The Informational Value of Green Finance: Global Evidence from Analyst Forecasts around Green Bond Issuances*

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April 27, 2026

Abstract

It is intensely debated whether green finance activities and the disclosures they entail generate informational value for financial markets. We inform this debate by examining the properties of equity analysts' earnings forecasts around green bond issuances. Using a global sample of listed companies across 40 countries, we document that analysts' earnings forecasts become significantly more accurate following green bond issuances. In their research reports, analysts increasingly incorporate discussions related to environmental and climate topics after such issuances, which serve as a salient information cue prompting greater research effort on the issuer. The improvement in forecast accuracy is more pronounced for firms that provide greater access to green bond-related information, such as post-issuance reports, and for firms headquartered in countries with weaker ex-ante disclosure requirements. Overall, our findings suggest that equity analysts extract and incorporate unique, incremental insights from green finance activities into their earnings forecasts.

JEL Classifications: G14, G20, Q56

Keywords: Green bonds, analyst forecasts, corporate sustainability, disclosure

* We thank Tobias Bauckloh, Maxime Couvert, Shingo Goto, Byoung-Hyoun Hwang, Shiyang Huang, Theis Jensen, Marcin Kacperczyk, Johannes Klausmann, Philipp Krueger, Teng Li, Tse-Chun Lin, Shirley Lu, Zacharias Sautner, Thomas Schmid, Hongyu Shan, Mingzhu Tai, Livia Yi, Jiaheng Yu, Xin Wang, Tianhao Yao, Aaron Yoon, David Zerbib, Xintong Zhan, Jingyi Zhang, Yupu Zhang, Joe Hong Zou, and seminar and conference participants at GRASFI 2025, CICF 2025, CSBF 2025, the 2025 Inaugural HKU Governance and Sustainability PhD Workshop, International Review of Finance 2025 Conference, Harbin Institute of Technology, Southwestern University of Finance and Economics, Sun Yat-sen University, University of Hong Kong, and University of Science and Technology of China for helpful comments and suggestions.

1 Introduction

After over 4,500 comment letters and two years of deliberation, on March 6, 2024, the U.S. Securities and Exchange Commission (SEC) adopted its first climate disclosure rule with a 3-2 commissioner vote. The new rule provoked significant debate and litigations over the necessity of climate-related disclosures, with discussions centering on potential regulatory overreach and First Amendment conflicts.[1] The controversy continued, and in September 2025, the Eighth Circuit paused the litigation after the SEC withdrew its defence of the climate disclosure rule. While numerous firms engage in voluntary environmental reporting practices, a consensus regarding the importance and financial relevance of such environmental information has yet to be reached.

The growing green bond market presents a useful setting to examine the financial relevance of environmental information and to inform the debate over climate-related disclosure. Green bonds, one of the most prevalent green financial instruments, allow issuers to finance or refinance projects that address climate and environmental issues. In practice, corporate green bond issuances require disclosure about the underlying green projects and post-issuance progress through green bond frameworks, allocation reports, and impact reports.[2] Therefore, issuing green bonds signals issuers' environmental commitments to sustainable developments (Flammer, 2021; Lu, 2025). Existing studies debate their effectiveness, with some arguing that green bonds bring limited improvements to the issuers' environmental performance (Tomunen and Yi, 2025). In this paper, we examine whether the issuance of a company's first green bond affects equity analysts' information collection and earnings forecast. Analysts are among the most important information users and producers in the financial markets. Answering whether green bond issuances contribute valuable information to analysts' earnings forecasts, or more broadly improve firms' information environments, is crucial for investors and policymakers as green finance markets and disclosure rules develop.

[1] The implementation of the new rule is also subject to challenges from the Major Questions Doctrine and Agency Deference, both of which are common deregulatory tools. See https://www.thomsonreuters.com/en-us/posts/esg/sec-climate-rule-first-amendment/ https://blogs.law.columbia.edu/climatechange/2023/12/11/the-secs-final-climate-disclosure-rule-must-respond-to-emerging-legal-risks/ for more details. The SEC announced in April 2024 that it would temporarily hold the implementation of its final climate disclosure rules until ongoing judicial challenges are resolved. In March 2025, the SEC decided to end its defense of the rules in the litigation.

[2] Typical green bond disclosure files include green bond frameworks, second-party opinions (SPOs), third-party assurances, allocation reports, and impact reports. Although disclosing these files is not universally mandatory, it aligns with best practices and investor expectations. One of the most influential voluntary guidelines for green bond frameworks, the Green Bond Principles established by the International Capital Market Association, recommends green bond issuers to report regularly after green bond issuances.

Whether corporate green bond issuances bring incremental improvements to firms' information environments remains an open empirical question. On the one hand, issuing green bonds adds incremental, project-level disclosure to the firm's public information set. The disclosure associated with green bonds provides novel information about the issuer's environmental commitments and the underlying green projects. By offering project-specific details on the green bond proceeds, green bond disclosures can alleviate information asymmetry (Lang and Lundholm, 1996). Green bonds also serve as signals of firms' sustainability commitments and marks potential organizational and operational changes toward sustainability. Increased visibility following issuance, through greater media (Lu, 2025) and institutional investor interest, can facilitate the diffusion of this information and the incorporation of the new information into analyst forecasts. Therefore, issuing green bonds could potentially improve analyst forecast accuracy of the issuers.

Although green bond issuances expand the set of disclosed information and increase public visibility, their impact on analyst forecasts can be constrained by non-standardized nature of green bond reporting and the nature of the underlying green projects. When disclosures lack standard formats, they impose high processing costs on readers, which can dilute the usefulness of information, potentially harming the firm's information environment. Besides, green projects financed by green bonds are often long-term and subject to technological uncertainty, making it difficult for analysts to translate project-level disclosures into near-term earnings implications. Beyond information processing challenges, regulatory gaps in the relatively young green bond market can limit the informational content of green bond disclosures.[3] The regulatory deficiencies may allow firms to misrepresent their environmental impacts or divert proceeds from stated purposes. Tomunen and Yi (2025), Bhagat and Yoon (2023), and Aswani and Rajgopal (2025) document limited environmental performance improvements and market responses following green bond issuances. Greenwashing can degrade issuers' information environments, as issuers engaging in greenwashing disseminate misleading information to the public.

In our research, we compare firms that have issued at least one green bond to corporate bond issuers that have not entered the green bond market to assess whether green bond issuances improve firms' information environment. We use a sample consisting of listed firms that are corporate bond issuers from 40 countries and regions spanning from 2010 to 2022. Our green

[3] The EU Green Bond Regulation became effective in December 2024 to enhance the transparency of green bonds and reduce the risk of greenwashing.

bond issuance records are sourced mainly from Environmental Finance. There are 703 listed corporate green bond issuers in our sample. We focus on financial analysts' earnings forecast-based measures, particularly average analyst forecast error, to assess the quality of corporate information environments. As shown by Harford, Jiang, Wang, and Xie (2019), analysts play an important intermediary role in the information environments of firms they cover. These analysts possess both the expertise to identify important firms and interpret corporate disclosures, and the career incentives to work carefully on understanding the implications of firm actions and deliver accurate forecasts. Thus, analyst forecasts serve as reliable indicators of information environment quality.

Our empirical findings support the conjecture that analyst earnings forecast accuracy improve with green bond issuances. We find that average analyst forecast error experiences statistically significant declines after the issuance year of the first green bond, with economically sizable magnitudes. These changes in analyst forecasts capture enhanced transparency and reduced asymmetry within issuers' information environments. The results are robust across alternative treatment-year definitions, forecast accuracy measures, and sample compositions. Our findings highlight the financial relevance of the nonfinancial information disclosed over the lifespan of green bonds.

Given that firms decide whether to issue green bonds, the choice of treatment is not random, and therefore, our baseline design is subject to selection bias. At the same time, the improvements in analyst forecast accuracy could be attributed to corporate green projects or more broadly sustainability transformation actions regardless of green bond issuances. To alleviate endogeneity concerns, we build a synthetic control sample for the treatment group.[4] For more rigorous causal inference, we employ the average number of green bonds underwritten by the investment banks that previously served as lead bond underwriters for the focal firm as an instrumental variable (IV). The choice of the IV arguably satisfies relevance and exclusion restriction. Banking relationships play a significant role in the underwriting market of corporate bonds (Yasuda, 2005). As underwriters compete for green bond issuances, those with more experience in managing green bonds have incentives to recommend green bond issuances to their existing conventional bond issuer clients. Meanwhile, the number of green bonds underwritten by investment banks should not directly influence analyst earnings forecasts. The green bond underwriting history of investment banks is shaped by the demand

[4] For each green bond issuer, we assign weights to conventional bond issuers in the same industry to construct a synthetic control following Abadie, Diamond, and Hainmueller (2010).

for green instruments in the overall market and the operating strategies of the banks. Both the synthetic control analysis and the two-stage least squares regressions implementing the IV approach produce evidence that is consistent with the argument that corporate green bond issuances are associated with increased analyst forecast accuracy.

At the country level, green bond issuances have a greater impact in countries with higher participation rates in the Science Based Targets initiative and in countries with weaker prior disclosure requirements, where the additional information provided by green bonds has a more significant influence. At the industry level, green bond issuances deliver more substantial informational benefits in industries where environmental factors are financially material. The impact of green bond issuances on forecast accuracy is also more pronounced for firms with larger green bond issuance volumes and for "pure play" green companies, whose primary business activities are dedicated to the green economy.

Information disclosures associated with green bond issuances provide financial analysts with a better understanding of issuers' green projects and commitments. These disclosures are incrementally useful and reduce disagreement among analysts. The significant decline in analyst dispersion suggests that the disclosures are informative. Additionally, the information in green bond pre-and post-issuance disclosures is unique in the way that they are project-based with use of proceeds explained and operational progress updated regularly. To assess whether analysts incorporate this information, we examine shifts in environmental discussions within analyst reports around firms' first green bond issuances. Following the first issuance, most analysts mention green-related terms more frequently. Using natural language analysis methods, we compare the frequency, intensity, and specificity of environment-related language during the one-year windows before and after the first green bond issuance. We find that analysts significantly expand their discussion of environmental topics following green bond issuance, and their discussion is also more substantive post-issuance.

To further highlight the role of information disclosure with green bond issuances, we confine our analyses on green bond issuers and show that the improvements in analyst forecast accuracy are more pronounced when issuers make their green bond disclosure files more easily accessible. Our results underscore the importance of information accessibility around green bond issuances and the significant role of environmental information in financial forecasting. Consistent with increased firm visibility information dissemination, we also find that issuers attract greater attention after their first green bond issuance, including higher analyst coverage, media coverage, and institutional ownership. We further show green bond issuance is

associated with greater analyst re-engagement, reflected in more frequent forecast revisions, while forecast accuracy improvements are weaker when analysts face limited cognitive capacity. Our analysis also reveals that green bond issuances are associated with significant reduction in stock return volatility and earnings volatility. This increased earnings stability may enhance the predictability of firm performance, however, forecast errors scaled by volatility measures also decline, indicating that the accuracy gains are not explained by stability alone and that an incremental information effect remains.

This paper makes three main contributions. First, we contribute to the growing literature examining how financial intermediaries process environmental, social, and governance (ESG) information. While prior research has provided insights into how analysts incorporate broad ESG news (Park, Yoon, and Zach, 2025; Derrien, Krueger, Landier, and Yao, 2025), our study offers novel evidence on how analysts evaluate project-level environmental investment information by focusing on green bond disclosures.

Second, we contribute to the strand of literature discussing the firm-level real effects of green bond issuance. Prior literature finds mixed evidence on the secondary market reactions to green bond issuance and the existence of "greenium", the yield difference between green and conventional bonds.[5] Despite the ongoing debate over whether green bonds can yield excess returns in the secondary market and reduce borrowing costs, the connection between green bond issuances and information environments remains underexplored. The findings of this paper show that issuing corporate green bonds improves corporate earnings forecast accuracy, extending beyond the aspects of firm value and borrowing costs. The issuance of green bonds draws attention from multiple stakeholders in the financial market and releases new information, both of which facilitate analysts' understanding of a firm's performance.

Finally, this paper adds to the studies exploring the financial materiality of corporate sustainability initiatives and nonfinancial disclosure (Khan, Serafeim, and Yoon, 2016). Related studies such as Grewal, Riedl, and Serafeim (2019) and Moss, Naughton, and Wang (2024) examine country level mandatory ESG disclosure. While these studies focus on mandated nonfinancial disclosures, green bond disclosures are unique as they involve nonfinancial project-based information released after the issuance of a financial instrument. This paper extends this literature by showing that information accessibility shapes both the

[5] The papers discussing the stock market reactions to green bond issuances include Bhagat and Yoon (2023), Aswani and Rajgopal (2025), Flammer (2021), and Tang and Zhang (2020). The papers focusing on the greenium include Larcker and Watts (2020), Caramichael and Rapp (2024), and Zerbib (2019).

corporate information environment and analyst judgement. Furthermore, in line with the findings of Krueger, Sautner, Tang, and Zhong (2024) and Dhaliwal, Radhakrishnan, Tsang, and Yang (2012), our results confirm that nonfinancial information has significant financial relevance and analysts can infer useful information from green bonds and the associated nonfinancial disclosures. Issuers who make their green bond disclosures available experience more substantial improvements in analyst forecast accuracy.

2 Institutional Background, Literature, and Hypothesis Development

In this section, we introduce the institutional background of green bonds and discuss relevant literature to develop hypotheses for our empirical analyses.

2.1 Green Bonds

The green bond market has grown in response to the increasing need for responsible investing and firms' demand to finance their environmentally friendly projects since its inception in 2007. As Figure IA1 in the Internet Appendix shows, aggregate volume and issuances trended upward through 2021, declined marginally in 2022, and rebounded in 2023. Corporate entities are major participants, issuing 31% of total green bonds in 2023, following the first corporate green bond issued by Vasakronan in 2013.

The process of green bond issuances usually consists of four steps. Prior to issuing green bonds, issuers need to identify eligible green projects and design a green bond framework that sets out the use of proceeds of the funds raised from the green bonds.[6] The green bond framework should undergo independent reviews from a second party (commonly an ESG consulting service provider) and a third party (typically an auditing firm) to verify the adherence with the Green Bond Principles (GBP) or other green bond standards.[7] The third step is the actual issuance of a green bond. This process parallels conventional bond issuance, which entails a series of essential steps, including regulatory approval, underwriting, credit ratings, road shows, and book building. Finally, issuers should disclose the use of proceeds and

[6] For a project to be identified as green, it must align with an internationally recognized taxonomy (e.g., the EU Taxonomy and Common Ground Taxonomy). A green taxonomy is a regulatory classification system that highlights which investment options or economic activities are sustainable.

[7] The GBP are voluntary process guidelines for green bond issuances developed by the International Capital Market Association. The GBP outline the best practices for issuing green bonds and disclosing relevant information. Alignment with the GBP is voluntary, and it is not the only set of principles that the issuer can choose from. Another commonly used green bond issuance guidance is the Climate Bond Standard published by the Climate Bonds Initiative.

publish reports regarding the allocation of the funds and the impact of their issued green bonds on a regular basis.

Aside from the rapid developments of the global green bond market, greenwashing has emerged as one of the biggest concerns. Corporate greenwashing refers to the case where firms convey false or misleading information about their environmental practices to shareholders and stakeholders. Curtis, Weidemaier, and Gulati (2024) emphasize the absence of enforceability of green commitments in the green bond market. For example, Caramuru Alimentos, a Brazilian soybean and corn processing company, faced allegations that its green bond proceeds funded suppliers involved in illegal deforestation in 2023.[8] In 2022, Airport Authority Hong Kong was accused of funding runway construction harmful to marine biodiversity with their green bonds.[9] Lam and Wurgler (2024) reveal that a large proportion of green bonds are refinancing launched projects with no novel green features. In instances of greenwashing, the information contained within the green bond disclosures loses its value, as it introduces disinformation into the market and compromises the issuer's information environments.

The regulatory frameworks governing green bonds is currently fragmented across international markets. While the EU implemented the EU Green Bond regulation in December 2023, other countries and regions lack comprehensive regulatory guidance. The regulatory inadequacies make greenwashing a predominant risk factor in the green bond markets. Beyond country-level regulations, issuers need to satisfy exchange-specific compliance requirements where their instruments are listed. For instance, the Luxembourg Green Exchange asks issuers to follow disclosure protocols and impose delisting penalties for non-compliance.

There is mixed evidence in the existing literature regarding the effects of issuing green bonds on stock returns and borrowing costs. For the reaction to green bond issuance in equity markets, Tang and Zhang (2020) and Flammer (2021) find positive equity market reactions to green bond issuances, while Bhagat and Yoon (2023) report insignificant equity market reactions. For the borrowing costs of green bonds, Baker, Bergstresser, Serafeim, and Wurgler (2022), Zerbib (2019), and Caramichael and Rapp (2024) document the existence of greenium. Larcker and Watts (2020) and Flammer (2021) find no significant difference in the yields of green bonds and conventional bonds. D'Amico, Klausmann, and Pancost (2026) develop a model to analyze the risk-free yield spread between sovereign green and conventional bonds. Daubanes,

[8] See https://www.ft.com/content/81c0fe03-6569-422c-bda9-82f5a9631c57 for more.
[9] See https://www.scmp.com/business/article/3162333/sustainable-finance-greenwashing-concerns-raised-hong-kong-airport-floats for more details.

Mitali, and Rochet (2024) build a signaling model that shows the motivation to issue green bonds is amplified by managers' interest in stock price. Other studies on green bonds examine their impact on corporate environmental performances. For example, Flammer (2021) points to the environmental impacts of corporate green bonds by showing that after a green bond issuance, issuers reduce their greenhouse gas intensities. Similarly, Benincasa, Fu, and Mishra (2025) find that firms making green commitments in their green bond frameworks subsequently improve carbon and biodiversity outcomes.

2.2 Green Bond Issuances and Analyst Forecasts

The issuances of corporate green bonds potentially improve analyst forecast accuracy through an information channel, where issuance expands and disseminates value-relevant nonfinancial information. An important aspect of green bond issuances is the information disclosed in the process of issuing green bonds. Goldstein, Kopytov, Shen, and Xiang's (2025) model suggests environmental disclosures enhance corporate information environments by augmenting price informativeness regarding ESG performance. Previous research on non-financial information, including works by Dhaliwal, Radhakrishnan, Tsang, and Yang (2012) and Chen, Hung, and Wang (2018), indicates that CSR information is important for analyst forecasts and firm profitability, respectively. Information accompanying green bond issuances, while very different from other types of non-financial disclosures, can contribute to analyst earnings forecast accuracy in the following ways.

Firstly, the action of a green bond issuance itself sends a signal to the market that reveals the type of the issuing firm (Flammer, 2021). The issuance of a green bond conveys to the market that the issuer is the type of firm with a strong commitment to environmental initiatives. Secondly, the issuance process requires disclosing a green bond framework, external reviews, and post-issuance reports. These documents provide fresh nonfinancial details about green projects, environmental commitments, and sustainability transition plans. Such disclosures are highly valuable to analysts. Sautner, Vilkov, van Lent, and Zhang (2025) provide evidence that financial analysts actively use and increasingly incorporate environmental information into their discussions and forecasts. Derrien, Krueger, Landier, and Yao (2025) confirm that analysts revise forecasts according to ESG news, and Park, Yoon, and Zach (2025) show that analysts integrate ESG risks in their assessments.

Furthermore, green bond disclosures offer unique project-specific information with a comprehensive description and detailed environmental impacts of the underlying projects of

the green bonds. This project-specific information included in green bond disclosures offers additional transparency and verifiability that are absent conventional bond disclosures, which typically provide only a general overview of how proceeds will be used. Following the issuances of green bonds, the release of new information can facilitate assessments of firm risks and reduce information asymmetry among investors. This information flow can hold financial relevance especially when the green projects financed by the bonds entail revenue-generating or cost-effective initiatives. For example, when green bonds finance infrastructure such as public transit systems powered by renewable energy, they demonstrate potential for future cashflow generation. Thus, the nonfinancial details disclosed with green bond issuances inherently carry financial implications. By detailing green projects and reducing asymmetry, green bond disclosures refine the overall corporate information environments.

The decision to issue a green bond also attracts greater interest from information intermediaries, including media, analysts, and institutional investors, which can facilitate the diffusion and the incorporation of the disclosed information into the market. Lu (2025) provides evidence indicating that firms experience escalated media coverage following the issuance of green bonds. Previous research has shown that media redistributes information to the public (Miller, 2006) and, in some cases, generate investigative scrutiny (Dyck, Morse, and Zingales, 2010), which may further strengthen the credibility of disclosed information. Meanwhile, institutional investors with environmental and social mandates seek to allocate funds to firms that show commitments to green transformation and excellence in environmental performance (Starks, Venkat, and Zhu, 2025; Gibbons, 2024; Gantchev, Giannetti, and Li, 2022). Interaction with institutional investors establishes closer connections between green bond issuers and analysts through common institutional clients, as shown by Li, Wong, and Yu (2020). With institutional owners functioning as information dissemination channels, analysts may gain more issuer-specific knowledge related to green projects and commitments, potentially leading to more precise forecasts.

Beyond institutional investors, financial analysts also closely track firms' decisions to green bond issuances. As discussed in Harford, Jiang, Wang, and Xie (2019), analysts strategically allocate their attention to cater to the needs of institutional investors and cover firms that are important for their careers. Accordingly, green bond issuance can draw incremental analyst attention with the newly disclosed environmental and project-based information. Appendix B provides detailed evidence from earnings call transcripts and analyst research reports documenting financial analysts' attention to green bonds. The cases presented in Appendix B

demonstrate analysts' consideration of the purposes and benefits of issuing green bonds, as well as the information contained in green bond disclosures. Table IA1 of Internet Appendix lists ten cases where analysts explicitly discuss green bonds in analyst reports. These cases illustrate that analysts consider capital structure implications of green bonds as well as firm sustainability strategies associated with green bonds.

Green bond issuances may have limited effects on firms' information environments if the accompanying disclosures are noisy or difficult to interpret. The disclosures bundled with green bond issuances do not have a standardized form, giving the issuers chances to exploit the lack of guidance and meet the minimal disclosure requirement by providing low-quality information (Christensen, Hail, and Leuz, 2021). The accessibility, ambiguity, and readability of the information can harm the financial materiality of green bond disclosure and lead to confusion among investors and analysts. Lastly, greenwashing by green bond issuers can contaminate the information environments by adding disinformation to the financial market.

In addition, the underlying green projects financed by green bonds are typically long-term and subject to technological uncertainty. These characteristics can complicate analysts' translation of project-level information into earnings forecasts, when additional information on green bond projects is available. As a result, although green bond issuances may expand the set of disclosed information, disclosure frictions may offset potential informational benefits, and the net effect on the informativeness of the firm's public information set may be limited.

Hypothesis 1: *Green bond issuances enhance the accuracy of analysts' consensus forecasts for the issuers.*

Green bond disclosures contain information that is useful to analysts in generating earnings forecasts. Green bond frameworks and reports introduce the underlying green projects that could be revenue-generating or cost-saving (e.g., construction of energy farms, waste recycling systems). As shown by Chi, Hwang, and Zheng (2025), information regarding these projects could be useful for analysts as alternative data and can help analysts enhance their forecasts. Since publishing green bond frameworks and post-issuance reports is not universally mandated, issuers vary in their information accessibility. The accessibility of disclosures matters because information that is difficult to locate may fail to reach its readers effectively. We conjecture that green bond issuers who make their green bond disclosures more accessible experience more pronounced improvements in analyst earnings forecast accuracy.

Beyond increasing information availability, the information released in the disclosures can prompt analysts to revisit and rethink existing assumptions about firms' operations, investment plans, and risk exposures, consistent with evidence that environmental information induces belief revision (Bernard, Tzamourani, and Weber, 2025). Nonfinancial information associated with green bond issuance can complement analysts' financial forecasting by triggering analyst re-engagement with earnings forecasts.

Hypothesis 2: *The improvements in analyst forecast accuracy are more pronounced when green bond issuers make their green bond disclosures accessible.*

3 Data and Summary Statistics

This section discusses the data sources for our main variables and describes the final sample constructed for our analyses.

3.1 Green Bond Data

Our green bond issuance history dataset integrates information from three sources: Environmental Finance, Bloomberg, and LSEG Refinitiv. Environmental Finance is a news and analysis provider focusing on sustainable finance. We use Environmental Finance as the main source for green bond issuance history and augment the data with additional issuance history from Bloomberg and LSEG Refinitiv. Panel B of Figure IA1 of Internet Appendix compares the green bond issuance data of publicly listed firms across the three data sources. The Environmental Finance data covers more green bond issuances in the 2010s, while Bloomberg has a greater coverage from 2021 to 2022. Combining these three datasets of green bonds allows us to build a comprehensive dataset for green bond issuances. We exclude green bonds that were issued through private placements and green bonds issued by private entities. Although the green labels in our data sources are self-designated by issuers, we exclude bonds that fail to align with any established sustainable bond principles.

3.2 Analyst Forecasts

We measure the quality of corporate information environment with analyst forecast error (*AFE*). Analysts serve as an information intermediary between firms and investors as they intake information released by firms and produce forecasts and recommendations to investors. They are also one of the major consumers of the information and signals released by firms, as they rely on them to produce accurate forecasts and make recommendations to fulfil their

intermediary role between firms and investors (Gibbons, Iliev, and Kalodimos, 2021).[10] Analyst forecast error is calculated as the equally weighted average absolute earnings per share (EPS) forecast error of one-year-ahead forecasts scaled by beginning-of-year stock price following Chang, Ljungqvist, and Tseng (2023). We use Worldscope and I/B/E/S as our data sources for the firm-level variables and analyst earnings forecast details, respectively.

3.3 Final Sample and Summary Statistics

The final sample contains 5,846 listed bond issuers from 40 countries with firm financials covered by Worldscope and analyst forecast details covered by I/B/E/S. The sample firms include 703 green bond issuers, while the remainder constitute conventional bond issuers that have not issued a green bond. Figure 1 shows the volume of green bond issuances by country for firms in the sample. Firms residing in countries in North America, the European Union, and East Asia are major issuers of green bonds. Panel A of Table 1 provides a breakdown of the sample by country. Japan, China, and the United States are the three nations with the largest number of public green bond issuers in our sample. The composition of our public green bond issuer sample is comparable to that of Flammer (2021) and Tang and Zhang (2020), with China and the United States remaining the primary sources of green bond issuing firms, while Japan has emerged as a significant contributor in recent years.[11]

Table IA2 provides an overview of the green bond issuer selection procedures we applied to our dataset. While the raw data encompasses over three thousand corporate green bond issuers, our final sample consists of 703 unique listed issuers after excluding private firms and those lacking financial and analyst data. We also report both the number of listed green bond issuers before and after merging with I/B/E/S analyst forecast details in Panel A of Table 1. We lose many of the green and conventional bond issuers due to limited I/B/E/S data coverage, especially for firms domiciled in China, Japan, and Sweden. Figure IA2 plots the number of new unique listed green bond issuers that enters the corporate green bond market throughout our sample period. The number of unique new issuers shows a year-on-year increase, except

[10] Although our study focuses on equity analysts, these informational effects may manifest differently for debt analysts. Given their focus on downside default risk, the project-level information in green bond disclosures might have a less pronounced impact on debt analysts' forecasts, especially for investment-grade issuers. Nevertheless, this information remains valuable to them for assessing corporate environmental and transition risks.

[11] Flammer (2021) uses an international sample of green bonds issued from 2013 to 2018. Tang and Zhang (2020) use an international sample of green bonds issued from 2007 to 2017. The number of green bond issuers in Japan surged during 2020 - 2022. The reason why Japan has so many unique listed green bond issuers can be attributed to the parent firms' tendency of issuing through multiple listed subsidiary entities. For example, Sumitomo Corporation issued green bonds through six of its subsidiaries, and the Mitsubishi Group issued green bonds through four of its subsidiaries.

for a decline in 2022. Panel B of Table 1 summarizes the main variables.[12] Of all the observations in our sample, around 14% derives from green bond issuers. Median analyst forecast error is 1.29% of the beginning-of-year stock price. On average, a firm in the sample is followed by 10.23 analysts. Panel C of Table 1 reports the summary statistics for the main variables for green bond issuers and conventional bond issuers. Green bond issuers are generally firms of larger sizes, with lower leverage ratios and higher levels of analyst coverage relative to their conventional counterparts.

4 Green Bonds and Analyst Forecasts

In this section, we perform analyses on the relationship between green bond issuances and analyst forecast accuracy. We begin by introducing our research design and baseline findings, followed by addressing potential endogeneity concerns. The final subsection explores heterogeneous effects of green bond issuances.

4.1 Baseline Results

To study the effect of green bond issuance on analyst forecasts, we estimate the following specification in the baseline regression:

$$Analyst\ Forecast\ Error_{i,t} = \beta_0 + \beta_1 After\ GB\ Issuance_{i,t} + \boldsymbol{X}_{i,t}\gamma + \eta_i + \delta_t + \epsilon_{i,t} \quad (1)$$

The dependent variable is analyst forecast error. The independent variable is *After GB Issuance*, a binary variable that indicates whether a firm has issued its first green bond.[13] This variable remains zero for firms that are not green bond issuers. The coefficient β_1 captures how analysts forecast error change with the issuance of green bonds for green bond issuers. We also include firm and year fixed effects to control for unobservable but persistent differences between firms and temporal variations throughout the sample period. The vector of control variables $\boldsymbol{X}_{i,t}$ follows the specification of Batta, Qiu, and Yu (2016). It consists of various firm characteristics, including firm size, leverage, market-to-book ratio (*M/B*), return on assets (*ROA*), capital expenditure (*Capex*), sales growth, property plant and equipment (*PPE*), research and development expenditure (*R&D*). Additionally, control variables incorporate GDP per capita,

[12] We also summarize analyst forecast dispersion in Table 1 Panel B. We use this variable to examine the role of information released with green bond issuances. The number of observations for analyst forecast dispersion falls below that of analyst forecast error, since firms with single-analyst EPS forecast coverage lack necessary data to calculate forecast dispersion.

[13] We focus on the first issuance of green bonds because subsequent green bond issuances may not attract as much attention from the market as the first green bond, and the disclosure around subsequent green bonds could contain repetitive content that already came out with the issuance of the first green bond.

excess yearly return, a binary variable indicating secondary equity issuance (*Stock Issuance*), the number of unique analysts covering the firm (*Analyst Count*), the average analyst forecast horizon (*Horizon*), and the yearly median of the daily bid-ask spreads (*Bid-ask Spread*).

Table 2 reports the baseline estimation results of the impact of green bond issuance on corporate analyst forecasts. Columns (1) and (2) estimates the treatment effects of green bond issuances without including control variables, where column (1) excludes firm and year fixed effects and column (2) includes them. Columns (3) and (4) add the full set of control variables without and with fixed effects. The coefficient of *After GB Issuance* is negative and statistically significant across all specifications, supporting the hypothesis that green bond issuance reduces analyst forecast error. According to column (4), issuing firms experience, on average, a 1.29% reduction in their average analyst forecast error. The results are economically significant, with coefficients in column (4) representing improvements of 12% of the sample standard deviation in forecast accuracy. The regression specification with a single explanatory variable and fixed effects in column (2) has an R-squared value of 0.25. This value is not substantially lower than the R-squared from regressions with control variables in column (4), suggesting that the explanatory power of our baseline estimation is not primarily driven by control variables.

We plot the dynamic effects of first green bond issuance on analyst forecast error using the two-way fixed effects (TWFE) specification in Equation (1) in Figure 2. We replace the *After GB Issuance* variable with a series of indicators measuring the number of years until or since the green bond issuance year in our estimation. Figure 2 includes the estimated coefficients normalized to the year before first green bond issuance and their 95% confidence intervals. Before the first issuance, there are no differential pre-trends in analyst forecast error, suggesting that the analyst forecast characteristics of green bond issuers and conventional bond issuers have evolved similarly in the absence of treatment. In the period following their initial green bond issuance, issuers experience decreases in average forecast error, compared to control firms. The decline in analyst forecast error exhibits a certain degree of persistence, remaining present four years after the initial issuance.

To examine whether post-issuance analyst forecast modifications originate from a niche group specializing in environmental practices or reflect broader collective enhancement by majority analysts, we first test whether the impact of green bonds is stronger for firms covered by fewer analysts. Table IA3 in the Internet Appendix presents baseline results for firms with below- and above-median analyst coverage. The comparable effects across the two groups, regardless of coverage level, indicates that the baseline impact of green bonds is less likely to

be predominantly attributed to a small group of expert analysts that are particularly paying attention to green bonds. If the outcome is primarily driven by specialized analysts, we would expect amplified effects in firms with limited analyst coverage. We additionally compute relative forecast accuracy, following the methodology of Harford, Jiang, Wang, and Xie (2019), for individual analysts covering green bond issuers during the periods preceding and following issuance. The distributional patterns of individual forecast accuracy, measured in relation to the full cohort of analysts covering the same firm, demonstrate consistency across the pre- and post-issuance intervals. The Kolmogorov-Smirnov test for the equality of the distributions of relative forecast accuracy produces a D statistic of 0.01 (p-value = 0.49), failing to reject the null hypothesis of distributional equivalence. The distributional equivalence suggests that the enhanced forecast accuracy is more plausibly a result of collective improvements within the analyst population rather than selective gains in individual analyst performance.

4.2 Robustness Tests

To ensure that our baseline findings are not driven by specific sample choices or measurement design, we conduct robustness tests using alternative measures, an alternative control group, and alternative event dates. Table 3 reports these robustness tests. In column (1) of Panel A, we consider the announcement date of a firm's first green bond as the treatment date, rather than the actual issuance date. In column (2), we expand the control group to include all listed firms that have not issued a green bond, including those without any bond issuances during the sample period. Column (3) excludes firms in the banking industry, given their significant role as major green bond issuers.[14] Across these alternative specifications, the results consistently confirm the reduction in analyst forecast error following green bond issuances.[15]

Panel B of Table 3 summarizes the estimations deploying alternative calculation methods of analyst forecast characteristics. In column (1), we substitute the single-period measures with a three-period forward average of forecast error. Column (2) uses logarithmic transformations of analyst forecast error as dependent variable. The final specification in column (3) of Panel B

[14] See Internet Appendix Figure IA3 for green bond issuance by industry. The banking sector leads in both aggregate green bond issuance volume and the number of green bonds issued.

[15] Figure IA4 of the Internet Appendix shows that our baseline results are not likely to be driven by any single country. In each regression, one country is excluded at a time, and the baseline specification is re-estimated. The consistently negative and significant coefficients indicate that the findings remain stable and robust across the sample.

uses an alternative scaling method. The absolute average analyst forecast error is scaled by actual EPS (Loh and Stulz, 2018). The estimations incorporating alternative measures consistently yield significant negative coefficients on the binary variable indicating the impact of green bond issuances.

In order to ensure that our baseline results are not driven by influential outliers, following Leone, Minutti-Meza, and Wasley (2019), we implement robust regression methodology (M-estimators). The corresponding results are reported in column (1) of Table 3, Panel C. To address the potential influence of country- and industry-specific green finance regulatory and policy variations on corporate green bond issuance decisions, we replace year fixed effects with country-year fixed effects in column (2) of Panel C, with industry-year fixed effects in column (3), and with both country-year and industry-year fixed effects in column (4). The M-estimators and the regressions incorporating alternative fixed effects yield similar inferences.

Recent studies on the staggered two-way fixed effects estimation emphasize that traditional TWFE relies on assumptions of homogeneity in treatment effect. When treatment effects are heterogeneous, standard TWFE regression estimates can be greatly biased due to the "forbidden" comparisons between cohorts that are both already treated. To address concerns about the reliability of the standard TWFE estimator, we employ heterogeneity-robust staggered treatment estimators developed by Sun and Abraham (2021), Callaway and Sant'Anna (2021), Borusyak, Jaravel, and Spiess (2024), De Chaisemartin and D'Haultfeuille (2020), and a stacked regressions design to our baseline regression specification. These estimators yield sensible results under arbitrary heterogeneous treatment effects. We report the results in Table IA4 of the Internet Appendix. Across all estimators, we consistently observe the impact of green bond issuances in reducing analyst forecast error.

4.3 Addressing Endogeneity Concerns

Green bond issuances are not random. Firms that choose to issue green bonds tend be outperformers in environmental and social practices. Non-issuing firms may also undertake green projects without issuing green bond to avoid the public scrutiny associated with the increased public attention after issuance. These selection patterns raise concerns that observed changes in analyst forecasts may partially reflect underlying firm characteristics rather than the issuance event itself.

Endogeneity issues in this study are less likely to arise from the analyst side. Prior work by Chi, Hwang, and Zheng (2025) faces endogeneity from analysts because they study analysts'

use of alternative data, such as geospatial indicators and satellite images. Accessing and processing such data often requires substantial technological support from brokerage in-house teams, making such data costly to obtain and use. In contrast, information associated with green bond issuance is commonly publicly available and comparatively inexpensive for analysts to utilize. Analysts can integrate the information without major resource constraints, which further reduces the likelihood that analyst-side endogeneity affects our analysis. In this section, we use the synthetic control method, an instrumental variable, and placebo tests to address the potential selection bias inherent in our green bond issuer treatment group.

4.3.1 Synthetic Controls

In accordance with Abadie, Diamond, and Hainmueller (2010), we create synthetic control units for each green bond issuer in our sample. The synthetic control method allows the data to identify control units through a weighted average of potential candidates. This methodology aims to minimize the pre-treatment distance between the artificial control unit and the treated unit. For each green bond issuer, we assign weights to conventional bond issuers within the same industry.[16] The weights are chosen to minimize pre-issuance trends of firm characteristics, such as size, return on assets, and leverage, and firm ESG performance, as measured by LSEG Refinitiv ASSET4 ratings. The pre-issuance trends are measured over a two-year window prior to the first green bond issuance, following Flammer (2021). Of all the green bond issuers in the sample, we were able to construct synthetic control units for 580 of them.[17] We also implement nearest-neighbor matching, pairing each green bond issuer with the most similar conventional bond issuer within in the same industry based on Mahalanobis distance computed from pre-issuance firm characteristics. The nearest-neighbor matching provides a matched sample of 438 green bond issuers.

We plot the differences between treatment units and synthetic control units around the first green bond issuance in Figure IA5. Each panel corresponds to a specific metric used to construct the synthetic controls, with points showing estimated differential between the treatment and control groups relative to issuance and associated confidence intervals. Across all firm characteristics and ESG performance metrics employed in constructing control units,

[16] Our pool of potential controls includes conventional bond issuers within the same SIC 2-digit industry code across different countries. We do not limit our control units to be within the same country because firms learn from their international peers about using green bonds as a financial instrument. Green bond issuances are not likely to be a behavior that clusters within the same country.

[17] We lost some of the green bond issuers in the process of constructing synthetic control units because some of the green bond issuers were not covered by the ESG ratings from ASSET4 in the pre-treatment period.

treated and synthetically control units share similar pre-issuance trends, as estimated differences prior to issuance are not statistically different from zero. Table 4 presents the results from Equation (1) using matched samples constructed via nearest-neighbor matching in column (1) and synthetic matching in column (2). Specifications in Table 4 support the baseline results that the issuance of the first green bond has negative impacts on mean analyst forecast error. The absolute magnitude of the coefficients in Table 4 is slightly smaller than the baseline estimation, and the regression estimations in the synthetically matched sample support the baseline findings.

4.3.2 Underwriter Green Bond History

To further alleviate the concern for potential endogeneity issues, we conduct two-stage least squares regression with an instrumental variable (IV). We incorporate the average number of green bonds underwritten by the investment banks that had previously served as the primary underwriter for a firm's bonds as an instrumental variable. This IV satisfies the two key criteria. It is closely related to a firm's decision of green bond issuance, since the investment banking relationship is one of the key determinants in the underwriting market of corporate bonds (Yasuda 2005). As investment banks compete in the green bond underwriting markets, investment bankers who are experienced with green bonds have incentives to approach clients and recommend issuing green bonds, raising their clients' chances of issuing green bonds. Meanwhile, an investment bank's green bond underwriting history is unlikely to directly affect client firms' information environments, except through green bond issuances. The green bond underwriting history of banks are shaped by market demand for green instruments and their operating strategies and these factors are external to individual firm's information environments. Regulatory framework governing investment banks mandate information barriers between debt underwriting teams and equity research divisions, which strategically minimizes the chance that underwriters' green bond business directly influences equity analysts' forecasts. Accordingly, the impact of underwriter green bond expertise on firm-level information environments should be mediated only through the corporate decision to issue green bonds.

A potential challenge to the exclusion restriction could arise if higher-quality underwriters with extensive green bond experience tend to engage with firms with better information environments or financial performance. Through scatter plots and fitted lines in Figure IA6 of the Internet Appendix, we analyze the distribution of firm characteristics across different levels of underwriter green bond expertise. Most characteristics, including leverage, M/B ratio, ROA,

sales growth, analyst forecast error, forecast dispersion, analyst coverage, and forecast horizon, show stable relationships with underwriter green bond history. The only exception is firm size, where the scatter plot indicates that larger firms are slightly more likely to engage with underwriters with more experience in green bonds. These patterns suggest that firm characteristics show minimal variation with underwriter green bond expertise and our choice of IV likely satisfies the exclusion restriction condition.

Table 5 reports the estimation results with the average number of green bonds underwritten by investment banks that had worked as the primary bond underwriter as an IV. In the first stage, as shown in specification (1) we regress the binary variable indicating the issuance of the first green bond on the IV. The IV passes the weak instrument test, with a Kleibergen–Paap F statistic of 320.81. The coefficient on the average cumulative green bond underwritten by investment banks that had worked as the primary underwriter of the firm is positively significant, fulfilling the relevance condition. Column (2) presents the second-stage regression results. The coefficients on the predicted value of *After GB Issuance* are negative and statistically significant. The results imply that the analyst forecasts of green bond issuers become more accurate and less dispersed after the issuance of the first green bond.

4.4 Heterogeneity in Green Bond Impacts

The baseline findings in the previous section suggest that corporate analyst forecast error reduces after the issuances of green bonds. In this section, we present tests that explore the heterogeneity in the impacts of green bond issuances.

4.4.1 Climate Commitments and Materiality

Societal demands for corporate environmental responsibility represents a dimension that could potentially influence the impacts of green bond issuances. Within economies where corporate environmental commitments are highly valued by investors and the public, green bond issuances attract greater attention, and analysts would dedicate more efforts to producing forecasts for green bond issuers. We use the participation rate in the Science Based Targets initiative (SBTi) among publicly traded companies to quantify country-level corporate green commitment. SBTi, a United Nations organization, provides frameworks and tools for firms to declare their science-based net-zero targets.[18] We classify firms into groups representing high

[18] The participation in SBTi is not required by governments. Its voluntary nature enables measurement of corporate environmental commitment independent of regulatory pressure.

and low levels of SBTi participation using the sample median of 3.4% as the threshold. Results reported in columns (1) and (2) of Table 6 Panel A show that green bond issuances significantly affect analyst forecast accuracy only in countries with high SBTi participation rates. The statistically significant difference in coefficients between high and low SBTi groups, with an F statistic of 4.22, indicates that green bond issuances exert stronger effects in countries that value green commitments more.

A firm's exposure to environmental-related issues varies with its industry. We classify industries into two groups based on the Sustainability Accounting Standards Board (SASB) materiality standards. The first group includes firms operating in industries where at least one environmental factor is deemed financially material by SASB.[19] The second group consists of firms in industries where no environmental factors are classified as material. Columns (3) and (4) of Table 6 Panel A present regression results for firms at different levels of industry exposure on environmental factors. Although issuing green bonds significantly reduces analyst forecast error in both groups, the effect is more pronounced among firms in industries with environmental materiality. The difference between the two coefficients produces a significant F statistic of 5.61. These findings indicate that green bond issuance generates stronger improvements in forecast accuracy for firms whose financial performance is more closely tied to environmental factors.

4.4.2 Culture and Legal Origins

National regulatory and cultural differences on information transparency could amplify the impact of green bond issuances on analyst forecasts, as green bonds bring new signals and disclosures. When pre-existing disclosure regulations are less extensive, the inclusion of new information accompanying green bonds generates greater incremental impacts. Following Maffett (2012), we adopt La Porta, Lopez-De-Silanes, and Shleifer's (2006) required disclosure intensity index as a metric for ex-ante disclosure requirement at the national level. We segment the sample by the median value of disclosure requirements to test the influence of green bond issuances on analyst forecast error in different national contexts. The results detailed in columns (1) and (2) of Table 6 Panel B show a stronger impact of green bond issuances in countries characterized by weaker pre-existing disclosure requirements, as indicated by the more negative coefficient on *After GB Issuance* in column (2). The coefficient

[19] The SASB identifies six environmental factors that a considered financially material: greenhouse gas emissions, air quality, energy management, water and wastewater management, waste and hazardous materials management, and ecological impacts.

difference across groups is statistically significant, demonstrating that firms in countries exhibiting weaker ex-ante disclosure requirements experience more pronounced impacts on analyst forecasts following green bond issuances.

Cultures that value information transparency can magnify the effect of green bond issuances on analyst forecasts, as green bonds introduce new information and disclosures. In individualistic societies that emphasize open communication and personal accountability, analysts would potentially allocate more attention and resources to firms issuing green bonds. Using Hofstede's (2001) individualism index, we divide countries by their median scores and examine how cultural context shapes the relationship between green bond issuance and analyst forecast errors. Results in columns (3) and (4) of Table 6 Panel B show that the impact is significantly stronger in high-individualism countries, with column (3) showing more negative coefficients than column (4). The coefficient difference is statistically significant, demonstrating that firms in transparency-oriented culture experience stronger impacts on analyst forecasts after green bond issuances.

Lastly, country characteristics influence firms' environmental decisions (Ferrell, Liang, and Renneboog, 2016). Liang and Renneboog (2017) argue that in non-common law countries, the law systems emphasize stakeholder benefits and therefore firms typically exhibit superior environmental awareness. To explore whether the relationship between the issuance of the first corporate green bond and firm information environment differs with law systems, we run the baseline regression in Equation (1) in two subsamples: firms incorporated in common-law countries and firms incorporated in non-common-law countries. Columns (1) and (2) of Table IA5 Panel A in the Internet Appendix present the estimation results of the baseline model within subsamples consisting of firms in these two types of legal systems. The impact of green bond issuance is significantly negative in both subsamples, with the estimated coefficient for common law countries slightly smaller in absolute magnitude than the coefficient for countries with other law systems. The test on the equality of two coefficients does not reject the null hypothesis.

We further examine the heterogenous impacts of green bond issuances across distinct non-English legal origin countries. The regression results documented in columns (3) and (4) of Table IA5 Panel A demonstrate differential outcomes for firms established in countries with French and German legal systems, as well as Nordic nations (specifically Denmark, Finland, Norway, and Sweden) operating under Scandinavian legal systems, respectively. The most pronounced reduction (2.12%) in analyst forecast error following green bond issuances occurs

in Nordic countries, traditional leaders in climate mitigation initiatives.While the difference in the coefficients between Nordic and French-German civil law firms is not significant, the larger magnitude of impact reflects greater investor attention for environmental investments in Nordic markets, and more comprehensive green bond disclosure practices by Nordic issuers. In terms of green bond regulation, despite the EU's more comprehensive regulatory framework for green bonds, our findings are not primarily driven by the additional regulation imposed on EU issuers. Panel B of Table IA5 shows that green bond issuances significantly impacts EU and non-EU issuers, with no statistical difference between their coefficients.

5 Channels and Mechanisms

The previous section provides evidence that analyst earnings forecast accuracy enhances after issuing green bonds. In this section, we discuss channels through which green bond issuances influence analyst forecasts.

5.1 Green Bond Disclosure and Reporting

5.1.1 New Information and Analyst Forecast Dispersion

This section examines whether green bond issuance provides incrementally useful information that reduces disagreement among analysts. While issuing green bonds offers analysts additional information pertinent to the issuer's business activities, ambiguous or uninformative disclosure may cause confusion among the analysts. Analyst forecast dispersion reflects differences of opinion among analysts (Diether, Malloy, and Scherbina, 2002), and prior research shows that firms engaging in more comprehensive disclosure practices experience lower levels of analyst forecast dispersion (Lang and Lundholm, 1996). Before green bond issuance, analysts rely on a shared set of public information, along with different sets of private information on issuers' green projects and commitments. Disclosure through green bonds aligns analysts' beliefs, leading to declined disagreement in their forecasts. Moreover, vague disclosures are unlikely to effectively reduce dispersion among analysts. Rajgopal and Venkatachalam (2011) and Bochkay, Markov, Subasi, and Weisbrod (2022) find that the quality of information is inversely related to analyst forecast dispersion. Thus, analyst forecast dispersion is expected to reduce if green bond disclosures are informative.

We analyze the changes in analyst forecast dispersion after the issuance of the first corporate green bond by substituting the dependent variable in Equation (1) with analyst forecast

dispersion (*AFD*). The findings are reported in Table 7. Analyst forecast dispersion is measured as the standard deviation of analysts' one-year-ahead EPS forecasts scaled by the beginning-of-year stock price, following Boone and White (2015). In column (1) of Table 7, the dependent variable is the analyst forecast dispersion, whereas in column (2), it is the natural logarithm of analyst forecast dispersion. Across both specifications, the coefficient on *After GB Issuance* is negatively significant, indicating that analyst forecasts become notably less dispersed following the issuances of the first green bond. The magnitude of the coefficient in column (1) suggests a 5.75% reduction in analyst forecast dispersion after green bond issuances, which is equivalent to a 10% reduction of sample standard deviation of forecast dispersion.

The observed outcome indicates that the reduction in forecast errors is not a consequence of increased disagreement regarding future earnings of green bond issuers. Instead, differences of opinions among analysts reduce following green bond issuance. This decrease in forecast dispersion aligns with the idea that incremental information associated with green bonds improves the precision of the shared public information. The results imply that disclosures accompanying green bonds are informative and relevant, facilitating greater consensus among analysts and resulting in a less dispersed distribution of analyst forecasts.

5.1.2 Placebo Tests and the Uniqueness of Green Bond Information

This section examines the informational uniqueness of green bonds by differentiating their effects from the impacts of conventional bond issuances through placebo tests isolating the unique characteristics and information carried by green bonds from conventional bonds. We randomly select 703 conventional bond issuers from the pool of all bond issuers, excluding green bond issuers, as placebo treatment firms. We then designate the year of their first bond issuance as the treatment year and run the baseline regression specification in Equation (1).[20] We repeat this procedure 1000 times and plot the histograms of the estimates on the placebo treatment in Figure 3. Figure 3 plots estimated coefficients on the indicator of bond issuance when the dependent variable is analyst forecast error. The true estimate from Table 3 is marked by the black solid line and is on the far negative side of the coefficient distributions. The probability of obtaining the true estimate is 0.12%, indicating that the informational effects are uniquely associated with green bonds, rather than simply with the act of bond issuance.[21]

[20] For the purpose of the placebo test, we define the "first conventional bond" as the firm's initial conventional bond issuance within our sample period.

[21] In cases where green bond issuers are U.S. energy sector firms and their green bonds are allocated energy plant projects, the information in their green bond disclosures may partially overlap with the plant-level operational and financial disclosures mandated by the Federal Energy Regulatory Commission. While other countries do not

We further investigate the impact of conventional bond issuances on a firm's analyst forecast characteristics by replacing the independent variable in the baseline design with a binary variable indicating the first conventional bond issuance. The coefficient estimates for a subsample of conventional bond issuers (excluding green bond issuers) are presented in Table IA7. The issuance of conventional bonds does not have a statistically significant impact on analyst forecast accuracy. The contrast between green and conventional bond issuances highlights a difference in information intensity. Conventional bonds are typically issued for general corporate purposes and offer limited forward-looking operational information. Green bond disclosures provide more granular project-level details. Therefore, the placebo tests and the insignificant estimates for conventional bonds indicate that our results are driven by green bond issuances rather than general bond issuance activities.[22]

5.1.3 Shifts in Environmental Discussion in Analyst Reports

To further understand how financial analysts incorporate the information released with green bond issuances, we examine environment-related discussions in analyst reports for green bond issuers. We collect analyst reports from LSEG covering one year before and one year after a firm's first green bond issuance and compare how analysts discuss each issuer's environmental matters across these two periods.[23] We identify the environment-related content in analyst reports using two methods: a bag-of-words approach and ClimateBERT (Bingler, Kraus, Leippold, and Webersinke, 2024), a language model trained to recognize climate-related language.

For every issuer-analyst pair, we parse analyst reports into paragraphs to quantify the frequency and intensity of green-related discussions in analyst reports. For the bag-of-words method, we construct a dictionary of common "green" root terms (e.g., green, carbon, renew, climate) and flag sentences containing theses terms as green sentences. We define

mandate plant-level financial disclosure, some, including the European Union, require energy sector firms to disclose certain operational information related to energy generation of energy plants. To eliminate the impact of alternative disclosure sources, Table IA8 presents subsample analyses excluding U.S. energy sector firms (column 1) and excluding energy sector firms from all countries (column 2). Our baseline findings are robust, with significantly negative coefficients for both subsamples.

[22] In addition to the analysis of initial green bond issuances, we examine the incremental effects of subsequent issuances (column (1) of Internet Appendix Table IA9) and the ramifications of green bond maturity (column (2) of Internet Appendix Table IA9). Subsequent issuances show limited incremental impact on analyst forecast accuracy, potentially because they typically occur before the initial bond's expiration, thus contributing marginally to the issuer's disclosure schedule and attracting less attention. Moreover, we find no significant reversal of the observed effects following the maturity of all outstanding green bonds.

[23] We restrict our sample to analyst research reports issued by bulge-bracket banks and exclude all non-English reports. Analysts who provide research only before or only after a firm's first green bond issuance are also excluded. The final sample consists of 528 issuer-analyst pairs.

Δ Green Sentences as the change in average number of such sentences per report within a firm-analyst pair before and after the first green bond issuance. This variable captures the shifts in the frequency of environment-related language. Figure 4 illustrates the frequencies of the green sentences by comparing the distribution of firms' average number of green sentences (logged) before and after green bond issuance, calculated within each firm-analyst pair. Figure 4 indicates a rightward shift in the post-issuance period curve, which indicates an increase in green-related sentences within firm–analyst pairs after issuance.[24]

To complement this broad keyword filtering, we quantify the intensity of discussion of green topics with ClimateBERT to assign each paragraph a score showing how strongly it focuses on environmental topics. The scores are averaged across analyst reports to measure how much attention analysts pay to environmental issues. *Δ Green Score* is computed as the difference between green score of each firm-analyst pair before and after the first green bond issuance. Additionally, the ClimateBERT has a specificity model that evaluates the degree to which the environment-related discussion conveys detailed and measurable information. *Δ Green Specificity* is defined as the difference between the average specificity scores for the pre- and post-issuance periods within each firm-analyst pair. This variable captures whether analysts' green communication becomes more specific or remains general following green bond issuance.

We also measure shifts in analysts language using *Textual Dissimilarity* (Dyer, Roulstone, and Van Buskirk, 2024). We compare the environment-related discussion between the pre- and post-issuance analyst reports within the same firm-analyst pair. We then encode discussions in analyst reports into numerical embeddings using the Sentence-Transformers model (Reimers and Gurevych, 2019; Breitung and Müller, 2025). This variable, defined as one minus the cosine similarity between embeddings, captures the extent to which the nature of green discussions changes.

We test the differences in median value in environment-related discussion before and after green bond issuances across firm-analyst pairs with the Wilcoxon signed-rank test. Across 528 firm–analyst pairs, the test result indicates that the positive median *Δ Green Sentences* and

[24] The two-sample Kolmogorov-Smirnov test shows a statistically significant difference between the distributions of average green sentences in the pre- and post-issuance, with a test statistic of 0.076 and a p-value of 0.039. We additionally plot changes in average number of green related sentences in Figure IA7 of Internet Appendix. Each point in represents a firm-analyst pair, with colors and symbols indicating whether post-issuance averages are higher, lower, or unchanged relative to pre-issuance values. 289 firm-analyst pairs have higher post-issuance averages of green sentences, 210 show decreases, and 29 remain unchanged.

Δ Green Score post-issuance are significant, with a test statistic of 73,504 ($p < 0.01$) and 77,779 ($p = 0.02$), respectively. For a subsample of 378 firm–analyst pairs, the median *Δ Green Specificity* is 0.168, with a test statistic of 18,947 ($p < 0.01$). Table 8 reports regression results examining how shifts in analyst environment-related language around green bond issuance relate to changes in their environment-related communication. The positive and statistically significant coefficients for *Textual Dissimilarity* indicate that greater shifts in analysts' wording correlate with larger increases in frequency (*Δ Green Sentences*), intensity (*Δ Green Score*), and specificity (*Δ Green Specificity*) of environmental content. These results indicate that the rise in green discussion post-issuance is not a mechanical reaction to the event or a repetition of prior information. Instead, analysts rework their narratives to actively process the granular information emerging from green bond disclosures. Analysts who revise their language in reports more extensively around green bond issuances also expand and deepen their environmental discussions.

5.1.4 Issuance Characteristics and Informativeness

In this subsection, we explore whether the effects of green bond issuance on analyst accuracy varies with the informativeness of disclosure associated with the issuance. While issuing a green bond can convey environmental commitment, issuers differ in the extent to which their green bond issuances generate decision-useful information for investors and analysts. We proxy the informativeness of green bond disclosures with the size of the initial green bond issuance and whether the issuer's core business is inherently tied to the green economy. We define two binary variables: (1) *Large Volume Issuance,* which indicates whether the volume of the initial green bond issuance exceeds the average issuance volume, and (2) *Pure Play*, denoting whether a firm operates exclusively within environmentally sustainable sectors.[25]

In column (1) of Table 9, we examine the intensive margin of green bond issuances by replacing the binary treatment variable to *GB Issuance Volume*, a continuous treatment variable that corresponds to the green bond issuance volume after the first issuance and zero otherwise. The coefficient on *GB Issuance Volume* is negative and statistically significant, which suggests that larger green bond issuances are associated with greater improvements in analyst forecast accuracy.[26] We next incorporate interactions of informativeness measures with *After GB*

[25] The sizes of green bonds are scaled by the total assets of the issuer. In this study, we define the firms whose green revenue exceeds 90% of their total revenue as "pure play" green companies. We use the green revenue data from the FTSE Russell Green Revenues.

Issuance. Column (2) of Table 9 shows that estimation results for the interaction between *Large Volume Issuance* and *After GB Issuance* is negative and significant. This coefficient confirms that the enhancements in analyst forecasts are more pronounced for firms issuing larger-sized green bonds. Column (3) of Table 9 shows that the interaction between the indicator for "pure play" green companies and *After GB Issuance* is negative and statistically significant.

The empirical evidence in Table 9 suggests that the informational effects of green bond issuances are stronger when the issuance is more likely to generate more salient and decision-useful information. Large-scale issuances typically involve more extensive green bond disclosures, increasing the amount of incremental information released to the firm's information environment. For pure-play issuers, green bond disclosures map more directly to their core business activities, making the disclosed information particularly informative for analysts.

5.2 Information Accessibility and Dissemination

5.2.1 Disclosure Accessibility

The accessibility of disclosures released during and after green bond issuances plays a crucial role in determining the ability for new information to reach its intended recipients and in reducing the information processing costs for investors and analysts. Maintaining a high level of information accessibility facilitates new information flow into the overall information environments. Issuers of green bonds typically report their green project details and progress through their official websites. Nevertheless, some issuers restrict their disclosure documentation exclusively to data vendors, while a portion of issuers choose to abstain from disclosing information. Since our analyses focus on first-time green bond issuances, the availability of pre-issuance disclosures is particularly useful for investors and analysts around the time of issuance.

Within a sample of green bond issuers, we interact the variable indicating green bond issuances with three binary variables measuring the accessibility of green bond information. *Disclosures Publicly Available* denotes the accessibility of green bond disclosure documentation through search engines. *Disclosures Available on Official Websites* stands for the presence of green bond-related disclosures on issuers' official websites. *Pre-issuance Disclosures Available* indicates whether a green bond issuer publishes pre-issuance documents

detailing their green projects and environmental initiatives.[27] In cases where green bond issuers that do not make the information available, analysts and investors would have to search for relevant information through press releases and other sources. The process of information retrieval can be tedious and may impede the effectiveness of information dissemination.

We report the regression results of adding the interaction term denoting disclosure accessibility to the baseline specification in Equation (1) in Table 10. Column (1) addresses the overall accessibility of disclosures on search engines. The interaction between *Disclosures Publicly Available* and *After GB Issuance* is negatively significant, indicating that the negative impact of green bond issuances on the average analyst forecast error is estimated to be 0.83% greater for firms with better information accessibility compared to those whose disclosures are not publicly available. The negative significant coefficients on the interaction terms in columns (2) and (3) of Table 10 also suggest that the reduction of analyst forecast error is significantly larger when green bond issuers publish their disclosures on official websites and release pre-issuance documents.

The findings in Table 10 highlight the importance of information accessibility. The enhancement of the corporate information environments resulting from green bond issuance is particularly pronounced when disclosures effectively flow to intended readers. These results confirm that disclosures, rather than general media coverage, drive the improvements in forecast accuracy. If the effects were merely outcomes of heightened public attention, the accessibility of green bond documents would be less relevant. The informational value of these disclosure also explains the persistent effects observed in Figure 2. Green bond frameworks and post-issuance reports typically address the plans for sustainability efforts of the issuers within the life of a green bond or even over a longer future horizon. It is also a common practice for issuers to release updated versions of the green bond disclosures every one or two years. While public attention may fade quickly, the information contained in green bond disclosures can continue to be valuable to the analysts over a longer period after the initial issuance.[28]

[27] We measure the presence of pre-issuance disclosures through the availability of second party opinions on green bond frameworks. Pre-issuance disclosures of green bonds usually consist of green bond frameworks and second-party opinions. While some of the issuers delete their frameworks after green bond issuances, SPO providers typically maintain access to the SPOs on their websites. The presence of an SPO implies the presence of a framework, even though the framework might have been deleted.

[28] Green bonds' information benefits extend beyond the issuer and propagate through corporate ownership structures. An analysis of parent and sister companies (Internet Appendix Table IA6) shows that green bond issuances improve the analyst forecast accuracy for immediate parents, but not ultimate parents. The results in Table IA6 also indicate that green bond issuances bring positive spillover effects to the information environments to sister firms of the green bond issuers.

5.2.2 Enhanced Information Dissemination

Prior literature documents a growing demand for sustainable assets among institutional investors (Krueger, Sautner, and Starks, 2020) and increased of media coverage following green bond issuances (Lu, 2025). Building on this evidence, we examine whether green bond issuances are followed by stronger information dissemination. Specifically, we test whether green bond issuances attract attention from media and institutional investors, key intermediaries in disseminating and processing the incremental information disclosed with green bonds. We estimate the specification in Equation (1) with an alternative set of dependent variables that are measures of attention from different parties.

We measure media attention using news article data from RavenPack, with articles considered directly relevant when their firm relevance scores exceed a threshold of 90. We take the logged number of news articles related to a firm each year (*News Coverage*) to measure media attention and use the percentage of institutional ownership (*Inst Ownership*) to quantify attention from institutional investors. Table IA10 of the Internet Appendix report the results. Corporate media visibility increases significantly following the first issuance of green bond. Column (1) shows an increase in news coverage, and column (2) yields similar results when restricting the sample to business articles and excluding articles related to lawsuits, the macro economy, and politics. Column (3) of Table IA10 shows that the issuances of green bonds are associated with a 1.24% unit increase in institutional ownership. The results in Table IA10 confirm that after the issuance of the first green bond, issuers attract incremental attention from key information intermediaries. [29]

5.3 Real Effects and Earnings Stability

Beyond signalling environmental commitments, green bonds may also be associated with gradual changes in a firm's operations and risk profiles. Over longer horizons, investments in green projects can contribute to resilience by fostering operational efficiency. Accordingly, green bond issuances may link to certain real effects if issuers undertake investments or adopt practices that enhance efficiency, potentially resulting in more stable earnings. Hoepner, Oikonomou, Sautner, Starks, and Zhou (2024) provide evidence that corporate environmental engagement can be accompanied by improvements in corporate risk profiles. Motivated by this

[29] We also examine whether green bond issuance strengthen firms' internal control practices. We use the number of earnings guidance announced in a year and EPS announcement delay as measures of internal control. We find that although green bond issuances were followed by a significant reduction in EPS announcement delay, there is not significant change in the number of guidance provided each year, as shown in Table IA11 of Internet Appendix.

perspective, we examine whether green bond issuance is associated with greater operational stability, as reflected in changes in stock return volatility and earnings volatility.

We use stock return volatility as a market-based proxy for firm uncertainty that partly reflects underlying stability. Prior research shows that stock volatility embeds forward looking uncertainty of a firm (Bekaert, Engstrom, and Xing, 2009). We measure stock volatility as the standard deviation of daily stock returns over the fiscal year. Earnings volatility is measured as the standard deviation of asset-scaled earnings before extraordinary items over the most recent three-year rolling window, following Dichev and Tang (2009). Panel A of Table 11 shows that green bond issuances are associated with significant reductions in both volatility measures. Columns (1) and (2) indicate that stock volatility and its logarithm transformation decline significantly following issuance. Columns (3) and (4) show parallel declines in raw and logged earnings volatility.

The reduction in stock return volatility and earnings volatility is consistent with the possibility that green bond issuance is accompanied by shifts in firms' real activities, such as improved operational efficiency or strengthened risk management practices. For example, investments in energy-efficient technologies may lower operating costs and stabilize performance, while more rigorous environmental risk assessments may reduce operational disruptions. Results in Panel A suggest that firm performance becomes more stable after issuance, which may contribute to improved forecastability.

To further distinguish whether the improvement in analyst forecast accuracy is primarily driven by enhanced information or by changes in stability, we examine analyst forecast error scaled by both stock return volatility and earnings volatility. A decline in these ratios indicates that forecast accuracy improves beyond the corresponding volatility decreases, suggesting that lower volatility does not fully account for the observed improvement in analyst performance. In column (1) of Panel B in Table 11, the negative and significant coefficient on *After GB Issuance* indicates that forecast error relative to stock volatility declines following issuance. Column (2) shows a similar decline in forecast error relative to earnings volatility. These findings show that while changes in stability contribute to earnings predictability, they do not fully explain the observed post-issuance improvement in analyst performance. Instead, the results indicate that enhanced information transparency, which we examined in the previous section, also plays a role in shaping analyst forecast accuracy.

5.4 Analyst Attention and Information Incorporation

Analysts actively pay attention to firms' environmental practices (Sautner, Vilkov, van Lent, and Zhang, 2025). Analysts may allocate more attention to green bond issuers, as incremental green bond disclosures prompt analysts to re-engage with prior forecasts. Figure 5 visually captures this re-engagement by plotting the cumulative proportion of analysts revising their forecasts after green bond and conventional bond issuance. The divergence between the two groups illustrates that green bond issuances trigger a swifter wave of forecast updates relative to conventional bond issuances. To capture analyst attention and the intensity with which analysts incorporate novel firm information into their forecasts, we use a binary variable indicating whether a firm is covered by at least one analyst (*Analyst Coverage*) and the per-analyst frequency of forecast revisions (*Revisions per Analyst*), following Harford, Jiang, Wang, and Xie (2019). These measures reflects the extent of analyst attention and the frequency with which analysts re-engage with their forecasts to incorporate newly available information overtime. Replacing the dependent variable in our baseline specification with *Analyst Coverage* and *Revisions per Analyst*, columns (1) and (2) of Table 12 Panel A report positive and significant coefficients on *After GB Issuance*. Specifically, green bond issuance is associated with greater analyst coverage and an increase of approximately 1.25 forecast revisions per analyst, consistent with analysts actively incorporating information accompanying green bond issuance into their forecasts.

The extent to which additional nonfinancial information associated with green bond issuance improves analysts' financial forecasts depends on whether analysts actively re-engage with and reconsider their prior earnings expectations. While green bond disclosures convey information about firms' operations, investment activities, and risk profiles, such nonfinancial information only affects forecasts if analysts have the capacity to incorporate it. Prior studies show that analyst-specific constraints limit their ability to re-evaluate existing beliefs (Kothari, So, and Verdi, 2016). Specifically, concurrent issuance of earnings forecasts across multiple companies (Drake, Joos, Pacelli, and Twedt, 2020) and decision fatigue (Hirshleifer, Levi, Lourie, and Teoh, 2019) reduce the depth of firm-specific analysis. We examine whether these forecast bundling and decision fatigue, two frictions that may limit analysts' capacity of re-engagement, attenuate the incorporation of green bond information into earnings forecasts.

We define *Bundled* as an indicator for firms where over 25% (the sample median) of covering analysts issue forecasts for multiple firms on the same day. We proxy for decision fatigue using *Decision Rank*, the log of one plus the cumulative number of forecasts an analyst

issues earlier on the same day. In Table 12, Panel B, the positive and significant coefficients on the interactions between *After GB Issuance* and *Bundled* (column 1) and Decision Rank (column 2) indicate that the reduction in forecast error following green bond issuance is significantly smaller when analysts face these cognitive constraints. This evidence is consistent with analysts being less able to revisit and adjust their financial expectations when cognitive demands limit their engagement with forecasts. Taken together, Panel B of Table 12 suggests that nonfinancial disclosures improve earnings forecasts primarily when analysts have sufficient capacity to re-engage and rethink their assessments.

6 Conclusion

The global green bond market has been growing, and understanding the implications of corporate green bond issuances is imperative for the development of sustainable finance. This study explores the impacts of corporate green bond issuances on analyst earnings forecasts. We show evidence that a firm's issuance of its first green bond reduces its average analyst forecast error in subsequent years. The relationship between green bond issuance and analyst forecast accuracy is particularly stronger in countries with weaker disclosure requirements.

The issuances of green bonds influence the precision of analyst forecasts primarily through novel information disclosure. We find evidence that the positive impact of green bond issuance is more pronounced for firms that make their green bond disclosure accessible to investors. Additionally, after the issuance of the first green bond, issuers attract increased attention from analysts, media, and institutional investors, which can further disseminate and translate green bond-related disclosures into the information environment. Overall, our evidence suggests that corporate green bonds can improve corporate information environments by increasing the availability and reach of novel information. This paper highlights a positive effect of issuing corporate green bonds on corporate information environments and adds to the literature exploring the impacts of corporate green bonds.

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Appendix A. Variable Definitions

Variable	Definition	Source
Analyst Forecasts		
AFE	Analyst forecast accuracy. The absolute value of the difference between the actual annual EPS for a firm and the median of the last estimates by analysts following a firm before the earnings announcement scaled by beginning-of-year share price (in percentage).	I/B/E/S, Worldscope
AFD	Analyst forecast dispersion. The standard deviation of analyst annual earnings estimates scaled by beginning-of-year share price (in percentage).	I/B/E/S, Worldscope
Horizon	The number of days from analyst forecast date to earnings announcement being forecasted date and averaged over all analysts following a firm.	I/B/E/S
Bundled	A dummy variable that equals to one when more than 25% (the sample median) of analysts following a firm release earnings forecasts for multiple companies on the day of the focal firm's forecast issuance, and zero otherwise.	I/B/E/S
Decision Rank	The logarithm value of one plus the cumulative number of same-day forecasts made prior to the firm's forecast release, averaged across all analysts covering the firm.	I/B/E/S
Forecast Bias	Analyst forecast bias. The difference between actual annual EPS and the consensus forecast, scaled by beginning-of-year share price (in percentage).	I/B/E/S, Worldscope
Green Bond Issuances		
GB Issuer	A dummy variable that indicates whether a firm is a green bond issuer.	Environmental Finance, Bloomberg, LSEG
After GB issuance	A dummy variable that equals one if a firm has issued its first green bond and zero if a firm has not yet issued a green bond.	Environmental Finance, Bloomberg, LSEG
Large Volume Issuance	A dummy variable that indicates whether the volume of the initial green bond issuance exceeds the average green bond issuance volume, and zero otherwise.	Environmental Finance, Bloomberg, LSEG
Pure Play	A dummy variable that equals one when green revenue accounts for over 90% of a firm's total revenue, and zero otherwise.	FTSE Russell
Green Bond Disclosures		
Disclosures Publicly Available	A binary variable that equals to one if an issuer's green bond disclosure documents are accessible via search engines, and zero otherwise.	Hand collected
Disclosures Available on Official Websites	A binary variable indicating whether a green bond issuer posts their green bond disclosure files on official websites.	Hand collected
Pre-issuance Disclosures Available	A binary variable that equals one if a firm publishes pre-issuance green bond disclosures, and zero otherwise.	Hand collected
Analyst Reports		
Δ Green Sentences	Change in the average number of sentences containing environment-related keywords per analysts' report for the same firm-analyst pair after green bond issuance	LSEG
Δ Green Score	Change in the average ClimateBERT detection score capturing the intensity of environment-related language within the same firm-analyst pair before and after green bond issuance.	LSEG
Δ Green Specificity	Change in the average ClimateBERT specificity score of environment-related text for the same firm-analyst pair before and after green bond issuance	LSEG
Textual Dissimilarity	One minus the cosine similarity between pre- and post-issuance text embeddings, computed using Sentence-Transformers, based on keyword-identified environment-related content in analyst reports within the same firm-analyst pair.	LSEG

Appendix A. Variable Definitions – *Continued*

Variable	Definition	Source
Analyst and Media Coverage		
Analyst coverage	The number of unique analysts issuing estimates for a firm in a fiscal year.	I/B/E/S
News Coverage	The logged number of news articles related to a firm in a year.	RavenPack
Business News Coverage	The logged number of business news articles related to a firm.	RavenPack
Control Variables		
Size	Total assets of a firm in US dollars.	Worldscope
Leverage	The ratio of total debt to total assets.	Worldscope
M/B ratio	Market-to-book ratio. Calculated as market capitalization divided by book value of equity.	Worldscope
ROA	Return on assets. Calculated as the net income divided by total assets.	Worldscope
Capex	Capital expenditure scaled by total assets.	Worldscope
PPE	Property, plant, and equipment scaled by total assets.	Worldscope
RD	Research and development expense scaled by total assets. Coded as 0 if missing.	Worldscope
Sales growth	Sales growth rate over a fiscal year.	Worldscope
Excess yearly return	Compounded 12-month stock return less the 12-month compounded return of a value weighted index of consisting of listed firms in a firm's home country.	Worldscope
Stock Issuance	A dummy variable indicating whether a firm has issued equity in a fiscal year	Worldscope
Bid-ask spread	Yearly median value of the daily bid-ask spreads of a firm, calculated as the difference between the daily closing bid price and ask price divided by the midpoint. Coded as missing if the bid-ask spread is greater than one, less than zero, or the number of observations is less than 120 in a year.	LSEG Refinitiv
GDP per capita	GDP per capita (in thousands of US dollars) of the country where the firm is headquartered.	World Bank
Other Variables		
Guidance count	The number of management EPS forecasts issued in a fiscal year.	Capital IQ
EPS announcement delay	The number of days between fiscal year end and EPS announcement date.	Worldscope, I/B/E/S
Stock Return Volatility	The standard deviation of daily stock returns over a fiscal year	Worldscope
Earnings Volatility	the standard deviation of earnings before extraordinary items (scaled by total assets) for the most recent five years, multiplied by a factor of 100.	Worldscope

Appendix B. Cases of Green Bond Mentioned in Earnings Calls and Analyst Reports

Case 1: Xylem Inc Q2 2020 Earnings Call (July 30, 2020)

Xylem Inc is an American water technology firm During Xylem Inc's Q2 2020 earnings call, an analyst raised a question regarding the basic understanding of green bonds. The CEO explained the characteristics of green bonds. The CFO then elaborated that their sustainability goals are independently verified by third parties and emphasized the substantial oversubscription and favorable pricing for green bonds.

Question from Scott Reed Davis - CEO & Research Analyst at Melius Research

*"Anyway, I have a couple of questions if you entertain me a little bit. The first one is just, Patrick, can you help me understand what a **green bond** is? I mean what's -- other than it sounds good. And I know, obviously, optics matter, too. But what does it mean? Just leave it at that."*

Answer from Patrick K. Decker - CEO of Xylem Inc

"Yes. I'll kick it off, and then Mark can go through a little bit more of the granularity. But effectively, it's a financing structure that is tied to certain KPIs that we have to deliver on in order to be able to achieve that financing. And it really is tied to our sustainability goals and metrics as a company. But Mark, if you want to get there?"

Answer from E. Mark Rajkowski - CFO of Xylem Inc

"That's right, Patrick. Our 2025 goals. And the way it works is, as we achieve those goals, we get credit. Those goals are audited, that performance is audited by Sustainalytics. And -- but it's interesting. In addition to the benefit on the rate, what was fascinating was the amount of demand that we got from investors who are focused on sustainable missions. And the offering was 5x oversubscribed in those small parts to the fact that we had almost 50% of those investors as focused on sustainable mission. So not only do we have an opportunity by executing against our very important sustainability goals to drive the rate down, but it was very helpful from a pricing perspective."

Case 2: RBC Capital Markets' Analyst Research Report on Verizon (August 27, 2021)

Verizon is an American telecommunication company. The equity analyst report by RBC Capital Markets cited details from the green bond impact report, highlighting the allocation of green bond proceeds and their project outcomes.

*"Verizon issued its **Green Bond Impact Report**, outlining the full allocation of the nearly $1B of net proceeds from its second green bond. Management commented: "To date, we have issued $2B in green bonds that support the transition to a greener grid and help us achieve our ambitious goal of net zero emissions in our operations by 2035." Verizon has fully allocated the net proceeds of its second green bond entirely to virtual power purchase agreements for renewable energy projects. These projects are for approximately 1 GW of new renewable energy generating capacity across seven states, of which about 83% is solar energy generating capacity and 17% is wind energy generating capacity."*

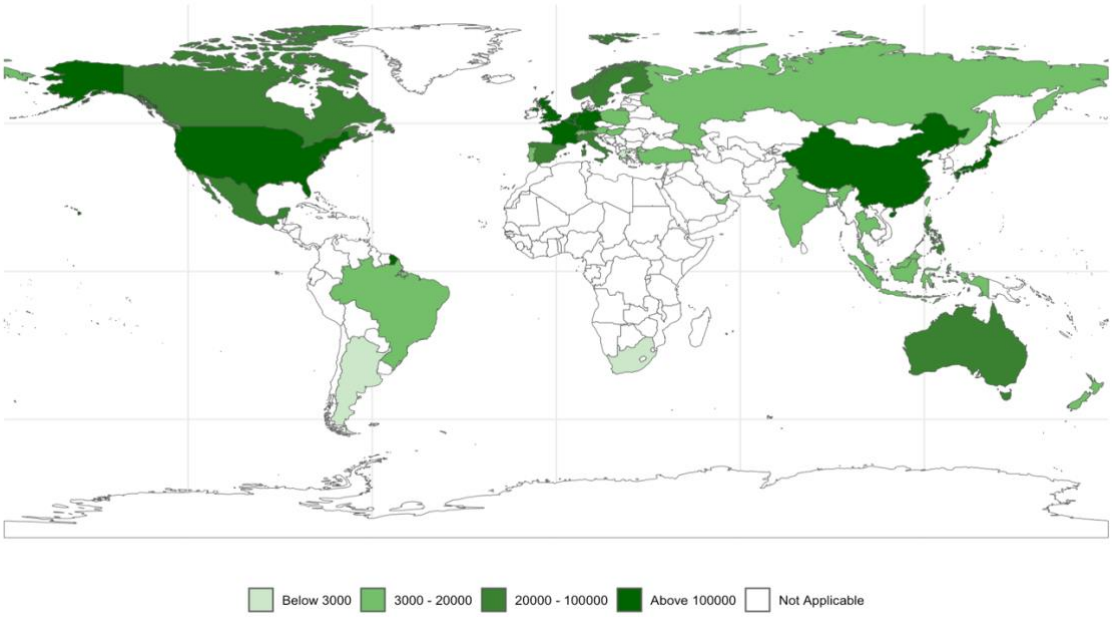


Figure 1. Global Green Bond Issuances
This figure presents the volume of green bond issuances in millions of USD from 2010 through 2023 in the 40 countries covered in the sample. Darker colors indicate greater green bond issuance volume.

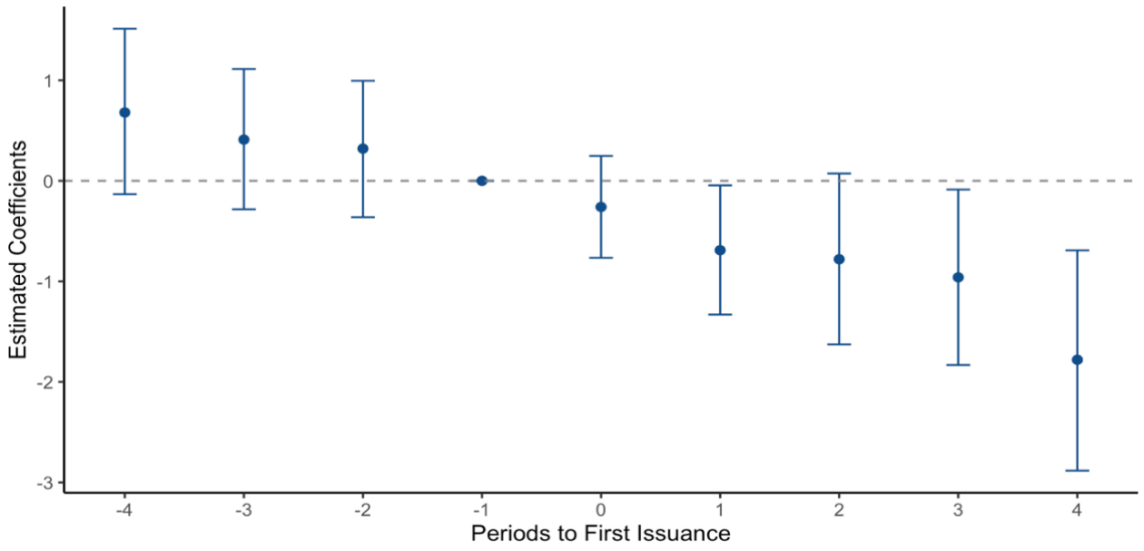


Figure 2. Analyst Forecast Error Around Corporate Green Bond Issuances
This figure plots the estimated coefficients and the 95% confidence intervals for the baseline regression that explores the impact of the first green bond issuance on analyst forecast error. We replace the independent variable in Equation (1) with the year relative to the first green bond issuance and take year t-1 as the benchmark year. The horizontal axis represents the relative year to the first green bond. The sample covers the period of 2010 - 2022. Standard errors are clustered by firm.

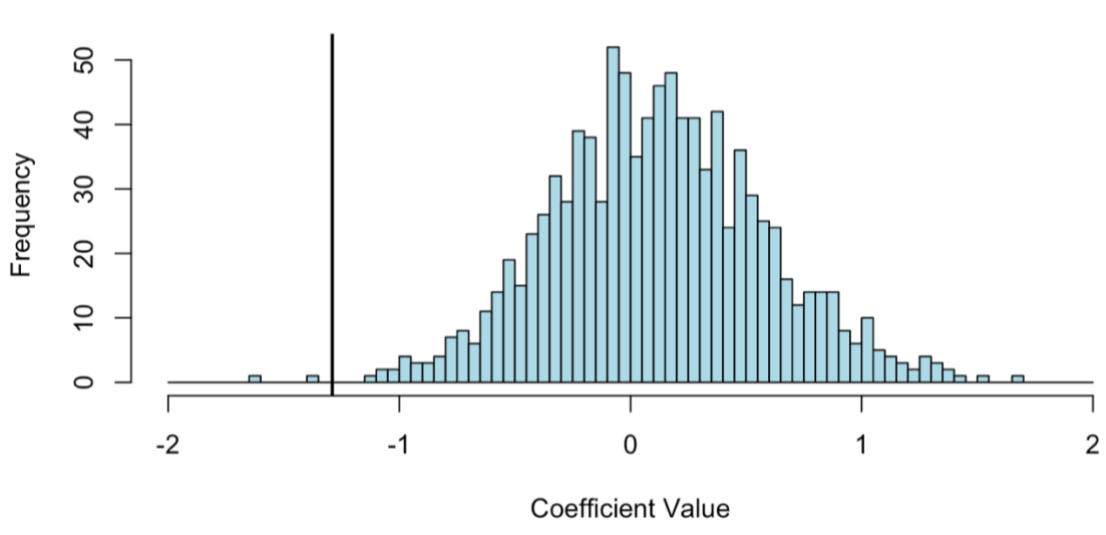


Figure 3. Coefficient Distributions of Placebo Tests
This figure shows histograms of the regression coefficients of a binary variable indicating bond issuance from 1000 placebo runs where we substitute green bond issuers with 703 conventional bond issuers randomly drawn from the sample of non-green bond issuers. The solid black vertical line represents the estimated coefficient from the regression specification in Equation (1) with analyst forecast error as the dependent variable.

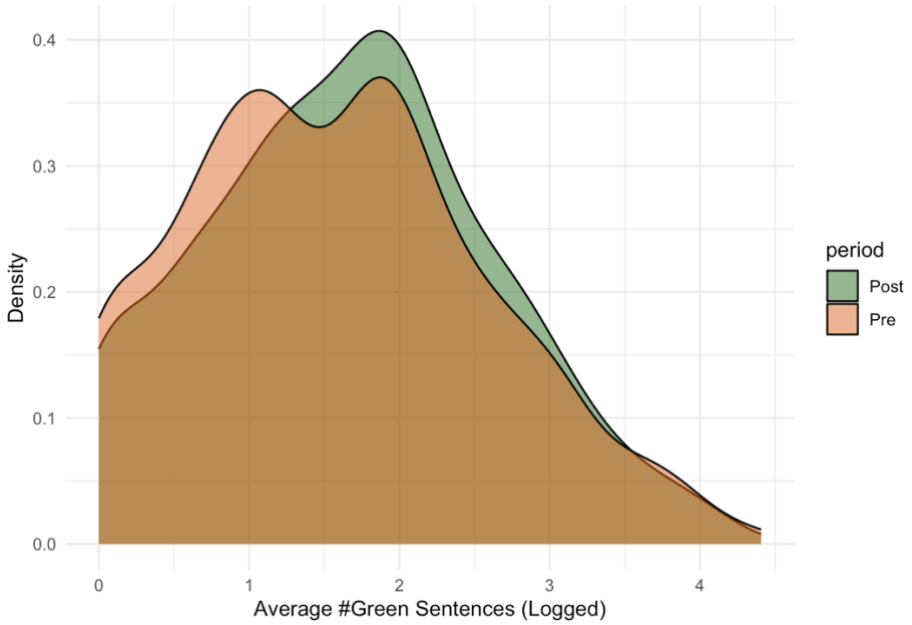


Figure 4. Changes in Analyst Green Discussion Following Green Bond Issuance
This figure shows the distribution of the logged number of green-related sentences pre- and post-issuance per analyst report before and after a company's first green bond issuance. The orange curve represents the pre-issuance distribution, while the dark green curve represents the post-issuance distribution.

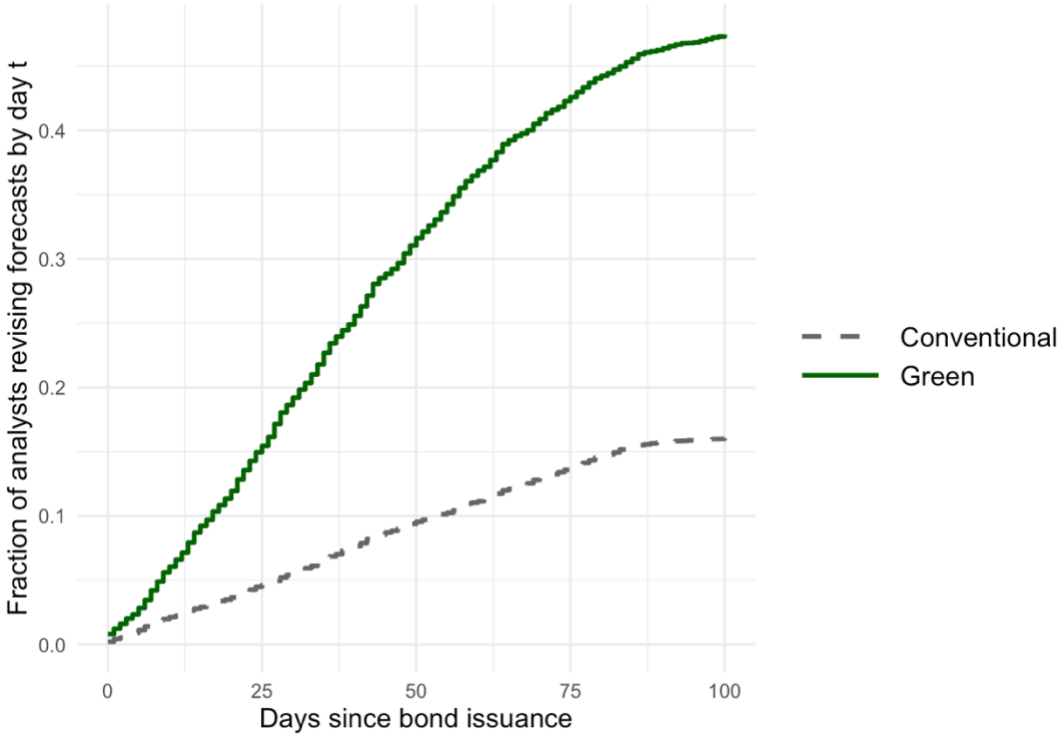


Figure 5. Cumulative Fraction of Analysts Revising Forecasts After Bond Issuance
This figure plots the cumulative fraction of analysts who revise their earnings forecasts within 100 days following a corporate bond issuance. The green solid line represents forecast revisions following the issuance of the first green bond, while the grey dashed line represents revisions following conventional bond issuances. The sample is restricted to analysts who provided pre-issuance coverage of the issuing firm. The horizontal axis denotes the number of days elapsed since the bond issuance date.

Table 1. Summary Statistics

This table reports the summary statistics of the key variables used in the regression analyses. The sample covers public firms from 40 countries with available analyst forecast data. Panel A reports the number of listed green bond issuers and the number of listed conventional bond issuers by country. Panel B reports summary statistics of the main variables. Panel C reports the mean and standard deviation of main variables for green bond issuers and conventional bond issuers separately. The sample comprises firm-year observations from 2010 to 2022. Definitions of variables are in Appendix A. Continuous variables are winsorized at the 1% and 99% percentiles.

Panel A. Country breakdown

	#Corporate GB Issuers	#Corporate Bond Issuers	#GB Issuers with Analyst Forecasts	#Bond Issuers with Analyst Forecasts
Argentina	2	13	2	9
Australia	7	59	7	57
Austria	13	23	5	22
Belgium	11	32	7	31
Brazil	18	122	8	99
Canada	20	221	17	195
China	147	1098	116	959
Denmark	7	16	7	16
Finland	12	38	7	34
France	28	134	25	131
Germany	25	121	16	106
Greece	4	15	3	14
Hong Kong	19	104	17	90
Hungary	4	9	3	7
India	14	340	11	294
Indonesia	6	65	3	57
Israel	2	37	2	30
Italy	21	89	15	74
Japan	187	645	139	606
Korea (South)	58	815	54	576
Malaysia	1	130	1	117
Mexico	6	42	3	42
Netherlands	10	36	7	31
New Zealand	8	25	8	25
Norway	31	97	25	82
Philippines	6	38	4	34
Poland	4	72	4	58
Portugal	3	17	1	15
Russian Federation	2	61	2	54
Singapore	7	73	5	64
South Africa	8	38	6	38
Spain	13	46	13	46
Sweden	51	94	33	84
Switzerland	12	62	10	57
Taiwan	17	454	16	372
Thailand	13	116	9	94
Turkey	11	60	9	52
United Arab Emirates	5	14	5	12
United Kingdom	21	35	6	32
United States	89	1241	72	1130
Total	923	6747	703	5846

Table 1. ─ *continued*

Panel B. Summary statistics of main variables						
	N	Mean	Std. Dev.	p5	Median	p95
Analyst count	51280	10.23	7.86	1	8	27
AFE	51280	4.35	10.82	0.07	1.29	17.36
AFD	43181	14.79	55.84	0.02	1.16	59.05
After GB issuance	51280	0.03	0.18	0	0	0
GB issuer	51280	0.14	0.35	0	0	1
Log(Size)	51280	21.92	1.83	18.91	21.86	25.29
Leverage	51280	0.3	0.2	0.02	0.28	0.62
M/B ratio	51280	2.49	4.04	0.46	1.59	7.57
ROA	51280	0.03	0.11	-0.07	0.03	0.13
GDP per capita	51280	0.04	0.02	0	0.04	0.07
Capex	51280	0.04	0.05	0	0.03	0.14
PPE	51280	0.3	0.26	0	0.24	0.82
R&D	51280	0.02	0.04	0	0	0.08
Excess yearly return	51280	-0.05	0.45	-0.63	-0.11	0.66
Stock issuance	51280	0.12	0.33	0	0	1
Sales growth	51280	0.04	0.36	-0.3	0.06	0.38
Horizon	51280	103.55	46.54	40.12	97.25	189
Bid-ask spread	51280	0.35	0.67	0.02	0.18	1.23

Panel C. Summary statistics for green bond issuers and conventional bond issuers						
	Green bond issuers			Conventional bond issuers		
	N	Mean	SD	N	Mean	SD
Analyst count	7146	13.19	8.5	44134	9.76	7.65
AFE	7146	3.07	7.27	44134	4.55	11.28
AFD	6524	7.09	27.56	37038	16.14	59.34
After GB issuance	7146	0.24	0.43	44134	0	0
Log(Size)	7146	23.41	1.55	44134	21.68	1.76
Leverage	7146	0.33	0.18	44134	0.29	0.2
M/B ratio	7146	1.83	3.09	44134	2.6	4.16
ROA	7146	0.03	0.05	44134	0.03	0.11
GDP per capita	7146	0.04	0.02	44134	0.04	0.02
Capex	7146	0.04	0.05	44134	0.04	0.05
PPE	7146	0.33	0.31	44134	0.29	0.25
R&D	7146	0.01	0.02	44134	0.02	0.05
Excess yearly return	7146	-0.07	0.36	44134	-0.05	0.47
Stock issuance	7146	0.07	0.25	44134	0.13	0.34
Sales growth	7146	0.04	0.25	44134	0.04	0.38
Horizon	7146	104.2	41.42	44134	103.44	47.31
Bid-ask spread	7146	0.29	0.47	44134	0.36	0.69

Table 2. Green Bond Issuance and Analyst Forecasts

This table presents the impacts of the green bond issuances on financial analyst earnings forecast accuracy. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Definitions of variables are in Appendix A. The sample comprises firm-year observations from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)	Forecast Error (3)	Forecast Error (4)
After GB Issuance	-1.32***	-1.44***	-1.25***	-1.29***
	(-7.02)	(-5.48)	(-6.18)	(-5.51)
Log(size)			-0.31***	-0.77***
			(-4.94)	(-3.48)
Leverage			3.50***	4.45***
			(6.95)	(4.67)
M/B			-0.10***	-0.03*
			(-5.59)	(-1.84)
ROA			-25.38***	-28.10***
			(-6.84)	(-5.97)
GDP per capita			-13.31***	-50.62***
			(-3.92)	(-3.88)
Capex			-2.81*	-15.77***
			(-1.76)	(-7.58)
PPE			1.85***	3.97***
			(4.88)	(3.42)
R&D			-17.90***	-22.80***
			(-7.21)	(-3.51)
Excess Yearly Return			-2.86***	-2.79***
			(-16.04)	(-15.95)
Stock Issuance			-0.46**	-0.18
			(-2.32)	(-1.01)
Sales Growth			-2.77***	-1.93***
			(-9.40)	(-6.52)
Analyst Count			-0.04***	-0.18***
			(-3.88)	(-8.11)
Horizon			-1.73***	0.29
			(-3.67)	(0.58)
Bid-Ask Spread			1.68***	1.96***
			(6.98)	(5.50)
Constant	YES	YES	YES	YES
Firm FE	NO	YES	NO	YES
Year FE	NO	YES	NO	YES
Observations	51280	51280	51280	51280
Adj. R2	0.001	0.25	0.15	0.34

Table 3. Robustness of the Impact of Green Bond Issuance

This table presents the robustness results regarding the impacts of the green bond issuances on analyst earnings forecast accuracy. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Panel A includes estimation results of using green bond announcement dates as the treatment dates, an alternative control group, and a sample that excludes banks. Panel B reports estimation results of applying alternative calculation methods to the dependent variable. Panel C reports the results with alternative regression designs. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Announcement dates and an alternative sample

	Announcement Dates	Alternative Control Group	Excluding Banks
	Forecast Error	Forecast Error	Forecast Error
	(1)	(2)	(3)
After GB Announcement	-1.27***		
	(-5.43)		
After GB Issuance		-1.05***	-1.33***
		(-4.84)	(-4.74)
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	51280	133771	45203
Adj. R2	0.34	0.38	0.34

Panel B. Alternative analyst forecast measures

	Three-period Average	Logged Values	Alternative Measures
	Forecast Error	Logged Forecast Error	Forecast Error
	(1)	(3)	(5)
After GB Issuance	-0.84**	-0.07***	-15.05**
	(-2.40)	(-2.80)	(-2.66)
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Dependent variable scaled by	Stock price	Stock price	Actual EPS
Observations	37704	51280	51225
Adj. R2	0.52	0.48	0.15

Panel C. Alternative regression designs

	M-Estimator	Alternative FE	Alternative FE	Alternative FE
	Forecast Error	Forecast Error	Forecast Error	Forecast Error
	(1)	(2)	(3)	(4)
After GB Issuance	-0.35***	-1.38***	-1.02***	-1.18***
	(-3.85)	(-5.99)	(-4.01)	(-4.50)
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Year FE	YES	NO	NO	NO
Country-year FE	NO	YES	NO	YES
Industry-year FE	NO	NO	YES	YES
Observations	51280	51280	50588	50588
Adj. R2	0.41	0.35	0.35	0.36

Table 4. Synthetic Matching

This table presents the matching results examining the impacts of the green bond issuances on analyst earnings forecast accuracy in samples containing green bond issuers and their control units. Green bond issuers are matched to control firms using nearest-neighbor matching in column (1) and synthetic matching in column (2). The dependent variable, analyst forecast error (*AFE*), is defined as the percentage deviation of actual EPS from analysts' consensus forecast, scaled by share price. *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. Nearest-neighbor matching pairs each issuer with the most similar control firm based on Mahalanobis distance, while synthetic controls are weighted averages of conventional bond issuers. Column (1) includes 438 matched issuers and column (2) includes 580 issuers with corresponding synthetic controls Definitions of variables are in Appendix A. The sample comprises firm-year observations from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)
	Nearest Neighbor Matching	Synthetic Matching
After GB Issuance	-0.85** (-2.51)	-0.72*** (-3.75)
Constant	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	10489	12291
Adj. R2	0.27	0.30

Table 5. Instrumental Variable Estimation

This table presents the instrumental variable estimation results examining the impacts of the green bond issuances on analyst earnings forecast accuracy. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. The instrument variable is the logged cumulative number of green bonds underwritten by the investment banks that have previously served as bond underwriters for the firms (*Log cumulative GB managed*). Definitions of variables are in Appendix A. The sample comprises firm-year observations from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	After GB Issuance (1) First Stage	Forecast Error (2) Second Stage
Log Cumulative GB Managed	0.042***	
	(17.91)	
After GB Issuance		-4.30**
		(-2.42)
Log(size)	-0.001	-0.86**
	(-0.18)	(-2.69)
Leverage	-0.02	5.36***
	(-1.43)	(4.24)
M/B	0.001	-0.02
	(1.26)	(-0.90)
ROA	-0.03**	-41.74***
	(-2.06)	(-8.58)
GDP per capita	-0.01***	-0.06***
	(-11.37)	(-3.41)
Capex	0.18***	-13.34***
	(4.60)	(-4.24)
PPE	-0.02	3.03*
	(-0.74)	(1.86)
R&D	0.11	-28.34***
	(1.39)	(-2.99)
Excess Yearly Return	-0.002	-2.74***
	(-1.19)	(-14.05)
Stock Issuance	0.001	0.10
	(0.21)	(0.38)
Sales Growth	0.003*	-2.23***
	(1.61)	(-5.64)
Analyst Count	-0.001	-0.18***
	(-1.00)	(-6.35)
Horizon	-0.012	-0.09
	(-1.40)	(-0.14)
Bid-Ask Spread	-0.01***	3.07***
	(-2.84)	(4.35)
Constant	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Kleibergen–Paap rk Wald F	320.81 (p-value = 0.00)	
Observations	31745	31745
Adj. R2	0.51	0.13

Table 6. Country-Industry Heterogeneity in Green Bond Issuance Impacts

This table illustrates estimation results in subsamples for firms located in different countries and industries. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. In Panel A, we run regressions in subsamples of firms based on their country's SBTi participation rate and whether a firm operates in industries where at least one environmental factor is defined as financially material by SASB. In Panel B, we run tests on subsamples consisting of firms from countries with different levels of regulatory and cultural emphasis on information transparency. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. SBTi participation and environmental materiality

	Forecast Error (1)	Forecast Error (2)	Forecast Error (3)	Forecast Error (4)
	High SBTi Participation	Low SBTi Participation	Env Materiality	No Env Materiality
After GB Issuance	-1.74***	-0.53	-1.47***	-0.51*
	(-5.96)	(-1.29)	(-4.19)	(-1.73)
Controls	YES	YES	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 4.22, *p* = 0.02**		F = 5.61, *p* = 0.04**	
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	25923	25357	35901	15379
Adj. R2	0.33	0.37	0.35	0.34

Panel B. Regulatory and cultural emphasis on information transparency

	Forecast Error (1)	Forecast Error (2)	Forecast Error (1)	Forecast Error (2)
	Strong Disclosure Requirements	Weak Disclosure Requirements	Individualistic Context	Collectivistic Context
After GB Issuance	-0.67**	-2.42***	-2.01***	-0.56*
	(-2.33)	(-3.96)	(-6.17)	(-1.68)
Controls	YES	YES	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 6.74, *p* = 0.01***		F = 9.81, *p* = 0.01***	
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	19009	6751	22651	28553
Adj. R-squared	0.37	0.36	0.34	0.37

Table 7. Analyst Forecast Dispersion

This table examines the impact of green bond issuances on the level of disagreement among analysts. The dependent variable in this table is analyst forecast dispersion (*AFD*), standard deviation of analysts' earnings estimates, scaled by share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Dispersion (1)	Logged Forecast Dispersion (2)
After GB Issuance	-5.75***	-0.03***
	(-5.56)	(-5.70)
Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	43181	43181
Adj. R-squared	0.48	0.59

Table 8. Analyst Green Communication

This table examines analysts' reactions to green bond issuances through changes in the environmental content in their communication with investors. Panels B focuses on changes in analysts' green-related language in analyst reports. *Δ Green Sentences*, *Δ Green Score*, and *Δ Green Specificity* capture changes in analysts' environmental-related discussion, measuring the frequency, intensity, and concreteness of green language in analyst reports at the firm-analyst level (post-issuance minus pre-issuance averages). *Text Similarity* is the cosine similarity between pre- and post-issuance text embeddings on keyword identified green content within firm-analyst pairs. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Δ Green Sentences	Δ Green Score	Δ Green Specificity
	(1)	(2)	(3)
	BoW	ClimateBERT	ClimateBERT
Textual Dissimilarity	1.87*	0.03***	0.27**
	(1.71)	(3.51)	(2.12)
Controls	YES	YES	YES
Year FE	YES	YES	YES
Observations	528	528	366
Adj. R-squared	0.04	0.04	0.05

Table 9. Green Bond Volume and Pure Play Issuers

This table contains regression results of analyses on green bond issuance characteristics. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. The sample for columns (1) and (2) contains green bond issuers, and the sample used in column (3) contains bond issuers with available green revenue data. *Large Volume Issuance* indicates whether the volume of the initial green bond issuance exceeds the average issuance volume. *Pure Play* denotes whether a firm's green revenue exceeds 90% of their total revenue. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)	Forecast Error (3)
GB Issuance Volume	-0.001**		
	(-2.37)		
After GB Issuance		-0.19	-1.11***
		(-0.60)	(-4.31)
*Large Volume Issuance * After GB Issuance*		-0.91**	
		(-2.59)	
*Pure play * After GB Issuance*			-1.39*
			(-1.83)
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	7146	7146	40915
Adj. R2	0.28	0.28	0.30

Table 10. Information Accessibility

This table illustrates the regression results for issuers with different levels of green bond information accessibility. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *Disclosures Publicly Available* equals one if an issuer's green bond disclosure documents are accessible via search engines, and zero otherwise. *Disclosures Available on Official Websites* is a binary variable indicating whether a green bond issuer posts their green bond disclosure files on official websites. *Pre-issuance Disclosures Available* is a variable that equals one if a firm publishes pre-issuance green bond disclosures, and zero otherwise. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Columns (1) – (3) use a sample containing green bond issuers. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)	Forecast Error (3)
Disclosures Publicly Available	-0.83**		
** After GB Issuance*	(-2.18)		
Disclosures Available on Official Websites		-0.78**	
** After GB Issuance*		(-2.11)	
Pre-issuance Disclosures Available			-0.98**
** After GB Issuance*			(-2.19)
After GB Issuance	0.07	0.36	0.11
	(0.30)	(0.10)	(0.27)
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	7146	7146	7146
Adj. R-squared	0.28	0.28	0.28

Table 11. Fundamental Stability

This table illustrates the estimation results examining changes in firm stability after the issuance of the first corporate green bond. Panel A examines stock return volatility and earnings volatility. Panel B evaluates whether forecast accuracy improves beyond changes in fundamentals by scaling analyst forecast error by stock volatility and earnings volatility. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. The table presents the analyses where the dependent variables are earnings volatility and the logged value of earnings volatility. Earnings volatility is proxied by the standard deviation of earnings before extraordinary items for the most recent five years, multiplied by a factor of 100. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Stock and earnings stability				
	Stock Volatility	Logged Stock Volatility	Earnings Volatility	Logged Earnings Volatility
	(1)	(2)	(3)	(4)
After GB Issuance	-0.74***	-0.04***	-0.004***	-0.003***
	(-4.75)	(-4.07)	(-4.21)	(-4.23)
Controls	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	50006	50006	50293	50293
Adj. R2	0.65	0.66	0.56	0.60

Panel B: Information effects beyond fundamental stability		
	Analyst Error/Stock Volatility	Analyst Error/Earnings Volatility
	(1)	(2)
After GB Issuance	-0.02**	-0.09*
	(-2.35)	(-1.72)
Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	50293	50006
Adj. R2	0.39	0.79

Table 12. Analyst Attention and Information Incorporation

This table presents estimation results examining changes in analyst attention and how the effects of green bond issuance vary with analyst attention constraints. Panel A reports estimates of changes in analyst re-engagement and attention, measured by analyst coverage and forecast revision activity. Panel B examines whether improvements in analyst forecast errors vary with analyst attention constraints. The dependent variable, analyst forecast error, is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. *Analyst Coverage* is a binary variable indicating whether a firm is covered by at least one analyst. *Revisions per Analyst* is the number of total forecast revisions received by a firm divided by the total number of analysts covering the firm. *Bundled* is a dummy variable that takes the value of one when more than 25% (the sample median) of analysts following the firm issue earnings forecast simultaneously for multiple firms on the day of focal firm's forecast issuance. *Decision Rank* is the logarithm value of the cumulative number of forecasts an analyst has made on the same day preceding a firm's forecast release, averaged across all analysts covering the firm. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Analyst re-engagement and attention

	Analyst Coverage	Revisions Per Analyst
	(1) Logit	(2) OLS
After GB Issuance	1.11***	1.25***
	(3.06)	(9.35)
Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	33426	51280
Adj. R-squared	0.33	0.44

Panel B. Analyst attention constraints

	Forecast Error	Forecast Error
	(1)	(2)
After GB Issuance	-1.86***	-1.76***
	(-5.60)	(-5.31)
*After GB Issuance * Bundled*	0.58**	
	(2.06)	
Bundled	0.10	
	(0.97)	
*After GB Issuance * Decision Rank*		1.03**
		(2.20)
Decision Rank		0.42*
		(1.71)
Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	34189	34189
Adj. R-squared	0.34	0.34

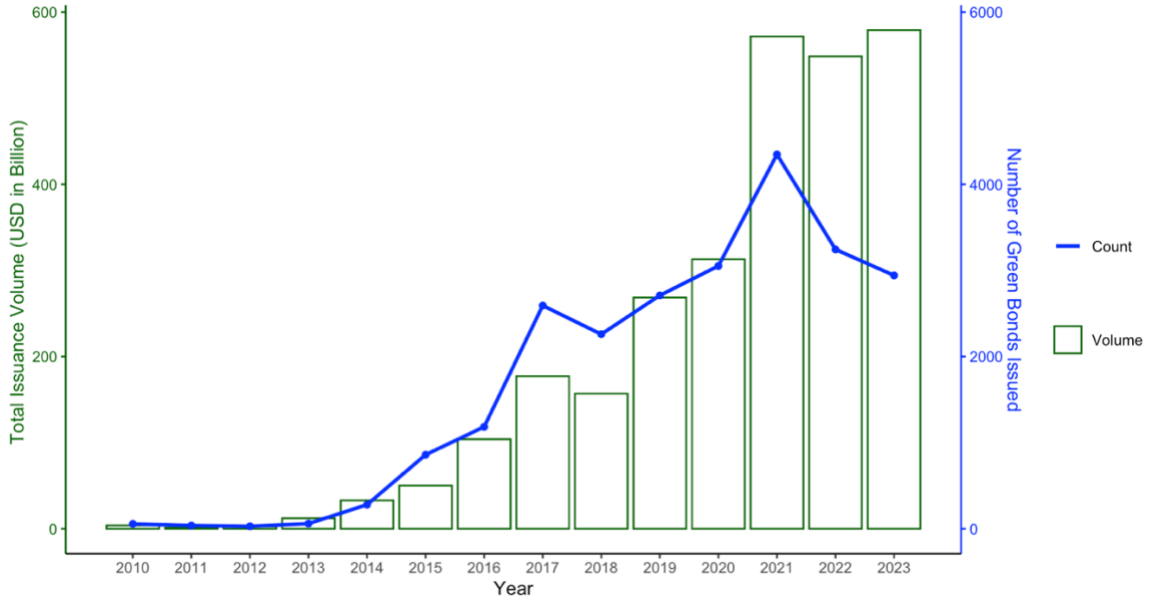
Internet Appendix for

"The Informational Value of Green Finance:

Global Evidence from Analyst Forecasts around Green Bond Issuances"

Appendix IA. Additional Figures and Tables

Panel A. Global green bond issuances by year



Panel B. Green Bonds Issued by Listed Companies in Three Data Sources

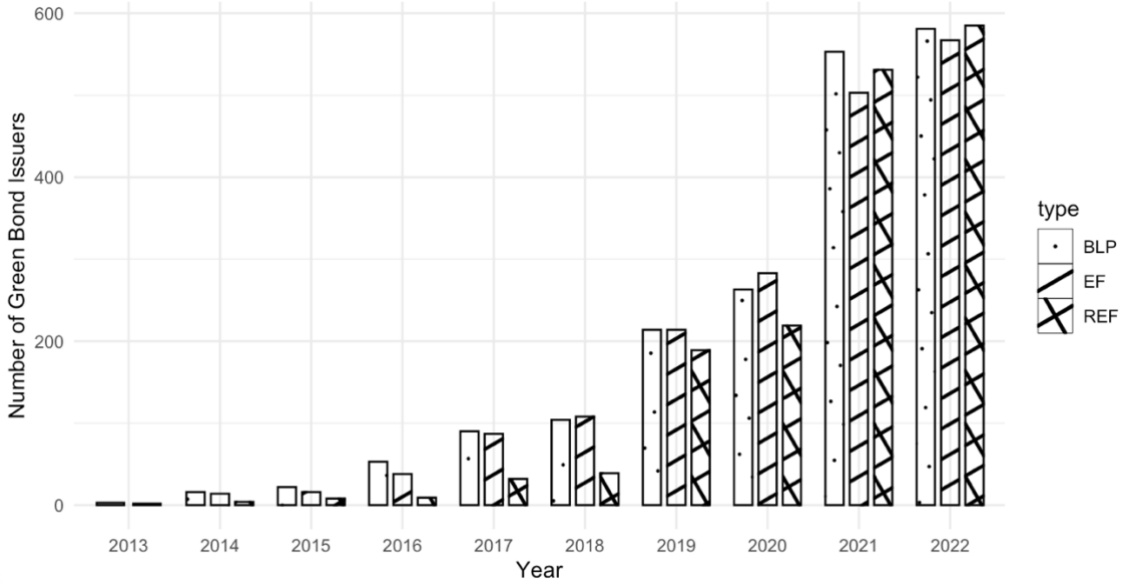


Figure IA1. Global Green Bond Issuances
Panel A of this figure displays the annual number of green bond issuances (blue line) and the volume of green bond issuances in billions of USD (green bars) from 2010 through 2023 around the globe. Panel B of this figure indicates the number of green bonds issued by listed companies in the green bond issuance datasets provided by Bloomberg, Environmental Finance, and LSEG Refinitiv. The number of green bonds is sorted by year, and each bar pattern represents a data source.

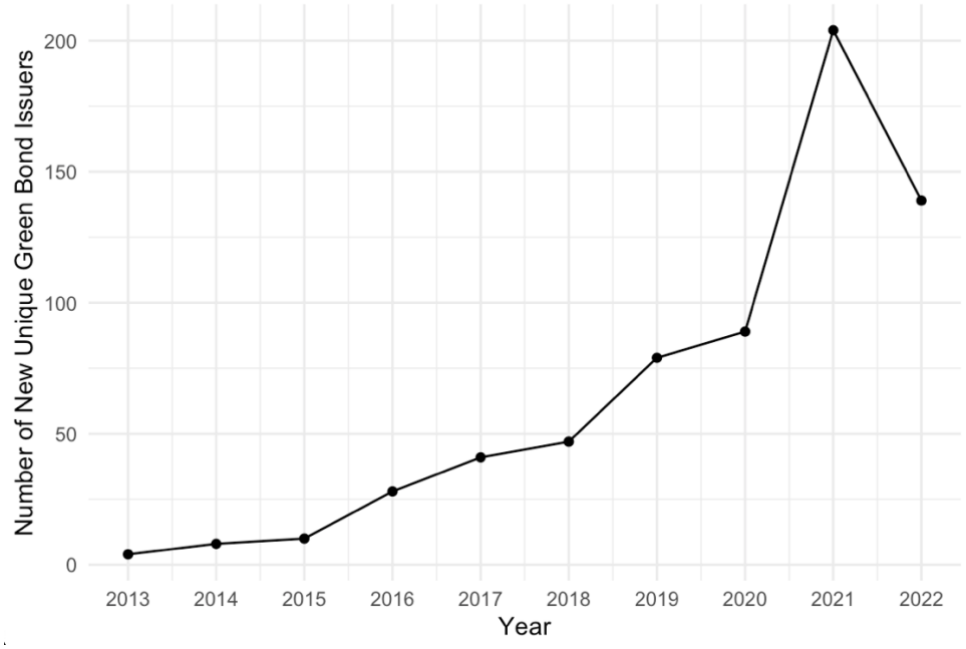


Figure IA2. New Unique Green Bond Issuers
This figure plots the number of new unique listed green bond issuers that enter the corporate green bond market each year from 2013 to 2022. The green bond data are gathered from Environmental Finance, Bloomberg, and Refinitiv.

Panel A. Number of green bond issuances



Panel B. Green bond issuance volume

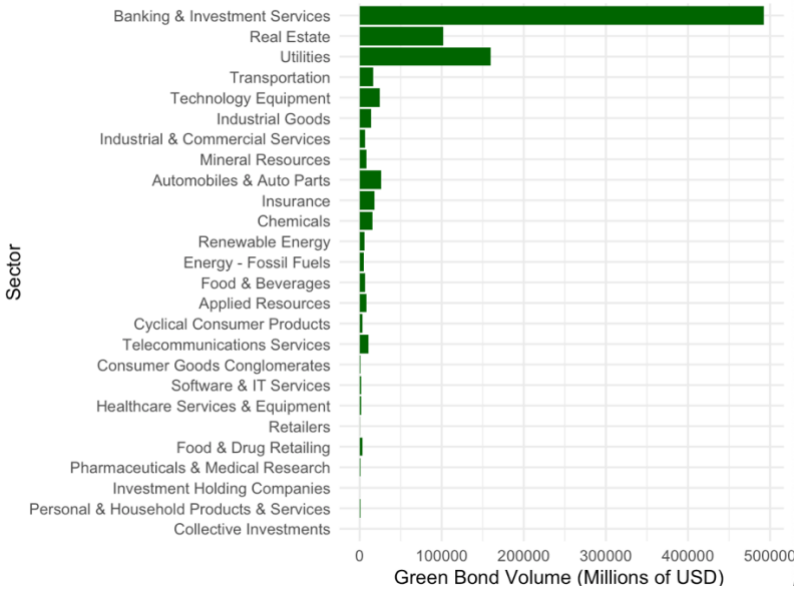


Figure IA3. Green Bond Issuance by Industry Sectors
This figure draws the number of green bonds issued (Panel A) and the total volume of green bonds issued (Panel B) by industry. The two panels cover green bonds issued by firms in the sample of this paper only.

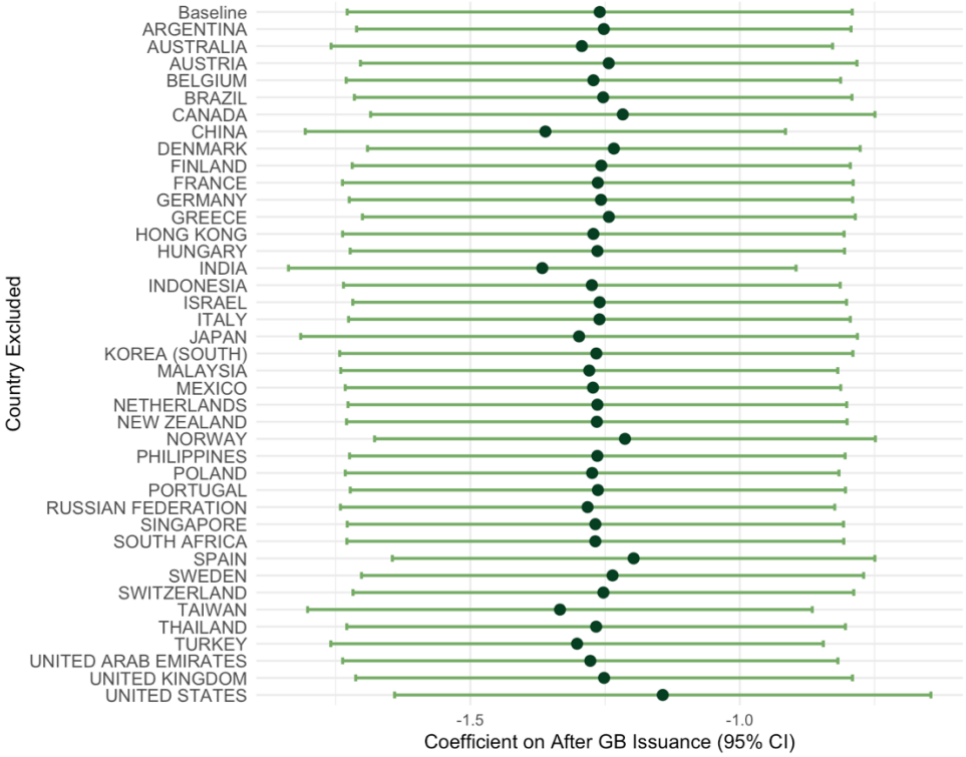


Figure IA4. Balance Test for Green Bond Issuance Volume
This figure presents the coefficient estimates and 95% confidence intervals from leave-one-country-out regressions of the baseline specification. For all countries, the upper bounds of the confidence intervals remain below zero.

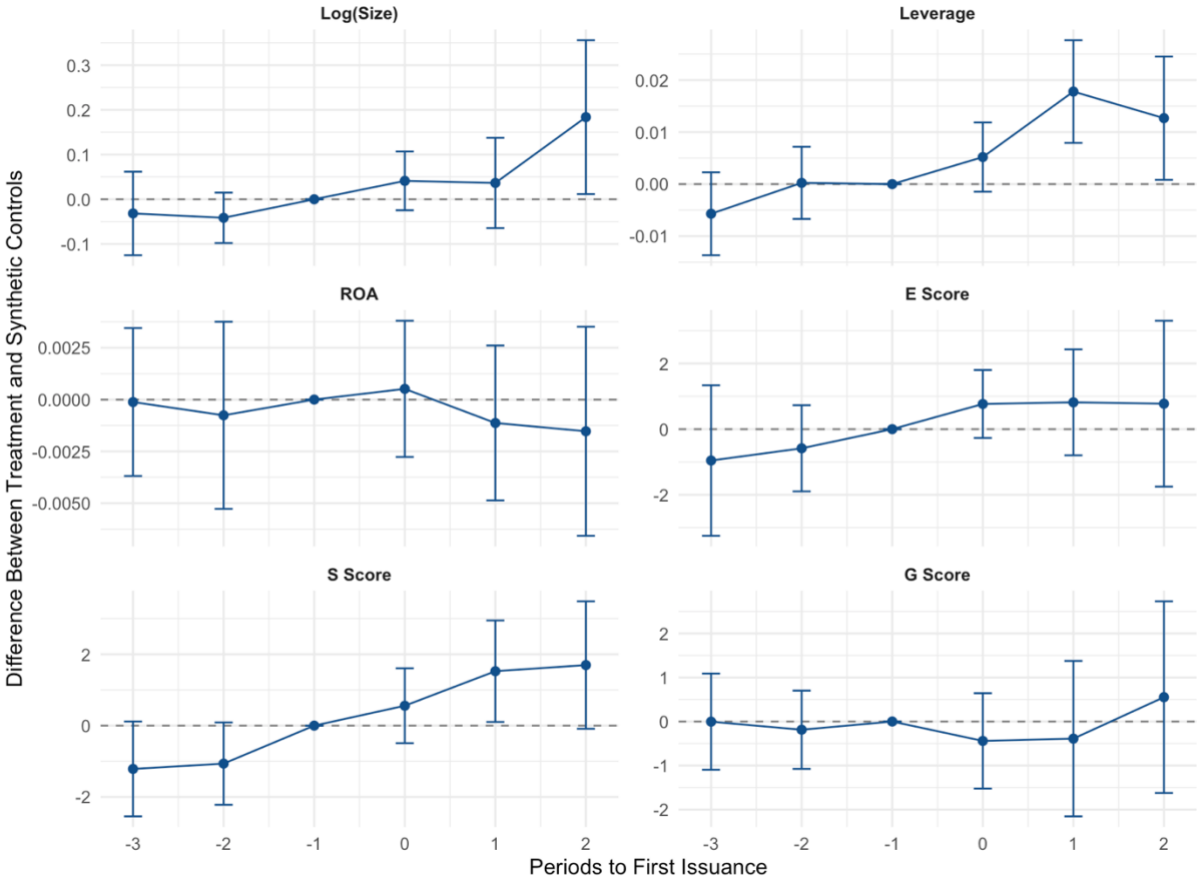


Figure IA5. Temporal Trends: Green Bond Issuers and Synthetic Controls
This figure includes panels presenting the estimated differences between green bond issuers and their corresponding synthetic control units across key firm characteristics used in the construction of these controls. The horizontal axis represents time relative to first green bond issuance, while the vertical axis stands for point estimates of differences with their associated confidence intervals. The estimates of the differences between the issuers and control units are derived from the coefficients of the interactions between treatment status and year-relative-to-issuance indicator variables, with the pre-issuance period as the reference period and specific firm characteristics as dependent variables in each panel.

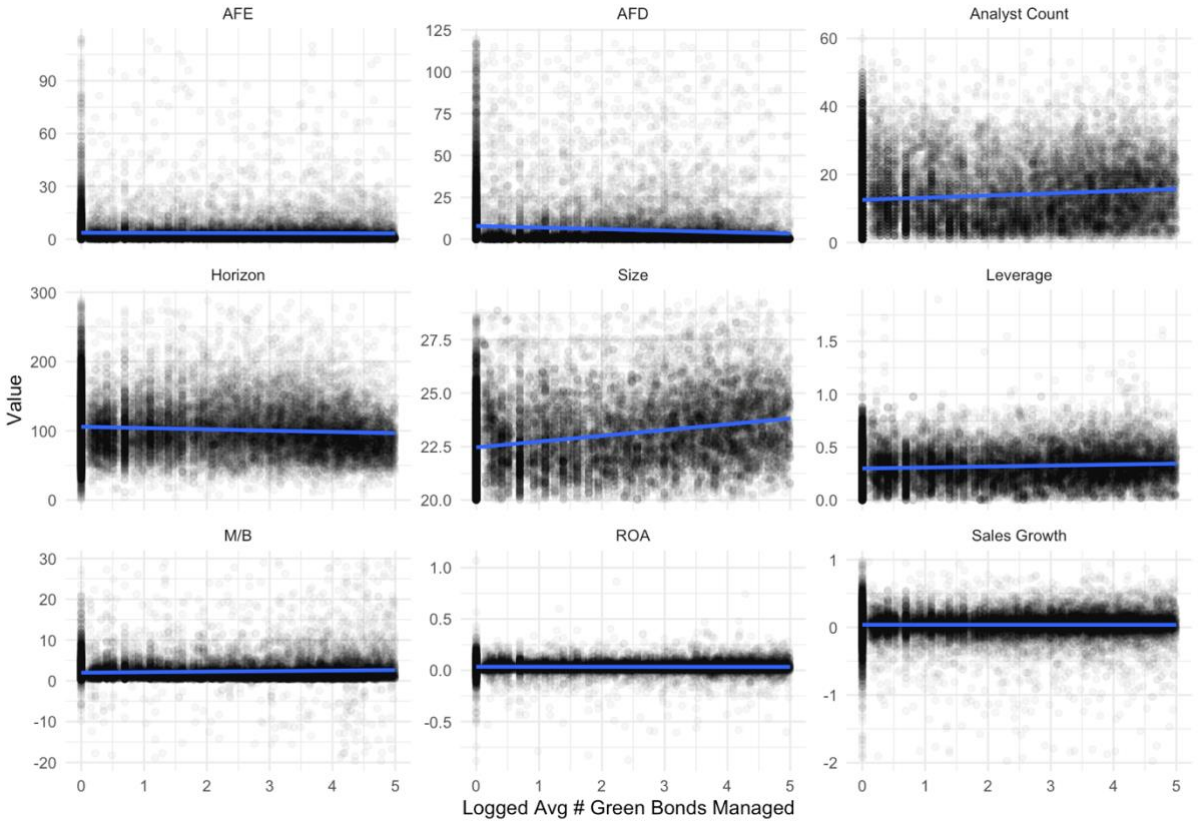


Figure IA6. Underwriter Green Bond Expertise and Firm Characteristics
This figure presents scatter plots visualizing the relationship between various firm characteristics (y-axis) and the logged average number of green bonds managed by underwriters that a firm worked with (x-axis, instrumental variable). Each plot includes a blue solid line representing the OLS fitted line from regressing the firm characteristics on the instrumental variable.

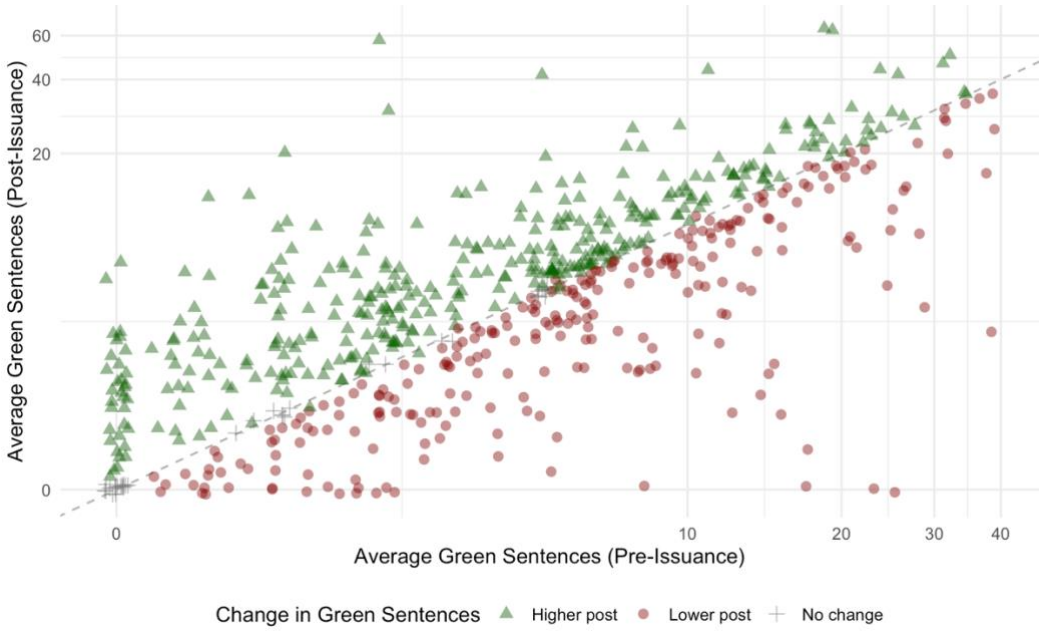


Figure IA7. Change in Frequency of Green-related Sentences per Analyst Report
This figure shows scatter plots indicating the changes in the average amount of green-related sentences. Each point in this figure represents a firm-analyst pair. Colors and symbols indicate whether the post-issuance average is higher (green triangles), lower (red circles), or unchanged (grey crosses) relative to the pre-issuance value. The dashed 45-degree line denotes parity between pre- and post-issuance averages (log scale).

Table IA1. Quoted Analyst Discussions of Green Bonds in Analyst Reports

This table compiles direct quotations from analyst reports that discuss companies' green bonds. Common discussion topics include green bond issuances, use of green bond proceeds, green bond disclosure practices, and the implications of green bonds for firms' operations.

Green Bond Issuer	Contributor	First Green Bond Issue Date	Analyst Report Date	Quoted Discussion of Green Bonds
Avangrid	Bank of America	Nov. 21, 2017	Dec. 15, 2017	The recent **Green bond** is a clear indication of willingness to lever up to fund renewables growth, and we suspect the company could well explore further opportunities in future years to do so… should other renewable funding mechanisms dry up.
Beijing Enterprises Water	JPMorgan	Aug. 13, 2016	Jun. 14, 2017	Green bonds help ensure manageable gearing. BEW plans to issue **green bonds** of Rmb2B backed by accounts receivables of some of its sewage treatment projects. ... We estimate BEW's net debt to total equity will stay at 100% over the next few years, which is still manageable.
B.Grimm Power	Deutsche Bank	Oct. 19, 2018	Feb 27, 2019	… we expect to see lower finance expenses. BGRIM completed some refinancing activity in 4Q18 including the issuance of a corporate bond … and a **Green bond** …
City Developments	Morgan Stanley	Apr. 6, 2017	Sept 25, 2017	CDL sold Singapore's first **green bond** in April 2017 ... We see CDL's sustainability disclosures as the most robust in our coverage, with a microsite providing higher frequency updates than on the annual basis typically disclosed by peers.
Getlink	Bank of America	Oct. 3, 2018	Sept. 12, 2019	The group should be much less exposed to any potential government action aimed at reducing CO_2 emissions … On 26 September 2018, Getlink priced its first issue of €550 m in **Green Bonds**… to help finance or re-finance green assets in clean transportation, energy efficiency and pollution prevention.
Huaneng Power	Morgan Stanley	Feb. 9, 2021	Apr. 6, 2021	We lower our forecast (for average financing cost) of 4.5% to 4.0% for 2021-23e, as we see a higher chance that big energy SOEs can be supported by **green bonds** or perpetual bonds to develop renewable energy.
Neoen	JPMorgan	Jun. 2, 2020	Jun. 10. 2020	We are including into our estimates ... the recently announced **green** convertible **bond**. We are rolling forward our PT from end-20 to end-21 and increasing it from €23 to €30.
Redeia	Bank of America	Jan. 24, 2023	May 3, 2023	In January 2023, Redeia issued a €500mn **green** perpetual hybrid **bond** (coupon 4.625%) ... We estimate hybrid issuance helps EPS to the tune of 3–4%.
SK Hynix	Morgan Stanley	Jan. 13, 2021	Jul. 27, 2021	… we believe the company's ESG rate will improve with its efforts to enhance green activities. SK Hynix, in January, issued a **green bond** worth US$1bn to expand its eco-friendly business …
Stem	Credit Suisse	Nov. 22, 2021	Oct. 14, 2022	Stem issued a $460 m **Green Bond** with a 0.5% coupon and a 7-year term in November 2021… In speaking with management, they have no plans to use the shelf, but have filed it as a housekeeping item.

Table IA2. Green Bond Issuers Sample Selection
This table reports the selection procedures of corporate green bond issuers in our final sample.

Sample Selection Process	
Number of unique corporate green bond issuers from Environmental Finance, Bloomberg, and Refinitiv from 2010 to 2022	3295
Procedures:	
(1) Removing private firms	971
(2) Removing firms not covered by Worldscope	941
(3) Removing firms not covered by I/B/E/S	703

Table IA3. Green Bond Issuance Impacts by Analyst Coverage Level

This table presents estimation results for subsamples of firms, differentiated by whether their analyst coverage is below or above the median level. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)
	Low Analyst Coverage	High Analyst Coverage
After GB Issuance	-1.20** (-2.28)	-1.00*** (-4.56)
Controls	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 0.12, p = 0.73	
Firm FE	YES	YES
Year FE	YES	YES
Observations	23949	26695
Adj. R-squared	0.36	0.33

Table IA4. Alternative Difference-in-Differences Estimators

This table provides estimations of the effect of green bond issuances on analyst earnings forecast accuracy using four alternative staggered DiD estimators. The alternative estimators follow Sun and Abraham (2021), Callaway and Sant'Anna (2021), Borusyak, Jaravel, and Spiess (2024) and De Chaisemartin and D'Haultfeuille (2020). We additionally modify our baseline specifications into a stacked difference-in-differences design. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. All regressions include firm-level, year-level fixed effects, and control variables. Stacked regressions incorporate firm-stack fixed effects and year-stack fixed effects. Continuous variables are winsorized at the 1% and 99% percentiles. Standard errors are clustered at the firm level.

	Sun and Abraham	Callaway and Sant'Anna	Borusyak, Jaravel, and Spiess	DeChaisemartin and D'Haultfeuille	Stacked Regressions
	(1)	(2)	(3)	(4)	(5)
Point Estimate	-1.20	-0.74	-1.42	-0.73	-0.89
Standard Error	0.18	0.34	0.24	0.21	0.25
Lower Bound 95% CI	-1.81	-1.41	-1.89	-1.15	-1.39
Upper Bound 95% CI	-0.59	-0.08	-0.93	-0.31	-0.40

Table IA5. Legal Origin and EU Regulation on Green Bond Issuance Impacts

This table illustrates estimation results in subsamples for firms located in countries with different law systems. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. In columns (1) – (4) of Panel A, we split the sample into subsamples based on the legal systems of the countries where the firms reside. In Panel B, we divide the firms in our sample based on whether they are from a country in the European Union. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Legal origins

	Forecast Error (1)	Forecast Error (2)	Forecast Error (3)	Forecast Error (4)
	Non-English Legal Origin	English Legal Origin	French & German Legal Origin	Scandinavian Legal Origin
After GB Issuance	-1.31***	-1.34***	-1.08***	-2.12**
	(-5.22)	(-3.99)	(-3.52)	(-2.55)
Controls	YES	YES	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 0.01, p = 0.93		F = 1.41, p = 0.23	
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	30517	20763	28556	1961
Adj. R-squared	0.35	0.36	0.35	0.43

Panel B. EU and non-EU issuers

	Forecast Error (1)	Forecast Error (2)
	EU Issuers	Non-EU Issuers
After GB Issuance	-2.01***	-1.13***
	(-3.97)	(-4.42)
Controls	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 2.50, p = 0.11	
Firm FE	YES	YES
Year FE	YES	YES
Observations	6370	44910
Adj. R2	0.39	0.40

Table IA6. Parents and Sister Firms of Green Bond Issuers

This table contains regression results of analyses on the changes in analyst earnings forecast accuracy of the parent companies and firms that share the same ultimate parent as the green bond issuers (sister firms). The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. In specifications (1) through (3), the sample contains all non-green bond issuers, including both conventional bond issuers and non-conventional bond issuing public firms. In column (1), the independent variable is *After Subsidiary Issuance*, which stands for whether any one of the subsidiaries of a firm has issued a green bond. In column (2), the dependent variable is *After Immediate Subsidiary Issuance*, which equals one if any one of the immediate subsidiaries has issued a green bond. In column (3), the independent variable, *After Sister Firm Issuance*, stands for whether any one of the sister firms of a company has issued a green bond. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)	Forecast Error (3)
	Ultimate Parents of Issuers	Immediate Parents of Issuers	Sister Firms of Issuers
After Subsidiary Issuance	-0.58		
	(-1.46)		
After Immediate Subsidiary Issuance		-0.85**	
		(-2.14)	
After Sister Firm Issuance			-0.88*
			(-1.94)
Controls	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	126505	126505	126505
Adj. R-squared	0.38	0.38	0.38

Table IA7. Conventional Bond Issuances from Non-Green Bond Issuers

This table presents the results examining the impact of conventional bond issuances on analyst earnings forecast accuracy. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After Conventional Issuance* is a binary variable indicating whether a non-green 0bond issuer has issued a conventional bond. Definitions of variables are in Appendix A. The sample excludes green bond issuers from the baseline sample. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error	Logged Forecast Error
	(1)	(2)
After Conventional Issuance	0.006	0.003
	(0.03)	(0.18)
Controls	YES	YES
Firm FE and year FE	YES	YES
Observations	44134	44134
Adj. R-squared	0.37	0.5

Table IA8. Green Bond Issuance and Analyst Forecasts in Non-Energy Sector

This table presents subsample analyses results examining the impact of green bond issuances on analyst forecast accuracy. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Column (1) presents results from a subsample excluding U.S. energy sector firms, while column (2) reports results from a subsample excluding energy sector firms across all countries in the sample. Definitions of variables are in Appendix A. The sample excludes green bond issuers from the baseline sample. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)
	Excluding U.S. Energy Firms	Excluding Global Energy Firms
After GB Issuance	-1.26*** (-5.46)	-1.16*** (-5.34)
Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	50065	46485
Adj. R-squared	0.34	0.33

Table IA9. Subsequent and Matured Green Bonds

This table summarizes the results examining changes in analyst earnings forecast accuracy after subsequent green bond issuances and after the maturity of all green bonds issued by a firm. The dependent variable, analyst forecast error (*AFE*), is the percentage deviation of actual EPS from analysts' consensus estimate, relative to share price. *After Subsequent Issuance* is an indicator that identifies whether a firm has issued a second green bond following the issuance of its first green bond. *After GB Matured* is a binary variable signifying whether all of an issuer's green bonds have matured, with no outstanding green bonds remaining. Definitions of variables are in Appendix A. The sample contains green bond issuers. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)
After Subsequent Issuance	-0.11	
	(-0.27)	
After GB Matured		2.98
		(1.01)
Controls	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	7146	7116
Adj. R-squared	0.28	0.28

Table IA10. Media and Institutional Attention

This table illustrates estimation results exploring the change in media and institutional investor attention after the issuance of the first corporate green bond. The dependent variables are the logged number of news articles related to a firm (*News Coverage*), the logged number of business news articles related to a firm (*Business News Coverage*), and institutional ownership in percentage (*Inst Ownership*). *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. Definitions of variables are in Appendix A. The sample comprises firm-year observations from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	News Coverage (1)	Business News Coverage (2)	Inst Ownership (3)
After GB Issuance	0.15**	0.15**	1.24***
	(2.15)	(2.10)	(3.40)
Constant	YES	YES	YES
Firm FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	11514	11514	50365
Adj./Pseudo R2	0.77	0.76	0.93

Table IA11. Internal Control Practices

This table illustrates the estimation results exploring the change internal control practices after the issuance of the first corporate green bond. *After GB Issuance* is a dummy variable that equals one if the firm has issued its first green bond. The table includes regression estimations showing the impact of green bond issuances on the number of earnings guidance provided and EPS announcement delay. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at the firm level. Continuous variables are winsorized at the 1% and 99% percentiles. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Guidance Count (1) Poisson	EPS Announcement Delay (2) Poisson
After GB Issuance	0.05 (1.11)	-0.02** (-2.09)
Constant	YES	YES
Firm FE	YES	YES
Year FE	YES	YES
Observations	38303	51262
Adj./Pseudo R2	0.37	0.49