysis Technique

This part talks about the methods needed to reach the study's goal, which is to study how stocks react to news of green bonds being issued in different countries. This study uses the event study method to figure out how the stock reacted to the news of the green bond issue. The news of green bond issuing is the event that is chosen. There were days before and after the event day that made up the event window. The estimation window is the time used to figure out what the expected return will be, and the post-event window is the period that comes after the event window. This paper used different event windows for a deep investigation of investors' responses to green bond issuance. For example, [-10+10] is one of the event windows used in this paper which describes the 10 days before and 10 days after the event day. Similarly, following are the other event windows: [-2+5], [-2+10], [-1+1], [0+1], [-2+20], [-2+40], [-5+10], [-10+20] [-10+40] used in this paper. The summary of the event study analysis can be shown in Figure 5.

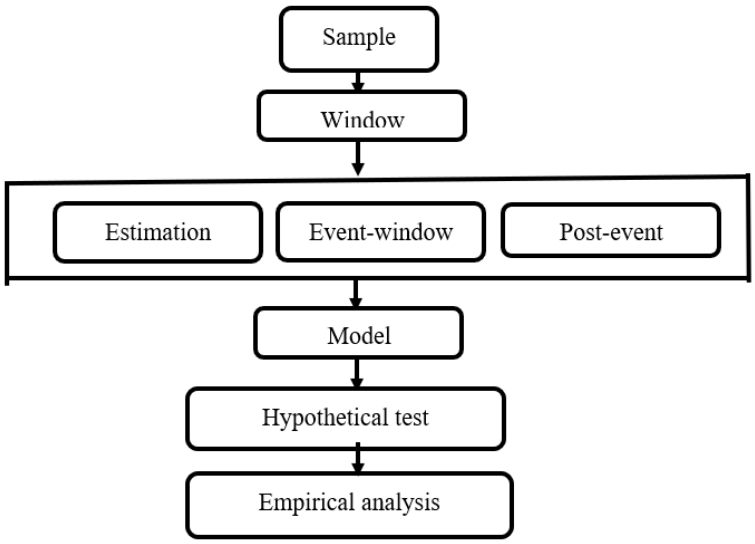

Figure 5 Event-study analysis steps
Source: Authors' processing

This method captures the reaction through the measurement of abnormal returns which is generally the difference between the actual and expected returns. The estimation of the abnormal returns (AR) will be based on MacKinlay, (1997).

$$AR_{it} = R_{it} - E(R_{it})$$

Where

R_{it} = Actual returns of security i at time t

$E(R_{it})$ = Expected returns of security i at time t

The expected returns are estimated based on Sharpe's (1964) market model:

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

Where:

α_i = intercept

β_i = beta, or slope of security i and market

R_{mt} = actual returns of the market at time t

ε_{it} = error term

The market model is measured using OLS based on 272 days (working days in a year) of the estimation window. Following the calculation of abnormal returns (AR), cumulative abnormal returns (CAR) are estimated for each company. The ARs will be summed up over the event window as CAR for each firm.

4. Results and discussion

Table 4 highlights the event study findings for various event windows. This table shows the investor response to the announcements of green bond issuance for the following event windows: 08 days [-2+5],13 days [-2+10], 03 days [-1+1], 02 days [0+1], 23 days [-2+20], 43 days [-2+40], 16 days [-5+10], 21 days [-10+10], 31 days [-10+20] and 51 days [-10+40]. The results reveal that cumulative average abnormal returns (CAAR) of the 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows are significantly positive at a 5% level. These positive and significant CAARs indicate that investors attain an abnormal return that is 7.30%, 13.59%, 14.36% and 15.69% higher than the expected return for 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows respectively. This positive and significant result designates that stocks respond positively to the announcements of green bonds issuance, indicating that investors are taking advantage of green bonds issuance. The CAAR of the other event windows are not significant, but still positive.

Table 4 Green Bond issuance announcement and stock market reaction

Event Time	CAAR	T-statistics	No. of Events
[-2+5]	0.0730***	2.065755	230
[-2+10]	0.1359***	2.301769	230
[-1+1]	0.0200	0.636174	230
[0+1]	0.0159	0.538982	230
[-2+20]	0.2115	1.53537	230
[-2+40]	0.3630	1.460589	230
[-5+10]	0.1436***	2.39013	230
[-10+10]	0.1569***	2.460176	230

Source: Authors' processing using event study methodology

Figure 6 illustrates the cumulative average abnormal return (CAAR) around the announcements of the green bonds' issuance.

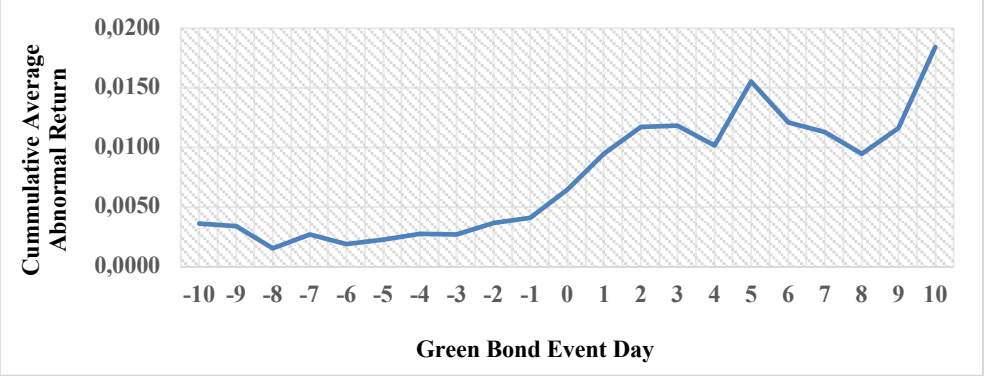

Figure 6 CAAR for the entire sample
Source: Authors' processing

Additionally, this paper analyzed by differentiating the business sectors of green bond issuers to answer which green bond issuers stand a better chance of being rewarded by the stock market. There are two different reasons. First, there are differences in the processes used by the two main categories of green bond issuers. As part of their core competencies, corporations offer green bonds for funding directly to their green projects. Financial institutions, however, offer green bonds either to offer environment friendly loans to their clients or make investments in green initiatives of other companies. Second, businesses involved in renewable energy may be more susceptible to environmental challenges and get more advantages from them compared to financial institutions.

Table 5 demonstrates how the reaction of stock to announcements of green bonds issuance differs for issuers belonging to the corporate sector or financial sector. Particularly, this study emphasized on the CAAR calculated for the 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows across industries. The result showed that CAAR for the corporate sector issuers of green bonds are significant at a 5% significance level around 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows, whereas, for financial sector issuers, the CAAR are insignificant for all event windows except 08 days [-2+5] event window. So, the CAAR around 08 days [-2+5] event windows are generally significant both in the corporate sector and financial sector issuers of the green bond, however the CAAR are higher in the corporate sector with 8.2914% as compared to 7.79% in the financial sector. Nonetheless, this difference is quite small.

Table 5 Sector-wise stock market reaction.

Corporate Sector			
Event Time	**CAAR**	**T-statistics**	**Observations**
[-2+5]	0.082914***	2.006405	154
[-2+10]	0.145459***	2.294821	154
[-5+10]	0.148503***	2.362712	154
[-10+10]	0.150607***	2.328708	154
Financial Sector			
Event Time	**CAAR**	**T-statistics**	**Observations**
[-2+5]	0.0779***	2.1577	76
[-2+10]	0.1444	1.6796	76
[-5+10]	0.1659	-0.08687	76
[-10+10]	0.2126	-0.09141	76

Source: Authors' processing using event study methodology

Sectoral-wise, corporate sector (non-financial corporations) that offer green bonds for direct funding to their own green initiatives gain more as compared to financial corporations that offer green bonds either to provide environmentally friendly loans to their clients or make investment in green projects of other companies. Therefore, corporate investors benefited more from green bonds' issuance than investors in the financial sector.

Further, Figure 7 illustrates the stock response (CAAR) for the Corporate and Financial sector.

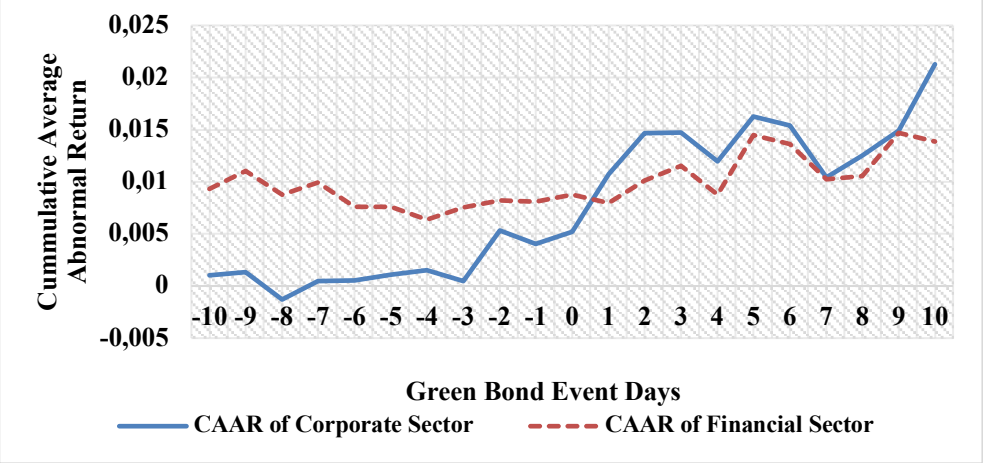

Figure 7 CAAR for Corporate and Financial Sector
Source: Authors' processing

Additionally, this paper also investigates the green bond issuer's domicile whether it plays a role in providing benefit to the investors regarding announcements of corporate green bond issuance. The reason for the investigation is the nature of financial markets and other country-level factors can influence the stock during the release of news (Farooq et al., 2022). In other words, investor's response to green bond issuance may vary across the countries. For instance, Lebelle et al. (2020) observed that negative reactions to green bonds issuance announcement was prominent in developed markets as compared to developing markets. On the other hand, Pedersen & Thun (2019) observed that Northern Europe experienced significantly higher stock market returns around announcements of green bond issuance whereas no significant returns were seen for the rest of the European region (Pedersen & Thun, 2019). Due to this inconsistency, it is eminent to inspect the comparative effect of announcements of corporate green bonds issuance on panel of developed and developing countries, as well as on each country independently.

Table 6 demonstrates how stock's reaction to the announcements of corporate green bonds issuance differs for issuers from different countries. Particularly, this study emphasized on the CAAR calculated for the 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows for a panel of developed and developing countries as well on each country independently. The result showed that CAAR for green bond issuers from developed countries are positive and significant at a 5% significance level around 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows, whereas, for green bond issuers belong to developing countries, the CAAR are insignificant for all event windows. This evidence implies that stock investors are more interested in developed country's green bond issuers than those of developing countries. One of the reasons for these significant positive CAAR may be due to more rational investors. As the markets of developed countries are less volatile, and investors react more rationally compared to markets of developing countries. On the other hand, one of the possible reasons for the insignificant behavior of most of the stocks of developing countries might be due to the high volatility risk of these markets. As this risk generates the possibility of negative returns, therefore these negative returns can combine with the effects of positive abnormal returns to produce insignificant outcomes.

Thus, it is might possible for developed nations that investors see green bond issuance rationally and appraise its positive consequences. Hence, it can be established that investors in developed countries get more benefit from the green bond issuance.

Table 6 Stock reaction for developed and developing countries.

Developed Countries			
Event Time	**CAAR**	**T-statistics**	**Observations**
[-2+5]	0.076271***	2.0037	171
[-2+10]	0.140331***	2.142521	171
[-5+10]	0.145606***	2.222957	171
[-10+10]	0.155975***	2.279893	171
Developing Countries			
Event Time	**CAAR**	**T-statistics**	**Observations**
[-2+5]	0.054384975	0.634179	59
[-2+10]	0.110921922	0.985957	59
[-5+10]	0.132536568	1.119537	59
[-10+10]	0.162029187	1.264389	59

Source: Authors' processing

Figure 8 illustrates the stock response (CAAR) for a panel of developed and developing countries.

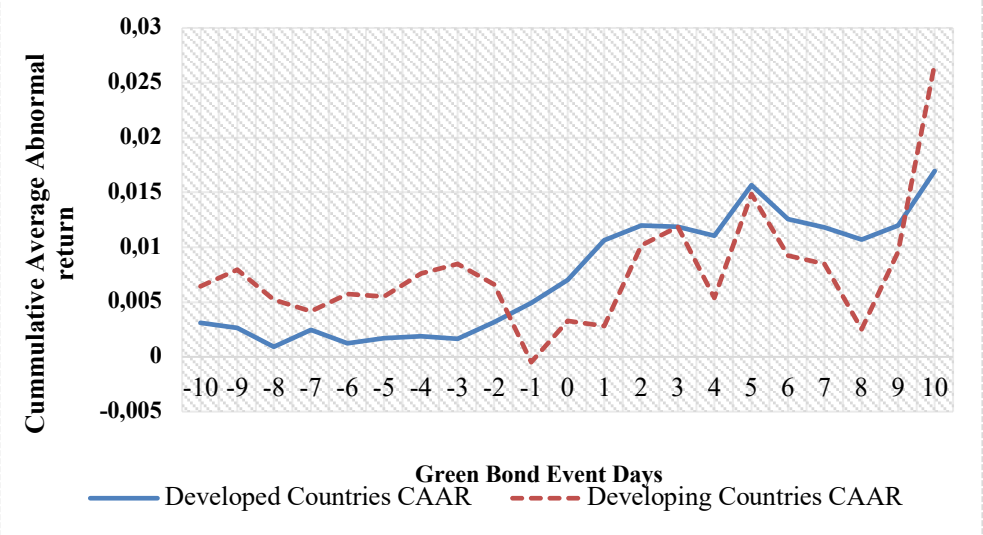

Figure 8 CAAR for Developed and Developing Countries' Firms
Source: Authors' processing

Table 7 emphasizes on the CAAR calculated for 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows for each country independently. The CAAR for each country are calculated by taking the mean of CAR of all companies operating in that country. The results in Table 7 revealed that all

developed countries except Greece, Spain and United Arab Emirates have positive and significant CAAR for several event windows, which shows that stock respond positively to the announcements of green bonds issuance, signifying the advantage the investors are getting from this issuance. However, the magnitude of the CAAR is different for each country. Belgium, Canada, Chile, Denmark, Finland, Italy, Lithuania, the Netherlands, Sweden, and Switzerland have significant positive CAAR over 08 days [-2+5], 13 days [-2+10], 16 days [-5+10] and 21 days [-10+10] event windows. Spain has negative and significant CAAR on similar event windows. Australia, Hungry, Poland, Saudi Arabia and Singapore have positive and significant CAAR over 08 days [-2+5] and 13 days [-2+10] event windows. Austria, the United States of America, and the United Kingdom have positive and significant CAAR for all event windows.

The rest of the country shows partially significant CAAR. France has positive and significant CAAR returns over 13 days [-2+10] and 21 days [-10+10] event windows. Germany and Portugal have significant positive CAAR over 08 days [-2+5] event window whereas the United Arab Emirates has significant negative CAAR for the same event window. Hong Kong has positive and significant CAAR for 13 days [-2+10] and 16 days [-5+10] event window. Japan has significant positive CAAR for 16 days [-5+10] and 21 days [-10+10] event windows. Norway has significant positive CAAR for 08 days [-2+05] and 21 days [-10+10] event windows. Taiwan has a significant positive CAAR for the 08 days [-2+05] event window. Out of all developed countries, only Greece has insignificant CAAR over all analyzed event windows. Overall, across-country analysis finds that the stock of most developed countries react significantly positively to green bond issuance and investors are gaining advantage of green bond's issuance in these countries.

Table 7 reports that most developing countries have insignificant CAAR for all analyzed event windows, such as Brazil, Colombia, Philippines, South Africa, South Korea, and Thailand have insignificant CAAR for all event windows which indicates that the stock does not respond well to announcements of green bonds issuance in these countries. However, in a few developing countries like China, India, and Türkiye, have significant CAAR but the magnitudes of these returns are different from each other and lower than the developed countries' returns. China and India have significant positive CAAR over 08 days event window [-2+5], 13 days event window [-2+10] and 16 days event window [-5+10] while Türkiye has positive significant CAAR over 08 days [-2+5] and 13 days [-2+10] event windows. Thus, it can be concluded that stocks from most developing countries do not react positively to announcements of green bonds issuance except for a few countries. This behavior might be due to the high volatility risk of these markets. This risk generates the possibility of negative returns; therefore, these negative returns mix with the effects of positive abnormal returns to produce unclear and insignificant outcomes. Further,

the stock responses (CAAR) for each country separately are presented in the Appendix.

Table 7 Stock market reaction to announcements of green bond issuance across countries.

Country	Status	CAAR [-2+5]	CAAR [-2+10]	CAAR [-5+10]	CAAR [-10+10]
Australia	Developed	0.2072***	0.3217**	0.4015	0.5378***
Austria	Developed	0.016268***	0.130255***	0.11289***	0.149089
Belgium	Developed	0.130041***	0.269218***	0.244311***	0.215268***
Canada	Developed	0.01906***	0.162921***	0.148916***	0.174816***
Chile	Developed	0.175659***	0.279621***	0.185358***	0.160197***
Denmark	Developed	0.264976***	0.420557***	0.471348***	0.731687***
Finland	Developed	0.248887***	0.471979***	0.497387***	0.515211***
France	Developed	0.093857	0.153574***	0.173024	0.213863***
Germany	Developed	0.033941**	0.061337	0.065174	0.070913
Greece	Developed	-0.10914	-0.2284	-0.20366	-0.12976
Hungry	Developed	0.112819**	0.105493***	0.187873	0.202231
Hong Kong	Developed	-0.13002	-0.20536***	-0.23499***	-0.28884
Italy	Developed	0.042604***	0.088178***	0.086631***	0.094845***
Japan	Developed	0.075779	0.146737	0.159531***	0.158281***
Lithuania	Developed	0.043565***	0.106054***	0.112353***	0.101861***
Netherland	Developed	0.235918***	0.386813***	0.48566***	0.559715***
Norway	Developed	0.180904***	0.288611	0.311587	0.348203***
Poland	Developed	0.488578***	0.92279***	0.97952	0.993131***
Portugal	Developed	0.032057***	0.063962	0.073064	-0.02072
Saudi Arabia	Developed	0.341488***	0.502632***	0.617929	0.673925
Singapore	Developed	0.119008***	0.165049***	0.089858	-0.00226
Spain	Developed	-0.22959***	-0.51347***	-0.51709***	-0.46425***
Sweden	Developed	0.110157***	0.184423***	0.18467***	0.174427***
Switzerland	Developed	0.025409***	0.132423***	0.093341***	0.045878***
Taiwan	Developed	0.138814	0.161663***	0.238288	0.298851
UAE	Developed	-0.40682***	-0.67175	-0.89129	-0.97968
UK	Developed	0.15223***	0.313374***	0.316246***	0.295239
USA	Developed	0.120141***	0.226125***	0.231305***	0.199713
Brazil	Developing	0.200187	0.166427	0.249397	0.428447
China	Developing	0.016982***	0.119856***	0.106513***	0.10356
Colombia	Developing	-0.04234	0.00593	0.077279	0.061505
India	Developing	0.093452***	0.220106***	0.296785***	0.324922
Nigeria	Developing	-0.18135	-0.35373***	-0.32304***	0.007294
Philippines	Developing	0.082239	0.101857	0.075224	0.12105

South Africa	Developing	0.097554	0.09	0.135524	0.136207
South Korea	Developing	-0.04135	-0.21521	-0.30585	-0.41337
Thailand	Developing	0.014883	0.009248	0.007965	0.02386
Turkiye	Developing	0.02165***	0.024299***	-0.05037	-0.17298

Source: Authors' processing using event study methodology

5. Conclusions and future research

By examining how stocks react to issuance announcements of corporate green bond globally, this study seeks to answer the question of whether investors benefit from the issue of corporate green bonds. This study's event analysis reveals that stocks generally react positively to news of corporate green bonds' issuance, demonstrating that investors benefit from it. Moreover, this paper finds that the stock shows a higher gain to the corporate sector (non-financial corporations) that offer green bonds for direct funding to their personal green initiatives as compared to financial corporations that issue green bonds either to provide environment-friendly loans to their clients or make investment in green projects of other companies. Overall, the findings of this paper are identical to signaling theory: By offering corporate green bonds, businesses communicate in the market about their devotion to the environment in a credible manner, and the stock positively responds to this action. The study's findings are consistent with earlier research showing that stock prices respond positively to news of the issue of corporate green bonds (Flammer, 2021; Tang & Zhang, 2020; Baulkaran, 2019). However, these results contradict a few previous research that shows negative responses to stock due to the perception of greenwashing (Wu, 2022; Lebelle et al., 2020). This paper negates the notion claiming green bonds serve as simply a greenwashing tool; if this were the case, investors must punish such practices through their negative market reaction.

Further, cross-country analysis displays a generally positive response of stock to the announcement of green bond issuance for developed countries' issuers, whereas insignificant stock reaction is observed generally for developing countries' green bond issuers. This result is confirmed through independent country analysis, where a similar reaction is observed. While most developed countries react significantly positively, a few countries like Hong Kong and Spain show negative stock reactions. On the other hand, stocks from developing countries (for example, Brazil, Colombia, Nigeria, Philippines, South Africa, South Korea, and Thailand) show an insignificant reaction to the announcements of corporate green bond issuance. A few countries, such as China, India, and Türkiye showed positive stock reactions, but the magnitude of their CAAR was lower than developed countries' CAAR. Overall, it may be concluded that stocks react more significantly positively to green bond issuance in

the developed countries and investors gain the advantage. This might be due to the presence of more rational investors and less market volatility. In contrast, high volatility might induce a mixed, hence, insignificant response as shown by the result in the developing countries.

Focusing on corporate green bonds, this study brings interesting contributions for various stakeholders. This study contributes to portfolio construction, where the issuance of green bonds is overall advantageous for firms' current investors in terms of their resource allocation, as suggested by Tang and Zhang (2020). Investors can also protect themselves from climate change risk through portfolio construction (Kelly et al., 2015). This study is also essential regarding management perspective for shaping their corporate financing strategies.

The paper suggests more research. The conclusions are based on somewhat limited data because corporate green bonds are a recent financial product. As further data becomes accessible, future research could provide a more thorough justification and a more accurate assessment of the long-term effects of corporate green bond issuance on the stock market. Second, stock responses to corporate green bond issuance differ from country to country, so further in-depth investigation may be conducted in the future to determine the reason for this difference. For example, this difference in stock reaction across the country might be due to the cultural values of the investors or any other specific country level factors. Therefore, an analysis of the impact of market conditions at the national level and investors' characteristics would make for a fascinating area of future research.

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Author Contributions

TR is responsible for the data analysis, interpretation, and drafting of the manuscript. The other authors have provided inputs for the manuscript's content and editing.

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The authors have not any competing financial, professional, or personal interests from other parties.

References

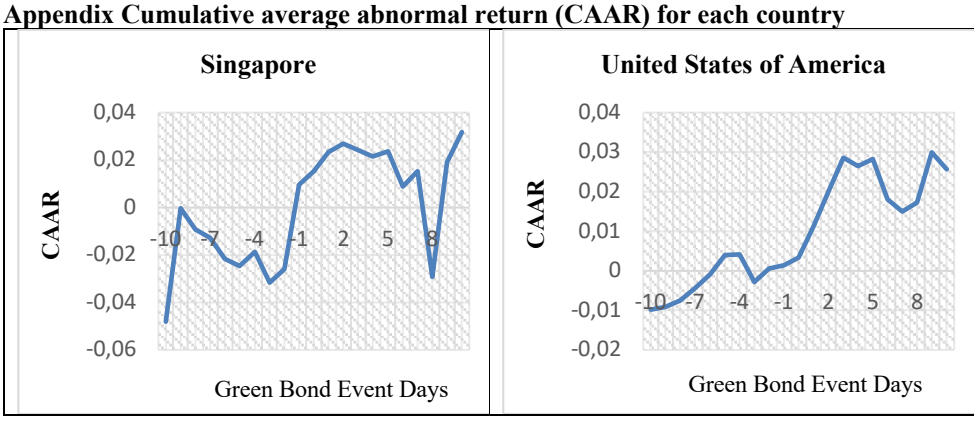
1. Ammann, M., Oesch, D., Schmid, M.M., (2011), Corporate governance and firm value: International evidence, Journal of Empirical Finance, 18(1), 36–55. https://doi.org/10.1016/j.jempfin.2010.10.003.
2. Banga, J., (2019), The green bond market: a potential source of climate finance for developing countries, Journal of Sustainable Finance and Investment, 9(1), 17–32. https://doi.org/10.1080/20430795.2018.1498617.
3. Barber, B. M., Morse, A., Yasuda, A., (2021), Impact investing, Journal of Financial Economics, 139(1), 162-185.
4. Barker, S., Dellios, J., Mulholland, E., (2021), Liability risk and adaptation finance, April, 55. https://www.unepfi.org/wordpress/wp-content/uploads/2021/04/UNEPFI-Climate-Change-Litigation-Report-Lowres.pdf.
5. Baulkaran, V., (2019), Stock market reaction to green bond issuance, Journal of Asset Management, 20(5), 331–340. https://doi.org/10.1057/s41260-018-00105-1.
6. Bazillier, R., Vauday, J., (2013), The Greenwashing Machine : is CSR more than Communication, HAL open science. https://hal.science/hal-00448861/.
7. Białkowski, J., Starks, L. T., (2016), SRI Funds: Investor Demand, Exogenous Shocks and ESG Profiles, University Canterbury Research Repository. http://hdl.handle.net/10092/12410, 11, 1–47.
8. Broadstock, D. C., Cheng, L.T.W., (2019), Time-varying relation between black and green bond price benchmarks: Macroeconomic determinants for the first decade, Finance Research Letters, 29, 17–22. https://doi.org/10.1016/j.frl.2019.02.006.
9. Campiglio, E., Daumas, L., Monnin, P., von Jagow, A., (2022), Climate-related risks in financial assets, Journal of Economic Surveys, 1–43. https://doi.org/10.1111/joes.12525.
10. Caroline Flammer, (2013), Corporate Social Responsibility and Shareholder Reaction : The Environmental Awareness of Investors, Academy of Management Journal, 56(3), 758–781.
11. CFRF, (2021), Climate Data and Metrics: Climate Financial Risk Forum Guide. https://www.fca.org.uk/publication/corporate/climate-financial-risk-forum-guide-2021-data-metrics.pdf.
12. Climate Bond Iniative, (2023), Green and other Labelled Bonds Held Market Share in 2022 Amidst Fall of Global Fixed-Income. https://www.climatebonds.net/resources/press-releases/2023/01/green-and-other-labelled-bonds-held-market-share-2022-amidst-fall.
13. Dann, L.Y., Mikkelson, W.H., (1984), Convertible debt issuance, capital structure change and financing-related information. Some new evidence, Journal of Financial Economics, 13(2), 157–186. https://doi.org/10.1016/0304-405X(84)90022-9.
14. Edward, Williamson, (1985), The Economic Institutions of Capitalism. The Free Press New York. https://doi.org/10.2307/258544.
15. Farooq, U., Nasir, A., Bilal, Bashir, M.F., (2022), The COVID-19 pandemic and stock market performance of transportation and travel services firms: a cross-country study, Economic Research-Ekonomska Istrazivanja, 0(0), 1–17. https://doi.org/10.1080/1331677X.2022.2053784.
16. Fatica, S., Panzica, R., (2021), Green bonds as a tool against climate change? Business Strategy and the Environment, 30(5), 2688–2701. https://doi.org/10.1002/bse.2771.

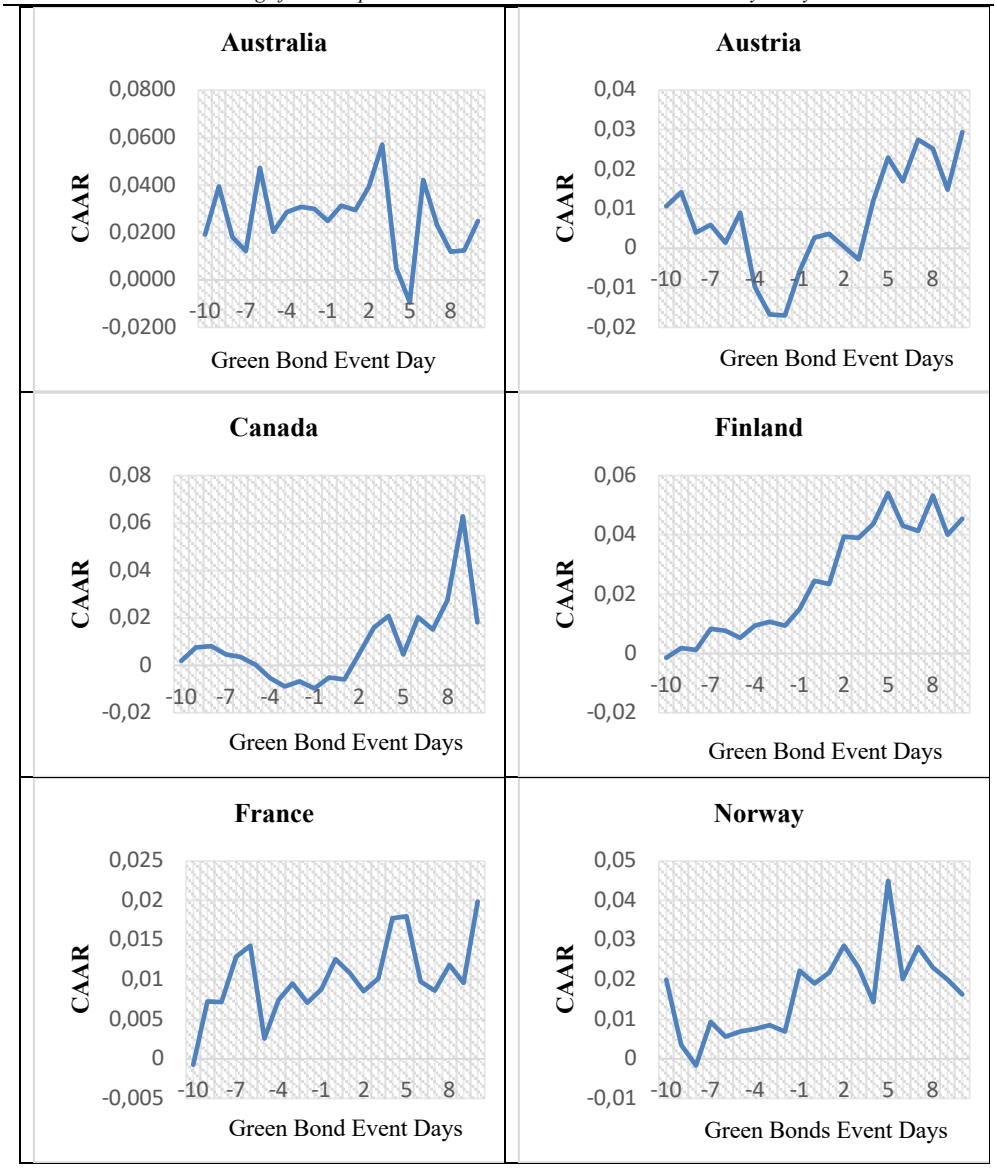
17. Flammer, C., (2020), Green bonds: effectiveness and implications for public policy, Environmental and Energy Policy and the Economy, 1(1), 95-128.
18. Flammer, C., (2021), Corporate green bonds, Journal of financial economics, 142(2), 499-516.
19. Flammer, C., (2015), Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach, Management science, 61(11), 2549-2568.
20. Geczy, C.C., Stambaugh, R.F., Levin, D., (2021), Investing in Socially Responsible Mutual Funds, Review of Asset Pricing Studies, 11(2), 309–351. https://doi.org/10.1093/rapstu/raab004.
21. George a. Akerlo., (1970), The market for "lemons": quality uncertainty and the market mechanism, The Quarterly Journal of Economics, 84(3), 488–500.
22. Glavas, D., (2019), How Do Stock Prices React to Green Bond Issuance Announcements? SSRN Electronic Journal, November. https://doi.org/10.2139/ssrn.3279069.
23. Hemmingson, C., Ydenius, R., (2017), The Convertible Bond Announcement Effect-An event study on the Nordic markets, Lund University School of Economics and Management.
24. Kila, K., (2019), Corporate participation in climate change mitigation in developing countries: 'Green capitalism' as a tool for sustainable development. Corporate Social Responsibility in Developing and Emerging Markets: Institutions, Actors and Sustainable Development, December 2017, 315–335. https://doi.org/10.1017/9781108579360.018.
25. Krüger, P., (2014), Author ' s Accepted Manuscript, Journal of Financial Economics. https://doi.org/10.1016/j.jfineco.2014.09.008.
26. Laborda, J., Sánchez-Guerra, Á., (2021), Green Bond Finance in Europe and the Stock Market Reaction, Estudios de Economia Aplicada, 39(3). https://doi.org/10.25115/eea.v39i3.4125.
27. Lebelle, M., Lajili Jarjir, S., Sassi, S., (2020), Corporate Green Bond Issuances: An International Evidence, Journal of Risk and Financial Management, 13(2), 25. https://doi.org/10.3390/jrfm13020025.
28. Lyon, T.P., Maxwell, J.W., (2011), Greenwash: Corporate environmental disclosure under threat of audit, Journal of Economics and Management Strategy, 20(1), 3–41. https://doi.org/10.1111/j.1530-9134.2010.00282.x.
29. Lyon, T.P., Montgomery, A.W., (2015), The Means and End of Greenwash, Organization and Environment, 28(2), 223–249. https://doi.org/10.1177/1086026615575332.
30. Lyu, Z., Liu, D., (2023), Government subsidies, environmental regulation, and green low-carbon circular production of enterprises, Transformations In Business & Economics, 22 (2) 59.
31. MacAskill, S., Roca, E., Liu, B., Stewart, R.A., Sahin, O., (2021), Is there a green premium in the green bond market? Systematic literature review revealing premium determinants, Journal of Cleaner Production, 280, 124491. https://doi.org/10.1016/j.jclepro.2020.124491.
32. MacKinlay, A.C., (1997), Event Studies in Economics and Finance, Journal of Economic Literature, Vol. 35, Issue 1, pp. 13–39.

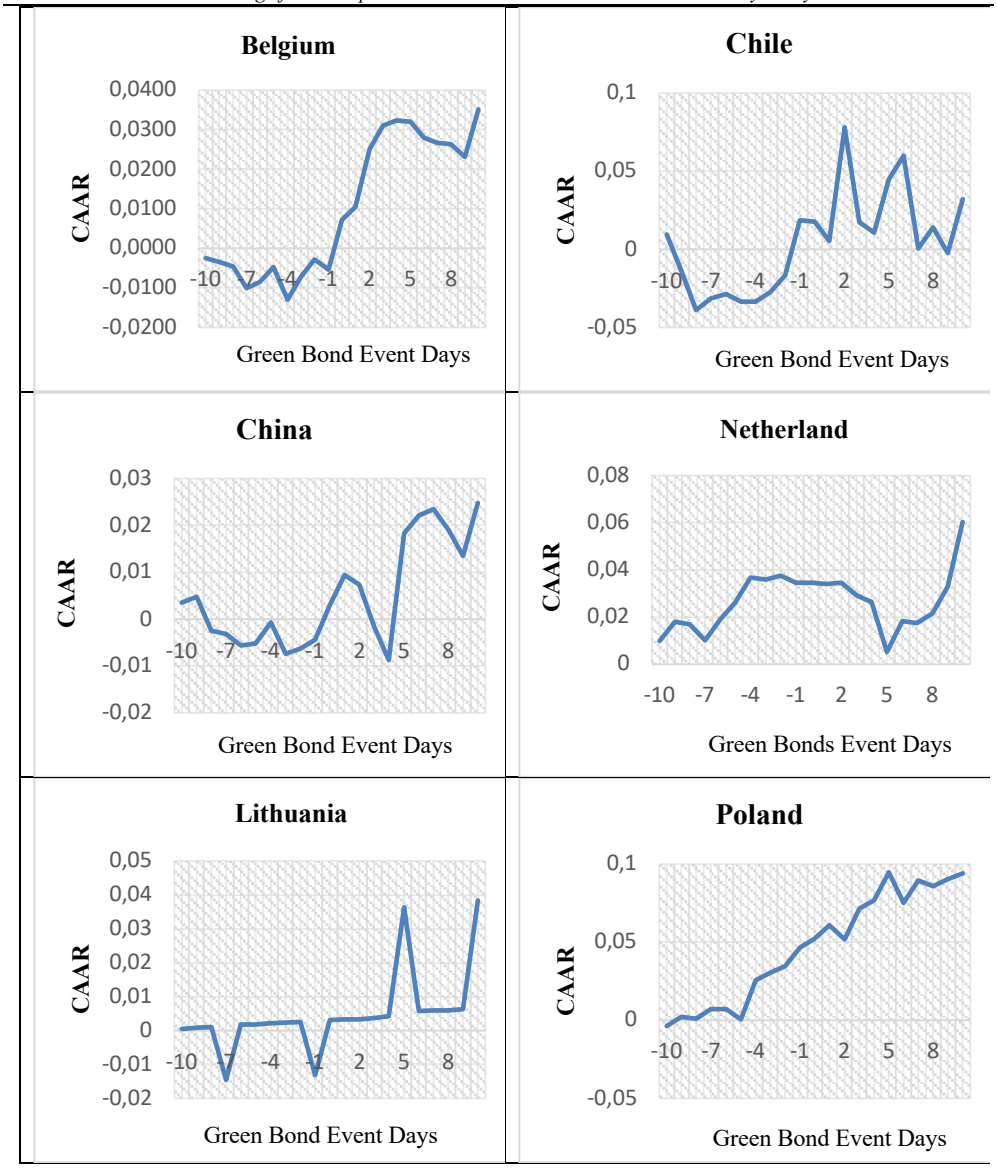
33. Maltais, A., Nykvist, B., (2020), Understanding the role of green bonds in advancing sustainability, Journal of Sustainable Finance and Investment, 11(3), 233–252. https://doi.org/10.1080/20430795.2020.1724864.
34. Manate, D., Lile, R., Rad, D., Szentesi, S.G., Cuc, L.D., (2023), an Analysis of the Concept of Green Buildings in Romania in the Context of the Energy Paradigm Change in the Eu, Transformations in Business and Economics, 22(1), 115–129.
35. Merk, O., Saussier, S., Staropoli, C., Slack, E., Kim, J., (2012), Financing Green Urban Infrastructure, OECD Regional Development Working Papers, 10, 65. http://dc.doi.org/10.1787/5k92p0c6j6r0-en.
36. Michael spence, (1973), Job Market Signaling, The Quarterly Journal of Economics, 87(3), 355–374.
37. Mihálovits, Z., Tapaszti, A., (2018), Green Bond, the Financial Instrument that Supports Sustainable Development, Public Finance Quarterly, 3.
38. Mohd Roslen, S.N., Yee, L.S., Binti Ibrahim, S.A., (2017), Green Bond and shareholders' wealth: A multi-country event study, International Journal of Globalization and Small Business, 9(1), 61–69. https://doi.org/10.1504/IJGSB.2017.084701.
39. Network for Greening the Financial System, (2019), A call for action climate change as a source of financial risk. https://www.ngfs.net/sites/default/files/medias/documents/ngfs_first_comprehensive_report_-_17042019_0.pdf.
40. Nguyen, T., Chaiechi, T., (2021), The Effects of Natural Disasters on Stock Market Return and Volatility in Hong Kong. In Economic Effects of Natural Disasters. INC. https://doi.org/10.1016/b978-0-12-817465-4.00002-9.
41. Park, S.K., (2018), Investors As Regulators: Green Bonds and the Governance Challenges of the Sustainable Finance Revolution, Stanford Journal of International Law, Vol. 54, N, Vol. 54, Issue 1. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3142887.
42. Castro, P., Gutiérrez-López, C., Tascón, M.T., Castaño, F.J., (2021), The impact of environmental performance on stock prices in the green and innovative context, Journal of Cleaner Production, 320, 128868.
43. Pedersen, A., Thun, J. E., (2019), Stock market reaction to green bond announcements: an empirical study on firms listed on European stock exchanges (Master's thesis). https://openaccess.nhh.no/nhh-xmlui/bitstream/handle/11250/2644200/masterthesis.pdf?isAllowed=y&sequence=1.
44. Riley, J.G., (1979), Informational Equilibrium, Econometrica, 47(2), 331. https://doi.org/10.2307/1914187.
45. Seetharam, I., (2015), Environmental Disasters and Stock Market Performance. Stanford University, Department of Economics, September. https://pdfs.semanticscholar.org/d90d/d0d2f6771d59f23aebfb605b3014d6242998.pdf.
46. Sharpe, W.F., (1964), Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk, The Journal of Finance, 19(3), 425–442. https://doi.org/10.1111/j.1540-6261.1964.tb02865.x.
47. Streimikiene, D., Mikalauskiene, A., Burbaite, G., (2023), the Role of Sustainable Finance in Achieving Sustainable Development Goals, Economics and Sociology, 16(1), 256–283. https://doi.org/10.14254/2071-789X.2023/16-1/17.

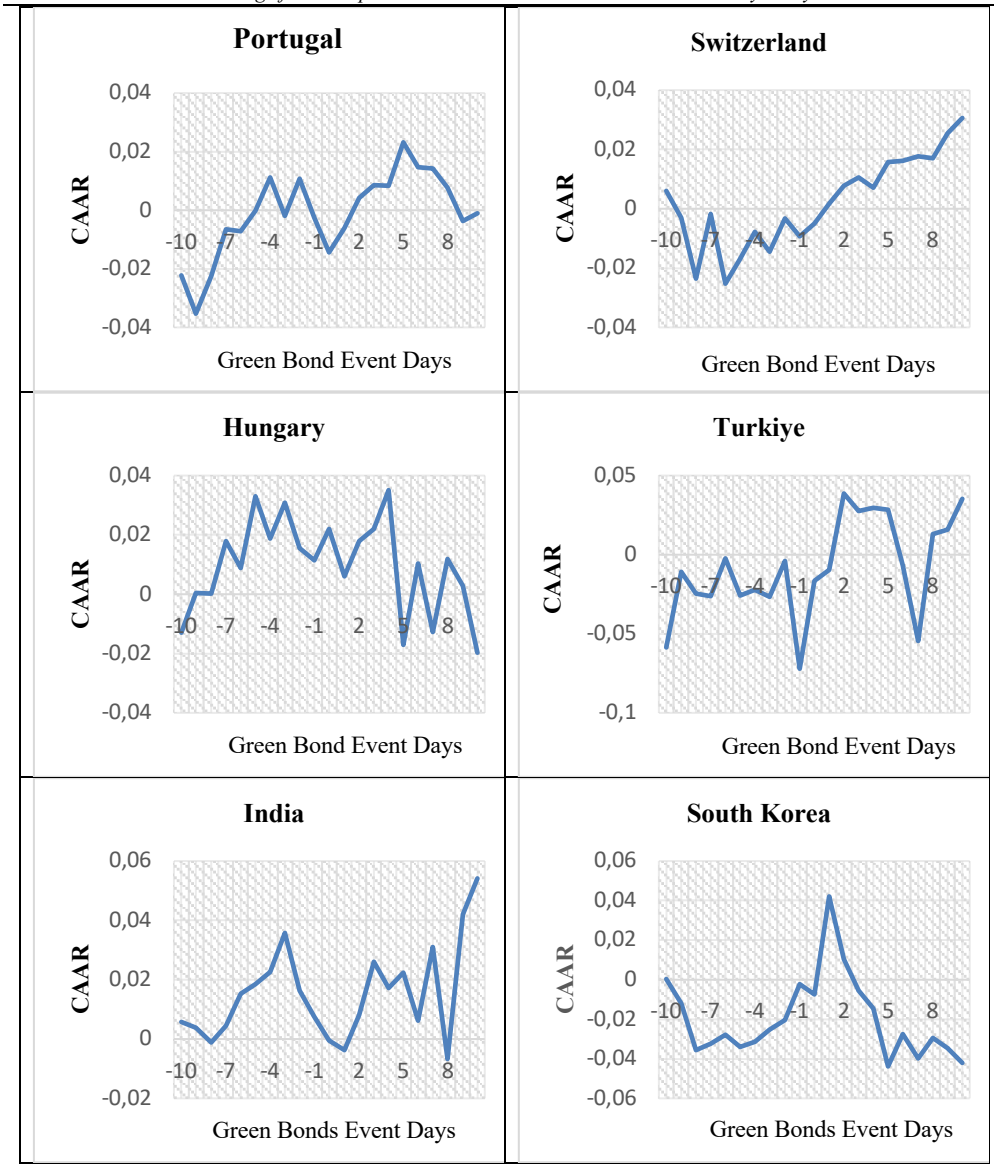
48. Tang, Y., Zhang, Y., (2020), Do shareholders benefit from green bonds?, Journal of Corporate Finance, 61(March), 1–18. https://doi.org/10.1016/j.jcorpfin.2018.12.001.
49. Tavor, T., Teitler-Regev, S., (2019), The impact of disasters and terrorism on the stock market, Jamba: Journal of Disaster Risk Studies, 11(1), 1–8. https://doi.org/10.4102/JAMBA.V11I1.534.
50. Verma, R.K., Bansal, R., (2021), Stock Market Reaction on Green-Bond Issue: Evidence from Indian Green-Bond Issuers, Vision. https://doi.org/10.1177/09722629211022523.
51. Wang, J., Chen, X., Li, X., Yu, J., Zhong, R., (2020), The market reaction to green bond issuance: Evidence from China, Pacific Basin Finance Journal, 60(February), 101294. https://doi.org/10.1016/j.pacfin.2020.101294.
52. Wu, N., Xiao, W., Liu, W., Zhang, Z., (2022), Corporate climate risk and stock market reaction to performance briefings in China, Environmental Science and Pollution Research, 0123456789. https://doi.org/10.1007/s11356-022-19479-2.
53. Wu, Y., (2022), Are green bonds priced lower than their conventional peers ?, Emerging Markets Review, March 2020, 100909. https://doi.org/10.1016/j.ememar.2022.100909.
54. Zhang, H., (2020), Regulating green bond in China: definition divergence and implications for policy making, Journal of Sustainable Finance and Investment, 10(2), 141–156. https://doi.org/10.1080/20430795.2019.1706310.
55. Zhou, X., Cui, Y., (2019), Green bonds, corporate performance, and corporate social responsibility, Sustainability (Switzerland), 11(23). https://doi.org/10.3390/su11236881.

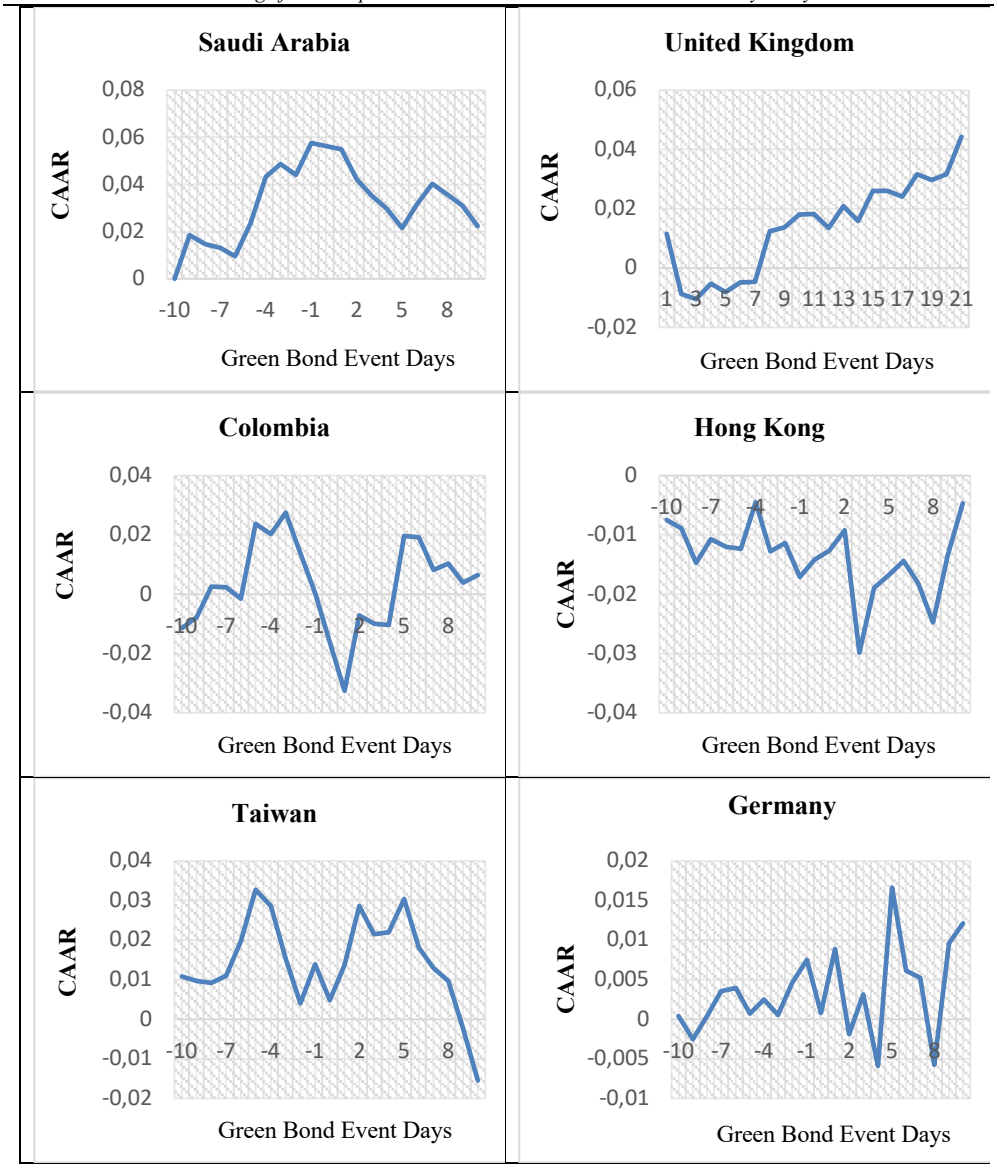
Appendix Cumulative average abnormal return (CAAR) for each country

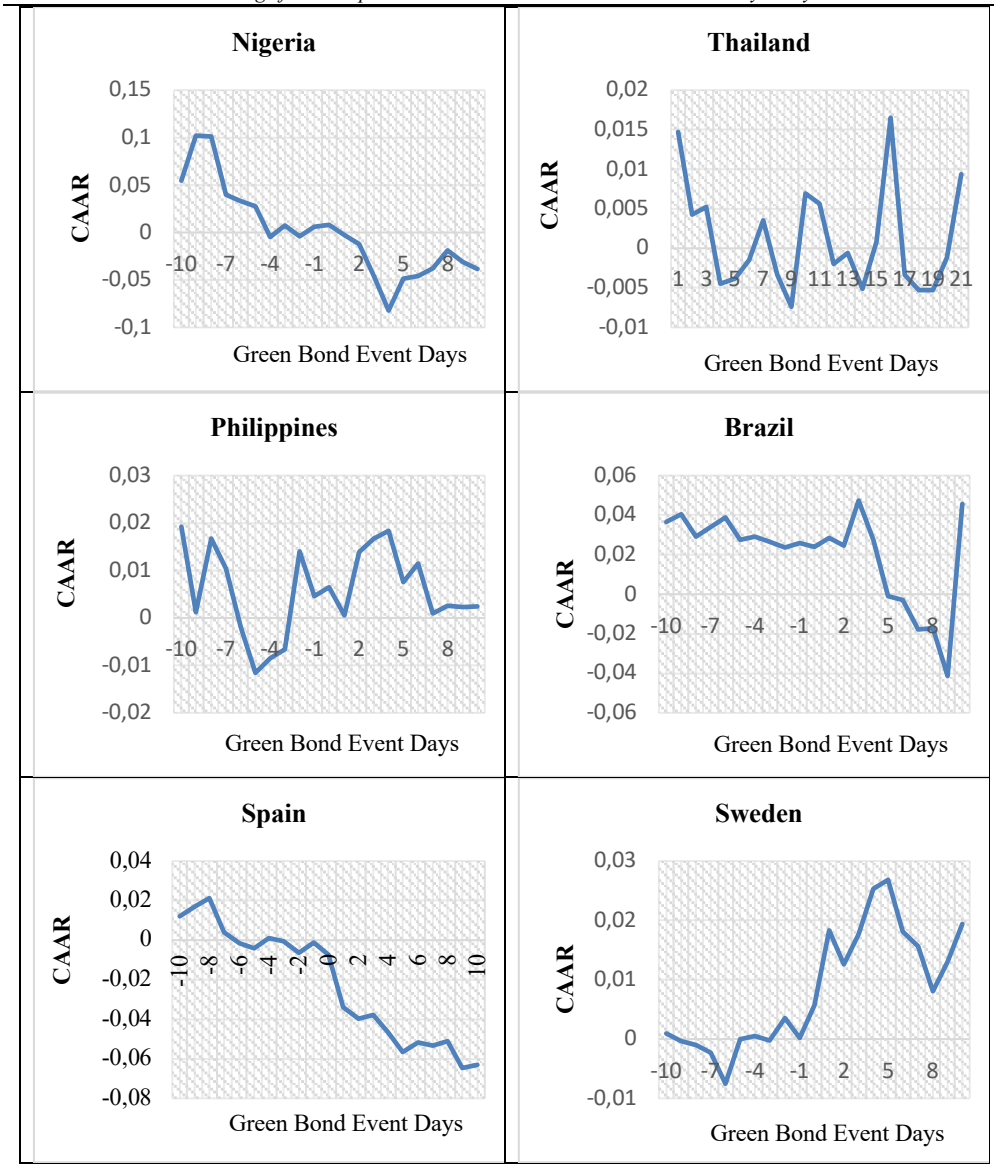


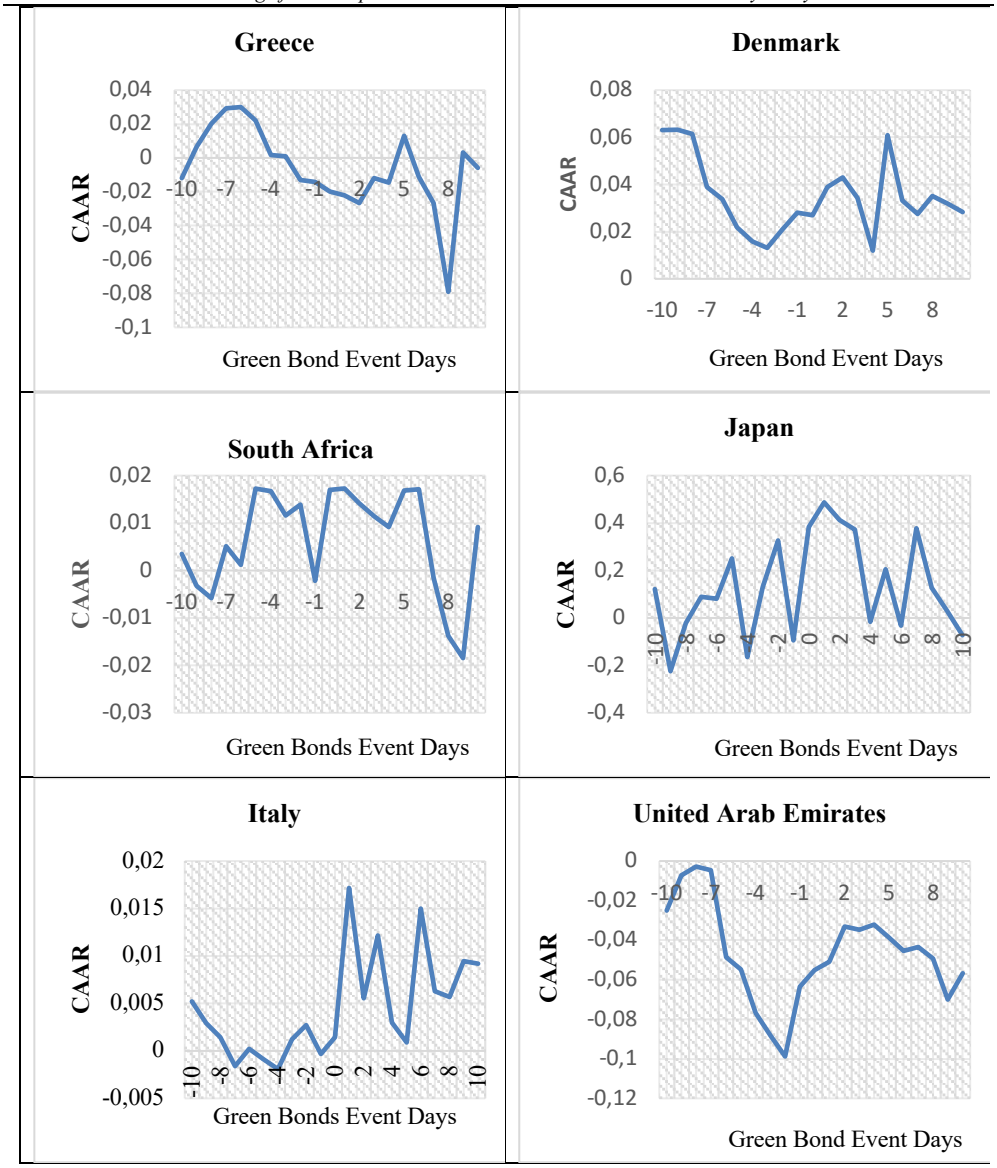

Australia
CAAR
0,0800
0,0600
0,0400
0,0200
0,0000
-0,0200
-10 -7 -4 -1 2 5 8
Green Bond Event Day
Austria
CAAR
0,04
0,03
0,02
0,01
0
-0,01
-0,02
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Canada
CAAR
0,08
0,06
0,04
0,02
0
-0,02
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Finland
CAAR
0,06
0,04
0,02
0
-0,02
-10 -7 -4 -1 2 5 8
Green Bond Event Days
France
CAAR
0,025
0,02
0,015
0,01
0,005
0
-0,005
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Norway
CAAR
0,05
0,04
0,03
0,02
0,01
0
-0,01
-10 -7 -4 -1 2 5 8
Green Bonds Event Days


Belgium
CAAR
0,0400
0,0300
0,0200
0,0100
0,0000
-0,0100
-0,0200
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Chile
CAAR
0,1
0,05
0
-0,05
-10 -7 -4 -1 2 5 8
Green Bond Event Days
China
CAAR
0,03
0,02
0,01
0
-0,01
-0,02
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Netherland
CAAR
0,08
0,06
0,04
0,02
0
-10 -7 -4 -1 2 5 8
Green Bonds Event Days
Lithuania
CAAR
0,05
0,04
0,03
0,02
0,01
0
-0,01
-0,02
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Poland
CAAR
0,1
0,05
0
-0,05
-10 -7 -4 -1 2 5 8
Green Bond Event Days


Portugal
CAAR
0,04
0,02
0
-0,02
-0,04
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Switzerland
CAAR
0,04
0,02
0
-0,02
-0,04
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Hungary
CAAR
0,04
0,02
0
-0,02
-0,04
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Turkiye
CAAR
0,05
0
-0,05
-0,1
-10 -7 -4 -1 2 5 8
Green Bond Event Days
India
CAAR
0,06
0,04
0,02
0
-0,02
-10 -7 -4 -1 2 5 8
Green Bonds Event Days
South Korea
CAAR
0,06
0,04
0,02
0
-0,02
-0,04
-0,06
-10 -7 -4 -1 2 5 8
Green Bonds Event Days


Saudi Arabia
CAAR
0,08
0,06
0,04
0,02
0
-10 -7 -4 -1 2 5 8
Green Bond Event Days
United Kingdom
CAAR
0,06
0,04
0,02
0
-0,02
1 3 5 7 9 11 13 15 17 19 21
Green Bond Event Days
Colombia
CAAR
0,04
0,02
0
-0,02
-0,04
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Hong Kong
CAAR
0
-0,01
-0,02
-0,03
-0,04
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Taiwan
CAAR
0,04
0,03
0,02
0,01
0
-0,01
-0,02
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Germany
CAAR
0,02
0,015
0,01
0,005
0
-0,005
-0,01
-10 -7 -4 -1 2 5 8
Green Bond Event Days


Nigeria
CAAR
0,15
0,1
0,05
0
-0,05
-0,1
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Thailand
CAAR
0,02
0,015
0,01
0,005
0
-0,005
-0,01
1 3 5 7 9 11 13 15 17 19 21
Green Bond Event Days
Philippines
CAAR
0,03
0,02
0,01
0
-0,01
-0,02
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Brazil
CAAR
0,06
0,04
0,02
0
-0,02
-0,04
-0,06
-10 -7 -4 -1 2 5 8
Green Bond Event Days
Spain
CAAR
0,04
0,02
0
-0,02
-0,04
-0,06
-0,08
-10 -8 -6 -4 -2 0 2 4 6 8 10
Green Bond Event Days
Sweden
CAAR
0,03
0,02
0,01
0
-0,01
-10 -7 -4 -1 2 5 8
Green Bond Event Days



Source: Authors' processing