The Effect of Green Bonds on Analyst Forecasts around the World*

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Abstract

This paper examines the impact of corporate green bond issuances on equity analysts' forecasts. Using a global sample of listed companies from 40 countries, we find that the issuance of a firm's first green bond is associated with improved analyst forecast accuracy and reduced analyst forecast dispersion. Post-issuance, issuers attract greater attention from analysts, media, and institutional investors. Information disclosures throughout a green bond's lifecycle are crucial, since the improvement in analyst forecast accuracy is particularly accentuated for firms offering greater accessibility to green finance information. Collectively, our findings demonstrate that green bond issuances enhance the information environment of issuing firms and emphasize the financial relevance of nonfinancial disclosures.

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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 vote. This rule mandates listed companies to disclose climate-related risks, and for larger firms, greenhouse gas emissions. The adoption of the new rule provoked debate over the necessity of climate-related information disclosure. Discussions about the SEC's decision center on potential regulatory overreach and First Amendment conflicts.[1] 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 emerging green bond market presents research opportunities to examine the relevance of environmental information. Green bonds, one of the most prevalent green financial instruments, enable issuers to commit their proceeds to finance or refinance projects that address climate and environmental issues. In practice, corporate green bond issuances require disclosure of details about the underlying green projects and post-issuance progress through the release of green bond frameworks, external reviews, as well as impact reports.[2] The issuance of green bonds signals issuers' environmental commitments (Flammer, 2021) while unveiling new nonfinancial information about their green initiatives. This study examines whether the issuance of a company's first green bond enhances its information environment. Studying whether green bond issuances contribute valuable and useful information to a firm's information environment is crucial for investors and policymakers to better understand the impacts of environmental disclosures and the evolving green bond market.

The influence of corporate green bond issuances on information environments remains an open empirical question. On the one hand, issuing green bonds strengthens external monitoring and reduces information asymmetry. Green bonds expand firm media coverage (Lu, 2023) and analyst coverage, therefore drawing more public attention. Institutional investors

[1] The implementation of the new rule is also subject to challenges from the Major Question Doctrine and the Agency Deference, both of which are common deregulatory tools. See https://www.thomsonreuters.com/en-us/posts/esg/sec-climate-rule-first-amendment/ and 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.

[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.

with environmental and social mandates also direct more attention to green bond issuers, recognizing their enhanced sustainability commitments. Surveillance from the media, analysts, and institutional investors raises the stakes of earnings management and misreporting, thereby incentivizing higher-quality corporate reporting. Furthermore, the disclosures associated with green bonds provide novel information regarding the issuing firm's environmental commitments, thus alleviating information asymmetry (Lang and Lundholm, 1996). Therefore, issuing green bonds could potentially improve the information environments of the issuers.

Although green bond issuances boost public visibility and information availability, the impact of issuing a green bond on the overall information environment can be constrained by non-standardized disclosure practices and the limited effectiveness of monitoring by institutional investors and external parties. The unstructured nature of green bond reporting imposes high processing costs for readers, which can harm the information environment of a firm. Unlike regulatory bodies, non-legal monitoring institutions like the media, analysts, and institutional investors lack enforcement capacity and face efficiency challenges. Chen, Harford, and Li (2007) show that institutional investors, especially those with short-term horizons, often favor passive trading over active monitoring for private gains. Scrutiny by analysts and media can motivate selective information disclosure, as it places pressure on managers to meet performance targets and investor expectations (Goldman, Matrel, and Schneemeier, 2022), potentially undermining the quality of corporate information environments. And lastly, the effectiveness of green bonds as commitment devices may be restricted. Thomunen and Yi (2024), Bhagat and Yoon (2023), and Aswani and Rajgopal (2022) document limited environmental performance improvements and market responses following green bond issuances. Greenwashing in the green bond market degrades issuers' information environments, as issuers engaging in greenwashing disseminate disinformation 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. We use a sample consisting of listed firms that are corporate bond issuers from 40 countries and regions spanning 2010 to 2022. Our green bond issuance records are sourced mainly from Environmental Finance. There are 703 listed green bond issuers in our sample. We adopt a set of financial analyst earnings forecasts-based measures to assess the quality of information environments, which include average analyst forecast error and analyst forecast dispersion. 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. Consequently, analyst forecasts serve as reliable indicators of the quality of information environments.

Our empirical findings lend support for the conjecture that corporate information environments improve with green bond issuances. We find that both the average analyst forecast error and analyst forecast dispersion experience statistically significant declines after the issuance year of the first green bond, with economically sizable magnitudes. These observed changes in analyst forecasts capture enhanced transparency and reduced asymmetry within issuers' information environments. The results are robust across alternative treatment years, analyst forecast measures, and sample compositions. Our findings highlight the impacts of corporate green bonds and 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. The improvements in corporate information environments could be attributed to corporate green projects or more broadly environmental, social, and governance (ESG) transformation actions regardless of green bond issuances. To alleviate endogeneity concerns, we build a synthetic control sample for the treatment group.[3] 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 corporate information environments. The green bond underwriting history of investment banks is shaped by the demand 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 (2SLS) 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 and reduced analyst forecast dispersion.

[3] For each green bond issuer, we assign weights to conventional bond issuers in the same industry to construct a synthetic control unit that is the nearest neighbor to the green bond issuer. The matching method follows Abadie, Diamond, and Hainmueller (2010).

The impact of green bond issuances on forecast accuracy and forecast dispersion are more pronounced for firms with larger green bond issuance volumes, "pure play" green companies (companies focused on the green economy) and firms in countries with higher Science Based Targets initiative participation rates. The benefits extend beyond issuers, as green bond issuances also bring positive spillover effects to the analyst forecast accuracy for both immediate parent companies and sister firms of the issuers. The positive effect on analyst forecast accuracy persists across both common law and civil law jurisdictions.

Besides, we document evidence that firms experience increased analyst coverage, media coverage, and institutional ownership after the issuance of their first green bond. The issuing firms demonstrate improved financial reporting subsequent to their first green bond offering. Our results additionally underscore the importance of information accessibility around green bond issuances and the significant role of environmental information in financial forecasting. We confine our analyses on green bond issuers and find that the improvements in analyst forecast characteristics are more pronounced for issuers that make their green bond disclosure files publicly accessible.

This paper makes two main contributions. First, by investigating the impact of green bond issuances on the information environments, 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.[4] 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 information environments, extending beyond the aspects of firm value and borrowing costs. The issuance of green bonds draws increased scrutiny from multiple stakeholders in the financial market and release new information, both of which facilitate analysts' understanding of a firm's performance.

Second, this research adds to the works exploring the financial implications of nonfinancial information disclosure. Dhaliwal, Radhakrishnan, Tsang, and Yang (2012) argue that country-level mandatory CSR disclosure requirements improve analyst forecast accuracy. Related studies, including Grewal, Riedl, and Serafeim (2019) and Moss, Naughton, and Wang

[4] The papers discussing the stock market reactions to green bond issuances include Bhagat and Yoon (2023) Aswani and Rajgopal (2022) Flammer (2021) and Tang and Zhang (2020). The papers focusing on the greenium include Larcker and Watts (2020), Caramichael and Rapp (2022), and Zerbib (2019).

(2024) examine corporate level mandatory ESG disclosure. While these studies focus on mandated nonfinancial disclosures, green bond disclosures are unique as they involve nonfinancial information released after the issuance of a financial instrument. This paper extends the strand of literature on nonfinancial information disclosure by showing that the accessibility of information shapes both the overall corporate information environment and analysts' judgement. Making green bond disclosures more accessible can better facilitate investor and analyst understanding. Furthermore, in line with the findings of Dhaliwal, Radhakrishnan, Tsang, and Yang (2012), our results suggest that nonfinancial information has significant financial relevance. Analysts can infer useful information from both the act of issuing green bonds and the associated nonfinancial disclosures. Issuers who make their green bond disclosures available experience more substantial improvements in both analyst forecast accuracy and dispersion.

2. 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 grown in response to the increasing needs for responsible investing and firms' demand to finance their environmentally friendly projects since its inception in 2007. Panel A of Figure 1 displays the development of the global green bond market in recent years. Both the aggregate volume and the number of green bond issuances followed an upward trend until the year of 2021. The issuance volume experienced a marginal decline in 2022 and rebounded in 2023. Corporate entities have been one of the major issuers in the green bond market, issuing 31% of the total green bonds in 2023. Vasakronan, a Swedish property company, issued the first corporate green bond in November 2013, marking the starting point for corporate green bond markets.

Green bond issuances usually consist of four steps. Before issuance, the issuer needs 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. [5] 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

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

(GBP) or other green bond standards.[6] The third step would be 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 publish audited 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 emerges as one of the biggest concerns for corporate green bonds. 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 enforce ability of green commitments in the green bond market. In 2023, Caramuru Alimentos, a Brazilian soybean and corn processing company and issuer of green bonds, faced allegations of greenwashing. Investigations showed that funds raised through these bonds were channeled to Caramuru's soy suppliers, who were involved in illegal deforestation and land grabbing.[7] In 2022, Reclaim Finance, a climate campaign group, called on investor attention for potential greenwashing in the use of green bonds proceeds by Airport Authority Hong Kong.[8] Reclaim Finance argued that the green bonds were funding the construction of a new runway, which could harm costal and marine biodiversity. Lam and Wurgler (2024) reveal that a large proportion of green bonds are refinancing launching 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.

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) and Aswani and Rajgopal (2022) report insignificant equity market reactions. For the borrowing costs of green bonds, Baker, Bergstresser, Serafeim, and Wurgler (2018), Zerbib (2019), and Caramichael and Rapp (2024)

[6] 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 principle that the issuer can choose from. Another commonly used green bond issuance guidance is Climate Bond Standard published by Climate Bonds Initiative.

[7] See https://www.ft.com/content/81c0fe03-6569-422c-bda9-82f5a9631c57 for more.

[8] See https://www.scmp.com/business/article/3162333/sustainable-finance-greenwashing-concerns-raised-hong-kong-airport-floats for more details.

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 (2023) provides a model for the yield spread of green bonds and conventional bonds. Daubanes, Mitali, and Rochet (2024) builds 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 and other types of corporate bonds. Flammer (2021) point to the environmental impacts of corporate green bonds by showing that after a green bond issuance, issuers reduce their greenhouse gas (GHG) intensities. Additionally, Beincasa, Fu, Mishra, and Paranjape (2022) show that green bonds have positive spillover effects on the pricing of subsequent conventional bonds.

2.2 Green Bond Issuances and Analyst Forecasts

The issuances of corporate green bonds can potentially improve corporate information environment through two channels: enhanced monitoring and new information disclosure. The decision to issue a green bond attracts attention from media, analysts, and institutional investors. Lu (2023) provides evidence indicating that firms experience escalated media coverage following the issuance of green bonds. Previous research has shown that media not only redistributes information to the public but also has a monitoring role to firms through its investigative reports (Miller, 2006; Dyck, Morse, and Zingales, 2010). The amplified media coverage brings intensified media monitoring and scrutiny, raising the cost for issuers to disseminate inaccurate or deceptive 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 (Gantchev, Giannetti, and Li, 2022; Starks, Venkat, and Zhu, 2023; Gibbons, 2024). The issuance of a green bond signals commitments to environmental issues and attracts institutional owners to the issuer's shareholder base, eventually leading to a clientele effect. The influx of institutional investors is particularly important because their monitoring role is essential for investor protection (Gillan and Starks, 2000; Cheng, Huang, Li, and Lobo, 2010). Firms have incentives to strengthen their reporting quality in response to the attention of institutional owners. 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 acting as information

dissemination channels, analysts gain more knowledge of green bond issuers, potentially leading to more precise forecasts.

Beyond institutional investors, financial analysts also observe firms' decisions on green bond issuances. As discussed in Harford, Jiang, Wang, and Xie (2019), analysts would strategically allocate their attention to cater to the needs of institutional investors and cover firms that are more important to their career. Therefore, financial analysts may direct more of their attention to green bond issuers. Appendix B provides detailed evidence from earnings call transcripts documenting financial analysts' attention to both green bond issuances and firms' prospective green bond issuance strategies. The cases presented in Appendix B demonstrate analysts' consideration of the purposes and benefits of issuing green bonds.

Analysts, as argued in Jensen and Meckling (1976), has comparative advantage in monitoring corporate governance. Analysts have the professional knowledge to detect potential inadequate corporate governance practices and have the career incentives to blow a whistle on corporate misconducts (Yu, 2008; Dyck, Morse, and Zingales, 2010). Meanwhile, analysts may invest more effort towards firms with enhanced media exposure. Bradshaw, Lock, Wang, and Zhou (2021) show that increased media coverage leads to more attention from analysts. Analysts can produce more accurate forecasts for green bond issuers as issuers experience increased media coverage following green bond issuances. Therefore, increased analyst coverage could encourage firms to raise their disclosure transparency and improve the corporate information environments. The media, analysts, and institutional investors collectively enhance monitoring of the green bond issuers, and the issuers have incentives to be more cautious with their financial and nonfinancial reporting.

Another important aspect of green bond issuances is the information disclosed in the process of issuing green bonds. Previous research on non-financial information, such as the works of 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 other types of non-financial disclosures, can contribute to the information environments 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, as introduced in section 2.1, the process of issuing a green bond requires the disclosure of a green bond framework, external review, and post-issuance reports. These

documents present fresh nonfinancial information regarding the issuers' green projects, environmental commitments, and long-term plans for sustainability transition. Such disclosures are valuable to analysts. Jing, Keasey, Lim, and Yu (2024) confirm analysts' monitoring of the environmental policies of their covered firms, and Park, Yoon, and Zach (2024) show that analysts integrate ESG risks in their assessments.

Furthermore, the information disclosed in green bond files can hold financial relevance especially when the green projects financed by the bonds entail revenue-generating 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 information disclosed with green bond issuances inherently carries financial implications. Following the issuances of green bonds, the release of new information can facilitate assessments of firm risks and reduces information asymmetry among investors. This improved transparency refines the overall corporate information environments.

Conversely, one can argue that green bonds have little substantial influence on a company's information environment. Institutional investors whose monitoring costs overweigh the potential financial gains from influencing firm management would prefer short-term trading rather than monitoring (Chen, Harford, and Li, 2007). Journalists and analysts' career incentive for monitoring green bond issuers can be limited for smaller-sized issuers (Dyck, Morse, and Zingales, 2010). The incremental change of scrutiny strength might be so small that green bond issuers see no need to improve the quality of their financial and nonfinancial reporting. From the perspective of managers, analysts and media attention poses stress on meeting performance targets and can induce more earnings management and selective disclosing (Matsumoto, 2002; Goldman, Matrel, and Schneemeier, 2022). Hence, the intensified attention from these three types of potential monitoring groups following the issuances of green bonds may not have effects on information environments.

In terms of green bond disclosure, firms typically disclose environmental projects and green transformation plans in their green bond framework. This type of information may not be financially material as it is not directly linked to corporate financial performance. The disclosures bundled with green bond issuance also do not have a standardized form, giving the issuers chances to exploit the lack of guidance and meet the minimal disclosure requirement by disclosing 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 will contaminate the information environments by adding disinformation to the financial market.

Hypothesis 1: *Green bond issuances enhance analyst forecast accuracy and reduce analyst forecast dispersion for the issuers.*

Green bond disclosures contain information that are useful to the 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 (2024), information regarding these projects could be useful for analysts as alternative data and can help analysts enhance their forecasts.

Since publishing frameworks and post-issuance reports for green bonds is not universally mandated, some issuers disclose more information regarding their green bonds than others. The accessibility of disclosures matters because if information about green bonds is difficult to locate, it will not reach its readers effectively and will raise the processing costs associated with green bond disclosures. We conjecture that green bond issuers who make their green bond related files more accessible experience more pronounced improvements in their information environments.

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 an online 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. 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 (those without bond identifiers) and green bonds

issued by private firms and other non-listed entities. Although the green labels of the bonds in the data sources are self-labeled by issuers, we remove bonds that fail to align with any established sustainable bond principles.

3.2 Analyst Forecasts

We adopt financial analyst forecasts-based measures of the corporate information environments following Heflin, Subramanyam, and Zhang (2003). 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 forecasts and recommendations to fulfil their intermediary role between firms and investors (Gibbons, Iliev, and Kalodimos, 2021). We measure the quality of corporate information environments with two variables: analyst forecast error (AFE), and analyst forecast dispersion (AFD). Analyst forecast error is calculated as the equally weighted average absolute earnings per share (EPS) forecast error scaled by beginning-of-year stock price following Chang, Ljungqvist, and Tseng (2023). Analyst forecast dispersion is defined as the standard deviation of analyst one-year-ahead EPS forecasts scaled by the beginning-of-year stock price following Boone and White (2015). We use Worldscope and I/B/E/S as our data sources for 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 deatails covered by I/B/E/S. Panel B of 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 those 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.[9]

[9] Flammer (2021) use 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

Table IA1 provide 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 for a decline in 2022.

Panel B of Table 1 summarizes the main variables. Of all the observations in our sample, around 14% derive from green bond issuers. Median analyst forecast error and median analyst forecast dispersion are 1.29% and 1.16% of the beginning-of-year stock price, respectively. The number of observations for analyst forecast dispersion falls below that of analyst forecast error, since firms with single-analyst EPS forecast coverage lack the necessary data to calculate forecast dispersion. 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 baseline analyses on the relationship between green bond issuances and analyst forecast characteristics. We begin by introducing our research design and baseline findings, followed by addressing potential endogeneity concerns. The final subsection explore heterogeneous effects of green bond issuances.

4.1 Baseline Results

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

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

The dependent variables, analyst forecast accuracy and analyst forecast dispersion, are metrics to assess the quality of information environments. The independent variable is *After*

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.

GB Issuance, a binary variable that indicates whether a firm has issued its first green bond.[10] This variable remains zero for firms that are not green bond issuers. The coefficient β_1 captures how analysts forecast error and dispersion move 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, 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. The first two columns estimate the treatment effects of green bond issuances without including the control variables. In columns (3) and (4), we add the full set of control variables to the regression specification. The coefficient on *After GB Issuance* is negative and statistically significant across all four specifications in Table 2, supporting the hypothesis that green bond issuance reduces analyst forecast errors and analyst forecast dispersion. This evidence indicates improvements in corporate information environments. According to columns (3) and (4), issuing firms, on average, experience a 1.29% reduction in their average analyst forecast error and a 5.75% reduction in their analyst forecast dispersion. The results are economically significant, with coefficients in columns (3) and (4) representing improvements of 12% and 10% of sample standard deviation in forecast accuracy and dispersion, respectively. The regression specification with a single explanatory variable and fixed effects in columns (1) and (2) has R-squared values of 0.25 and 0.46, respectively. These values are not substantially lower than those from regressions with control variables in columns (3) and (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 and forecast dispersion using the two-way fixed effects (TWFE) specification in Equation (1) in

[10] We focus on the first issuance of green bond 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 contents that already came out with the issuance of the first green bond.

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 include 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 (Panel A) and dispersion (Panel B), 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 and forecast dispersion, compared to control firms. The declines in analyst forecast error and forecast dispersion exhibit a certain degree of persistence, remaining present four years after the initial issuance.

4.2 Robustness Tests

Our empirical estimation results are robust to alternative event dates, alternative measures, and an alternative control group. The regression estimations reported in Table 3 evaluate the robustness of the baseline results. In columns (1) and (2) of Panel A, we consider the announcement date of a firm's first corporate green bond as the treatment date, rather than the actual issuance date. In columns (3) and (4) of Panel A, we expand the control group to include all firms that have not issued a green bond, including those that did not issue any bonds during the sample period. To account for the country-level variations in regulations and initiatives for green finance markets, which may greatly influence firms' green bond issuance decisions, we replace year fixed-effects with country-year fixed effects in columns (5) and (6) of Panel A. The estimations with alternative treatment dates, an alternative control groups, and country-year fixed effects validate the reduction in both analyst forecast error and analyst forecast dispersion following green bond issuances or announcements.

Panel B of Table 3 summarizes the estimations deploying alternative calculation methods of analyst forecast characteristics. In columns (1) and (2), we substitute the single-period measures with three-period forward averages of forecast error and dispersion. Columns (3) and (3) use logarithmic transformations of analyst forecast error and analyst forecast dispersion as dependent variables. The final specifications in columns (5) and (6) of Panel B use alternative scaling methods. The absolute average analyst forecast error are scaled by actual EPS (Loh and Shultz, 2018) and the standard deviation of analyst forecasts are scaled by median earnings forecast (Fracassi, Petry, and Tate, 2016). The estimations incorporating alternative measures consistently yield significant negative coefficients on the binary variable indicating the impact of green bond issuances on both analyst forecast measures.

To ensure our baseline results are not driven by influential outliers, following Leone, Minutti-Meza, and Wasley (2019), we implement robust regression methodology (M-estimators). We report the results in columns (1) and (2) of Table 3, Panel C. In columns (3) and (4) of Panel C, we consider a subsample that excludes firms in the banking industry, given their significant role as major issuers of green bonds.[11] The robust regression analysis and the regressions on this refined sample in 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 regressions estimates are greatly biased by 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 (2021), and De Chaisemartin and D'Haultfeuille (2020) to our baseline regression specification. These estimators yield sensible results under arbitrary heterogeneous treatment effects. We report the results in Table IA2 of Internet Appendix. Across all estimators, we consistently observe the impact of green bond issuances in reducing analyst forecast error and dispersion.

4.3 Addressing Endogeneity Concerns

Green bond issuances are not random. Green bond issuers are typically outperformers in environmental and social practices. Control firms could also undertake green projects without issuing green bonds because they want to avoid public scrutiny that comes with the increased public attention after green bond issuance. In this section, we use the synthetic control method (SCM), 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 SCM 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

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

each green bond issuer, we assign weights to conventional bond issuers within the same industry.[12] In constructing the synthetic control units, we employ ordinary least squares to minimize the distance between pre-issuance trends of firm characteristics—such as size, Tobin's Q, Return on Assets (ROA), and leverage—and firm ESG performance, as measured by Refinitiv ASSET4 ratings, for green bond issuers and the control units. The pre-issuance trends are measured in a two-year window before the issue year of the first green bonds following Flammer (2021). Of all the green bond issuers in the sample, we were able to construct synthetic control units for 590 of them.[13]

Table 4 presents the results of running the regressions specified in Equation (1) with four measures of analyst forecast characteristics as dependent variables in the synthetically matched sample. All specifications in Table 4 support the baseline results that the issuance of the first green bond has negative impacts on mean analyst forecast errors and analyst forecast dispersion. 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 (2SLS) 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 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

[12] 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 in using green bonds as a financial instrument. Green bond issuances are not likely to be a behavior that clusters within the same country.

[13] 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 by ASSET4 in the pre-treatment period.

instruments and their operating strategies. 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 OLS fitted lines in Figure IA4 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, for which 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 2SLS 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 Cragg-Donald F statistic of 1180.3. 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. Columns (2) and (3) present the second-stage regression results. In both specifications, 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.

4.3.3 Placebo Tests

To mitigate the concern that our findings on the improved information environments after green bond issuances is driven by the act of bond issuances rather than the unique characteristics of green 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). We repeat this procedure 1000 times and plot the histograms of the estimates on the placebo treatment in Figure 3. Panel A and Panel B of Figure 3 plot the

estimated coefficients on the indicator of bond issuance when the dependent variables are analyst forecast errors and analyst forecast dispersion, respectively. In both panels, the true estimates from Table 3 are marked by the black solid line and are on the far negative side of the coefficient distributions. The probability of obtaining the true estimate is 0.12% in Panel A and less than 0.1% in Panel B.

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 IA3. The issuance of conventional bonds does not have statistically significant impact on analyst forecast accuracy and analyst forecast dispersion. The distribution of the coefficients of bond issuance in the placebo tests and the estimates on conventional bond issuances indicates that our results are driven by green bond issuances rather than general bond issuance activities.

4.4 Heterogeneity in Green Bond Impacts

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

4.4.1 Climate Change Commitments, Industry Materiality, and Legal Origins

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, an United Nations organization, provides frameworks and tools for firms to declare their science-based net-zero targets.[14] We classify firms into groups representing high 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 show that green bond issuances significantly

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

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. [15] The second group consists of firms in industries where no environmental factors are classified as material. Columns (3) and (4) of Table 6 present regression results for firms at different levels of industry exposure on environmental factors. Although issuing green bonds significantly reduces analyst forecast errors 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 a stronger improvements in forecast accuracy for firms whose financial performance more closely tied to environmental factors.

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 on 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 environmental 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 IA4 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)

[15] 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.

of Table IA4 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. Issuers in countries of both categories experience significant decreases in analyst forecast errors following green bond issuances. Analyst forecast errors in Nordic countries are estimated to decline by 2.12%, which is the largest reduction across all country groups. Nordic countries have traditionally been the forefront of climate change mitigation. While the difference in the coefficients between Nordic and French-German civil law firms is not significant, the larger magnitude of impact potentially reflects greater investor attention for environmental investments in Nordic markets, and more comprehensive green bond disclosure practices by Nordic issuers.

4.4.2 Analyst Attributes

Prior literature documents that analyst forecasts are subject to biases, and the cross-sectional variation in analyst forecasts is linked to analyst-level attributes (Korhtari, So, and Verdi, 2016). Here we test whether analysts' forecast bundling patterns, decision fatigue, and professional experience influence the improvements in forecast precision following corporate green bond issuances.

Drake, Joos, Pacelli, and Twedt (2020) show that concurrent issuance of earnings forecast across multiple companies diminishes forecast accuracy. We identify analyst forecasts as bundled when an analyst issue at least one other EPS forecast for a different firm on the same calendar day as the focal firm's forecast. A firm is designated as having a high proportion of bundled forecasts (*Bundled*) if the percentage of its earnings forecasts originating from analysts who bundles its forecast exceeds the sample median of 25%. Forecasts for firms with higher bundled forecast ratios experience smaller improvements in analyst forecast precision after green bond issuances, as the coefficient on the interaction between *After GB Issuance* and *Bundled* is significantly positive in column (1) of Table 7. This is consistent with Drake, Joos, Pacelli, and Twedt (2020) finding that bundled forecasts tend to be less accurate. Meanwhile, in untabulated results, green bond issuances do not significantly alter firm's likelihood of receiving bundled forecasts. The insignificant change in forecast bundling following green bond issuances may reflect two competing forces: analysts' tendency to group these issuers in thematic research (increasing bundling) verses their tendency to provide standalone forecasts reflecting enhanced attention to green bond issuers. These two opposing effects may neutralize each other and induce the insignificance ion the change in percentage of forecasts being bundled after green bond issuances.

Hirshleifer, Levi, Lourie, and Teoh (2019) document evidence that cognitive decision fatigue leads to decreased accuracy in analyst judgements. We capture analyst decision fatigue with decision rank, which is the logarithm of one plus the number of forecasts an analyst has issued before forecasting for the focal firm. In column (2) of Table 7, we interact the average decision rank of a firm across analysts covering a firm (*Decision Rank*) with *After GB Issuance*. The positive and significant interaction coefficient indicates that green bond issuers with a lower average analyst decision rank experience smaller reductions in analyst forecast error post-issuance. These results suggest that analyst decision fatigue attenuates the positive impact of green bonds on the information environments.

We further expand the analysis by considering analyst forecast optimism after green bond issuances. We use analyst forecast bias, the difference between actual EPS and the consensus EPS deflated by stock price the beginning of the current fiscal year, as the dependent variable in column (3) of Table 7. We find a significant positive coefficient for first green bond issuance. This shows consensus forecasts fall below the actual EPS by a greater amount, implying that firms deliver greater positive earnings surprise after the issuance of the green bonds.

4.4.3 Issuance Characteristics

In this section, we explore whether the main treatment effects from the baseline estimation vary depending on the features of green bond issuances. Although green bond issuances signify a commitment to environmental matters, the extent of this commitment can vary among firms. We attempt to proxy the level of environmental commitment through two dimensions: the volume of the green bond issuances and the primary business activities of a firm. Our focus is on firms with larger green bond issuance volumes and "pure play" green companies, whose main business activities are dedicated 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 the firm operates exclusively within the environmentally sustainable sector.[16]

We incorporate interactions of the environmental commitment measures with our main independent variable, *After GB Issuance*, and report the estimation results in Table 8. Panel A reports findings regarding green bond issuance volume, and Panel B presents results on pure

[16] 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% if their total revenue as "pure play" green companies. We use the green revenue data from FTSE Russell Green Revenues.

play green firms' issuances. The regression outcomes displayed in columns (1) and (2) are derived from subsamples of green bond issuers that categorize issuers into large and small-size issuers. The impact of green bond issuance on average analyst forecast error is significant exclusively for large-size issuers and the difference in the coefficients of *After GB Issuance* has a significant F statistic of 3.21. Columns (3) shows estimation results with the interaction term between *Large Volume Issuance* and *After GB Issuance*. The negative significant coefficient on the interaction term confirms that the enhancements in analyst forecasts are more pronounced for firms issuing larger-sized green bonds.

In columns (4) and (5) of Table 8 Panel A, we examine the intensive margin of green bond issuances by converting the binary treatment variable to *GB Issuance Volume*, a continuous treatment variable that correspond to the green bond issuance volume after green bond issuances, and zero otherwise. Column (4) demonstrates that the effect green of green bond issuance volume exhibits a negative significant coefficient, suggesting a significant impact of increasing green bond issuance volume on analyst forecast accuracy. In using green bond issuance volume as the treatment variable, the continuous treatment design has an underlying assumption that high-dose units would have the same treatment effects as low-dose units (Calllaway, Goodman-Bacon, and Sant'Anna, 2024). Following Cook, Jones, Logan, and Rose (2023), we present balancing test results in Figure IA5 of Internet Appendix to evaluate the extent to which green bond issuance volume correlates with covariates. The coefficient estimates indicate that the control variables do not show significant association with the magnitude of green bond issuance volume, except for GDP per capita. We further use covariate balancing propensity score (CBPS) of treatment to balance pre-trends and alleviate the concern that continuous treatment design is more vulnerable to parallel trend assumptions. The results of applying the CBPS to the regression design is presented in column (5) of Table 8 Panel A, consistently showing that green bond issuance volume has a negative impact on analyst forecast errors.

Columns (1) and (2) of Table 8 Panel B present regression results in which bond issuers are classified based on their categorization as "pure play" green companies. Our results indicate that the impact of green bond issuances on firm average analyst forecast error is significant, irrespective of whether the issuing firms are "pure play" or non- "pure play". In column (3) of Panel B, the interaction term has a statistically significant negative coefficient of -1.39. The empirical evidence suggests the influence of green bond issuances on the improvement of information environments is notably more effective for two specific subsets of firms: large-scale green bond issuers and firms that operate as "pure play" companies.

4.4.4 Green Bond Maturity and Issuances Through Subsidiaries

Issuing green bonds through subsidiaries is another common practice. Parent firms may hesitate in issuing green bonds directly especially in early stages of the green bond market, as firms want to avoid the negative consequences for not being able to successfully complete the underlying green projects while still want to signal their green commitments. We look into the impacts of green bond issuances on issuers' parent firms and firms that share the same parent company with the issuers (sister companies). We report the estimations of running baseline specification on parent and sister firms in Table IA5. Columns (1) and (2) examine the ultimate parents of green bond issuers, whereas columns (3) and (4) examine the immediate parents of the issuers. The issuance of green bonds significantly improves the information environment for the immediate parents of issuers, but not for the ultimate parents. Columns (5) and (6) of Table IA5 examine the sister companies of green bond issuers and both columns yield negatively significant coefficients for the variable indicating green bond issuances by sister companies. These two columns provide evidence that green bond issuances bring positive spillover effects on the information environments to sister firms of the green bond issuers.

Although green bonds are relatively new instruments in the market, some issuers have already reached the maturity of all their green bonds and currently have no outstanding green bonds. To examine whether the positive impact on information environments brought by green bond issuances get reversed after green bond maturity, we explore the change in analyst forecast accuracy and dispersion around the maturity of the last outstanding green bond. We regress analyst forecast errors and analyst forecast dispersion on a dummy variable that denotes green bond maturity and report the results in Table IA6 of the Internet Appendix. Green bond maturity does not exhibit a statistically significant impact on forecast errors and forecast dispersion.

5. Channels and Mechanisms

The previous section provides evidence that corporate information environments enhance after issuing green bonds. In this section, we discuss channels through which green bond issuances influence analyst forecasts.

5.1 Accessibility of Green Bond Disclosures

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 focuses 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 publish pre-issuance documents detailing their green projects and environmental initiatives.[17] In cases where green bond issuers who 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 9. Column (1) address 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 9 also suggest that the reduction of analyst forecast error are significantly larger when green bond issuers publish their disclosures on official websites and release pre-issuance documents.

The findings in Table 9 highlight the importance of information accessibility in the green bond market. The enhancement of the corporate information environments resulting from

[17] 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 consists 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 own websites. The presence of an SPO imply the presence of a framework, even though the framework might have been deleted.

green bond issuance is particularly pronounced when the information can effectively flow to its potential readers. The significant role of information in green bond disclosures additionally explains the persistence of the effect of green bond issuances 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 monitoring attention and scrutiny may fade away within a shorter timeframe, the information contained in green bond disclosures can continue to be valuable to the analysts in a longer period after the first issuance.

5.2 Enhanced Monitoring

Prior literature has documented a growing demand for sustainable assets among institutional investors (Krueger, Saunter, Starks, 2020), an amplification of media coverage for issuers after green bond issuances (Lu, 2023), and analysts' attention to the environmental policies of the firms they cover (Jing, Keasey, Lim, and Xu, 2024). We focus the monitoring effects and information inflows to corporate information environment to understand the impact of green bond issuances. In this section, we examine whether the issuances of green bonds attract attention from analysts, media, and institutional investors, and whether the extra attention received after green bond issuance is associated with boosted financial reporting quality. Specifically, we estimate the regression specification in Equation (1) with an alternative set of dependent variables that are measures of attention from different parties.

We use the number of unique analysts that produce EPS forecasts for a firm (*Analyst Count*) and a binary variable indicating whether a firm is covered by at least one analyst (*Analyst Coverage*) to quantify analyst attention. 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 10 presents the estimation results of regressing measures quantifying analyst and institutional investor attention on green bond issuances. The Poisson estimation results in column (1) indicate that after the issuance of the first green bond, the difference in the logarithm of the number of analysts covering EPS forecasts is expected to increase by approximately 0.02 units. Additionally, analysts are more inclined to initiate coverage of firms that issue green

bonds, as shown by column (2) of Table 10. The logistic regression results indicate that chance of being covered by analysts significantly rises following green bond issuances.

The results in column (3) illustrate that the number of news articles covering a firm increases after its first green bond issuance. In column (4) of Table 10, we narrow the scope of news articles to business articles only and exclude those related to lawsuits, the macro economy, and politics. We find similar results that media coverage on green bond issuers intensifies after green bond issuances. Column (5) of Table 10 show that the issuances of green bonds are associated with a 1.24% unit increase in institutional ownership. The results in Table 10 confirm that after the issuance of the first green bond, issuers attract more attention from analysts and institutional investors.

The growth in institutional ownership and analyst coverage of green bond issuers aligns with the view that career prospects influence analysts' coverage choices. Analysts are more likely to cover green bond issuers when it benefits their professional development. One potential advantage of covering green bond issuers is to cater the needs of institutional clients, as their trading commissions on these issuers generate revenue for analysts' employers. We examine the change in daily trading volume before and after the first green bond issuance in Table IA4 of Internet Appendix. We obtain equity trading data from TAQ and calculate institutional trading volume by identifying retail trading following Boehmer, Jones, Zhang, and Zhang (2021) from the total trading volume. Columns (1) and (2) presents regression results with average daily total trading volume and trading volume from institutional investors, respectively.[18] Both columns illustrate that the issuance of green bonds induce significant increases in both total trading volume and institutional trading volume. The findings in Table IA4 confirm institutional investors' demand for green assets and suggest the potential benefits for analysts to cover green bond issuers.

Increased attention implies increases in public scrutiny. Do green bond issuers raise the quality of their financial reporting and improve their internal control practices after green bond issuance? Assigning variables measuring the quality of financial reporting and internal control to the left-hand side of Equation (1), we investigate the relationship between corporate financial reporting and internal control subsequent to the issuance of green bonds. Specifically, we use the probability of financial report restatements (*Restatements*) and abnormal accruals

[18] The sample period of Table IA7 contain the trading days within two years before and after first green bond issuance. The sample consists of green bond issuers only. The trading volume measures are scaled by total assets.

(*Abnormal Accruals*) as the measures for financial reporting quality.[19] For internal control quality, we consider the number of earnings guidance announced in a year (*Guidance Count*) and EPS announcement delay (*EPS Announcement Delay*). Regression results in Table 11 show that the issuance of corporate green bonds is associated with better financial reporting and internal control quality. The regression results in column (1) of Panel A show a negative and significant coefficient for the binary variable indicating financial report restatements, suggesting that green bond issuances reduce the likelihood of financial statement restatements. Moreover, in column (2), our results indicate that green bond issuances have a significant positive impact on the number of earnings guidance provided. The length of EPS announcement delay reduces significantly after green bond issuance as well, as indicated by the negative significant coefficient on green bond issuances in column (3) of Panel A.

We report the impact of green bond issuances on corporate abnormal accruals in Panel B of Table 11. In column (1), the regression-based calculation of abnormal accruals is performed on firms grouped by industries, while in column (2) the regressions are fitted on individual firms. Both specifications have nominal abnormal accruals as the dependent variable. Columns (1) and (2) produce significantly negative coefficients on the independent variable for green bond issuances when the dependent variables are measures of abnormal accruals. These findings indicate a negative association between the issuance of green bonds and the practice of earnings management. The collective findings presented in Panels A and B of Table 11 illustrate that issuance of the first green bond enhances in both the quality of financial reporting and the robustness of internal control practices.

Lastly, we find that the improvement analyst forecast accuracy can be mechanically explained by the stabilization of earnings after green bond issuances. We additionally examine changes in earnings volatility subsequent to green bond issuances. Our measure of earnings volatility follows Dichev and Tang (2009). We proxy earnings volatility with the standard deviation of asset-scaled earnings before extraordinary items over the most recent five-year rolling window, multiplied by 100. As shown in Panel C of Table 11, green bond issuances are associated with significant reductions in raw earnings volatility in column (1) and the the natural logarithm of earnings volatility in column (2). The results suggest that post-issuance earnings exhibit greater persistence and stability, which enhances the predictability of earnings and contribute to improved forecast accuracy.

[19] We adopt the abnormal accruals calculation method by Jones (1991), the abnormal accruals are estimated using regression-based methods and the observations in the regression grouped based on their SIC industry classification and their firm ID.

6. Conclusion

The green bond market has been growing in the past ten years, and understanding the consequences of corporate green bond issuances is imperative for the development of sustainable bonds. This study explores the impact of corporate green bond issuances on equity analyst earnings forecasts. We show evidence that a firm's issuance of the first green bond reduces its average analyst forecast error and analyst forecast dispersion in subsequent years. The issuances of green bonds mainly impact analyst forecast accuracy through two channels: new information disclosure and enhanced monitoring. We show that after the issuance of the first green bond, issuers attract increased attention from analysts, media, and institutional investors, leading to enhanced scrutiny. Firms raise the quality of their financial reporting and internal control practices following their green bond issuances. Additionally, the accessibility of green bond disclosures plays an important role. 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. 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 bond issuances.

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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 the firm's beginning-of-year share price (in percentage).	I/B/E/S, Worldscope
AFD	Analyst forecast dispersion. The standard deviation of analyst annual earnings estimates divided by the absolute value of the mean of the analyst 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 equal 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 indicate whether a firm is a green bond issuer.	Environmental Finance, Bloomberg, LSEG Refinitiv
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 Refinitiv
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 Refinitiv
Pure Play	A dummy variable that equals one when green revenue accounts for over 90% of a firm's total revenue, and zero otherwise	LSEG Refinitiv
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

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 US dollars of a firm's home country.	World Bank
Other Variables		
Restatements	A dummy variable that equals to one if a firm experiences one or more financial restatements.	Worldscope
Guidance count	The number of management EPS forecasts issued in a fiscal year.	Capital IQ
Abnormal Accruals	Error term from regressing accruals on their economic drivers following Jones (1991).	Worldscope
EPS announcement delay	The number of days between fiscal year end and EPS announcement date.	Worldscope, I/B/E/S
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. Analyst Attention Towards Green Bond Issuances – Cases from Earnings Call Conferences

Case 1: Azure Power Global Q3 2019 Earnings Call

Question from Joseph Amil Osha - MD & Equity Research Analyst at JMP Securities

*"I wanted to return to your comment about the **green bond** and the spread that had tightened there. What does that imply for your future thoughts about funding? Because you said you're also getting better spreads from your domestic lenders. Which route might we see you take going forward?"*

Answer from Inderpreet Singh Wadhwa – Former Advisor of Azure Power Global

"Yes. I think we will continue to be a mix of project finance and bonds. And the process we follow there is once the assets are built, they are fairly mature and markets are receptive, we will issue green bonds. And when the projects are in development, under construction, we will tap local project finance or construction finance options. And all of these will be somewhat driven by the external market conditions and the rates, which we can negotiate and the spreads we can negotiate with various counterparties. But the good news is that we are probably the most diversified in terms of both domestic project finance lenders, overseas project finance lenders as well as public institutional capital from the green bond market. So we will evaluate all of these options project by project and continue to do, which is the most cost-effective strategy for the business."

Case 2: Xylem Inc Q4 2020 Earnings Call

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."*

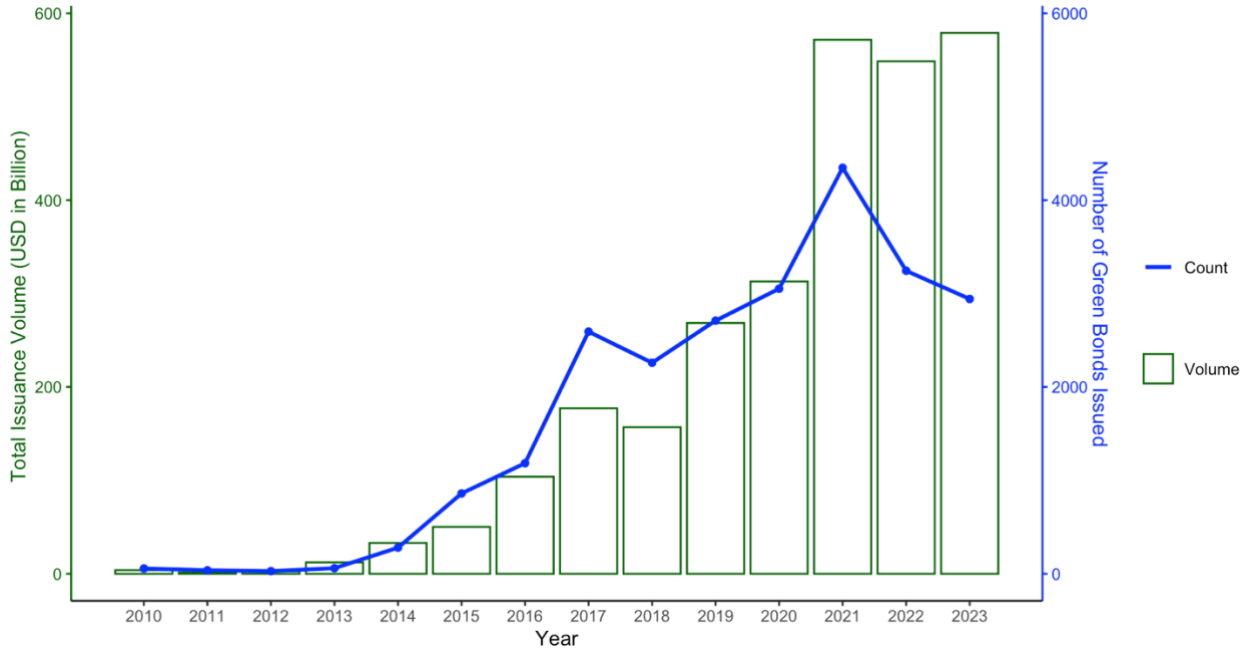
Answer from Patrick K. Decker - CEO of Xylem Inc

"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."

Panel A. Global green bond issuances by year



Panel B. Green bond issuances around the world

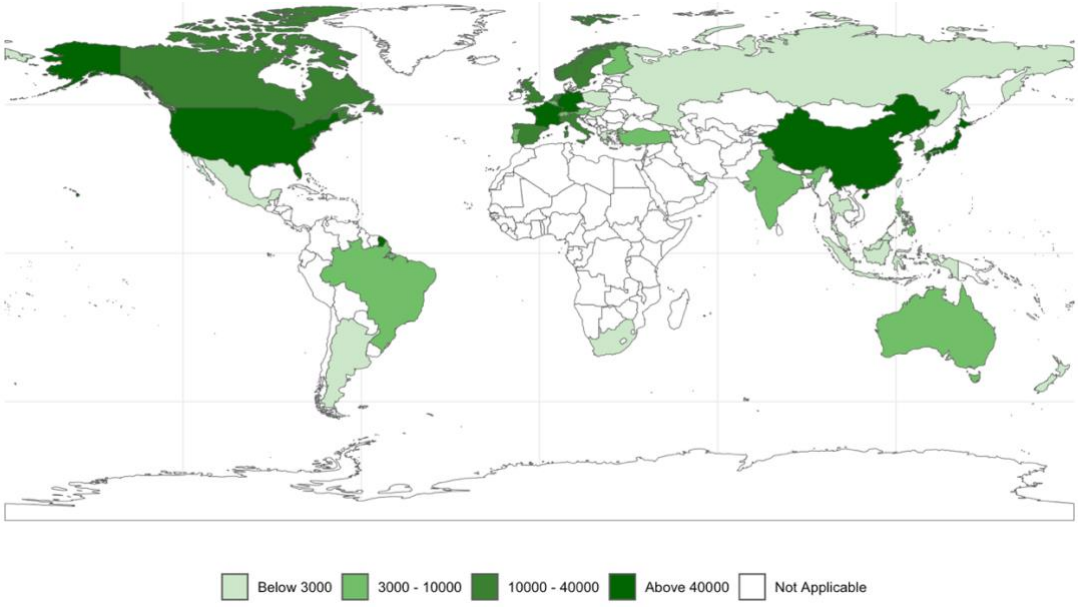
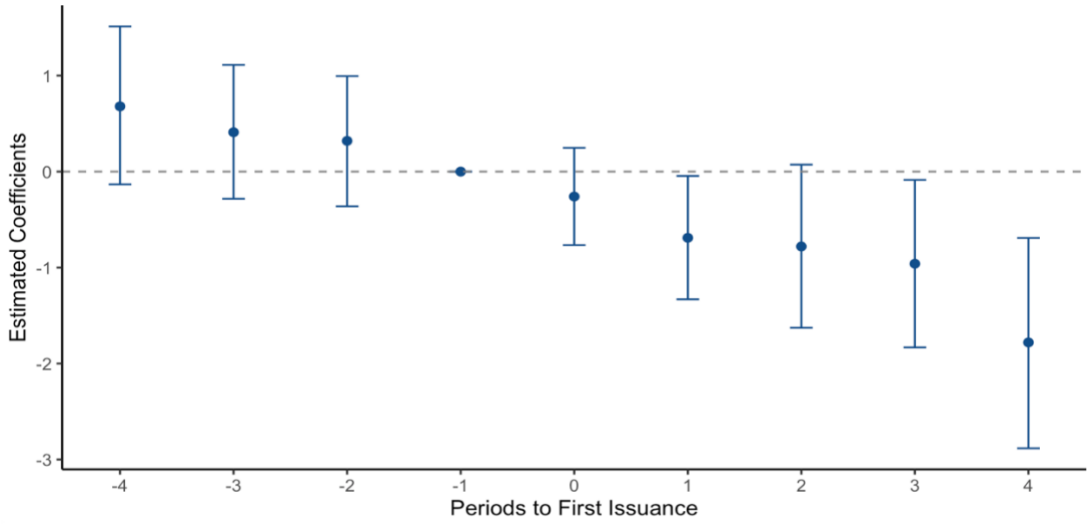


Figure 1. Global Green Bond Issuances

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 presents the volume of green bond issuances in millions of USD from 2010 through 2022 in the 40 countries that are covered in the sample. Darker colors indicate greater green bond issuance volume.

Panel A. Dynamic treatment effects for analyst forecast error



Panel B. Dynamic treatment effects for analyst forecast dispersion

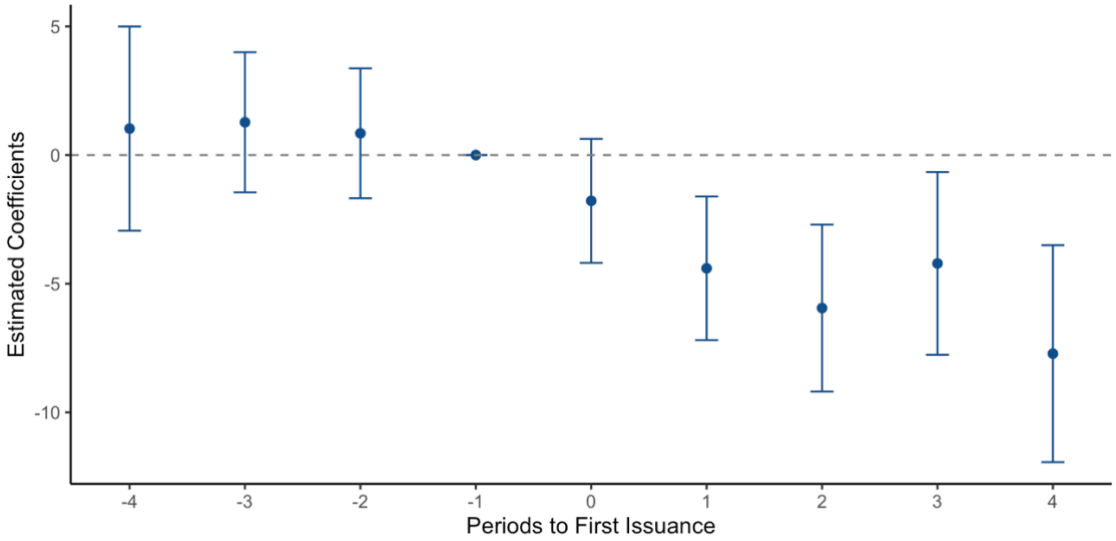
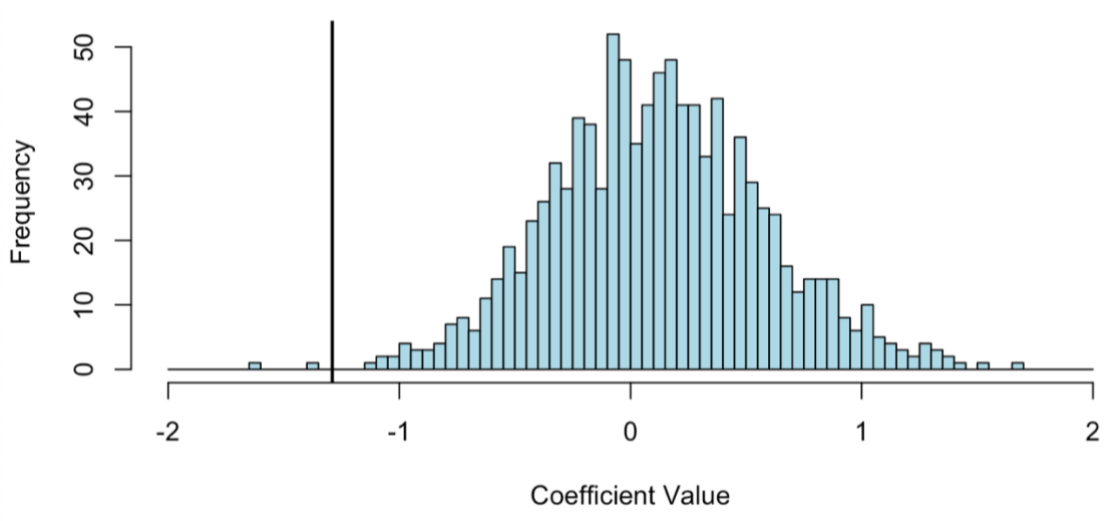


Figure 2. Analyst Forecasts Around Corporate Green Bond Issuances
This figure plots the estimated coefficients and the 95% confidence intervals for the baseline regression that explores the impact of the issuance of the first green bond on analyst forecasts. We replace the independent variable with the year relative to the first green bond issuance and take year t-1 as the benchmark year. Standard errors are clustered by industry.

Panel A. Coefficient distribution for analyst forecast error



Panel B. Coefficient distribution for analyst forecast dispersion

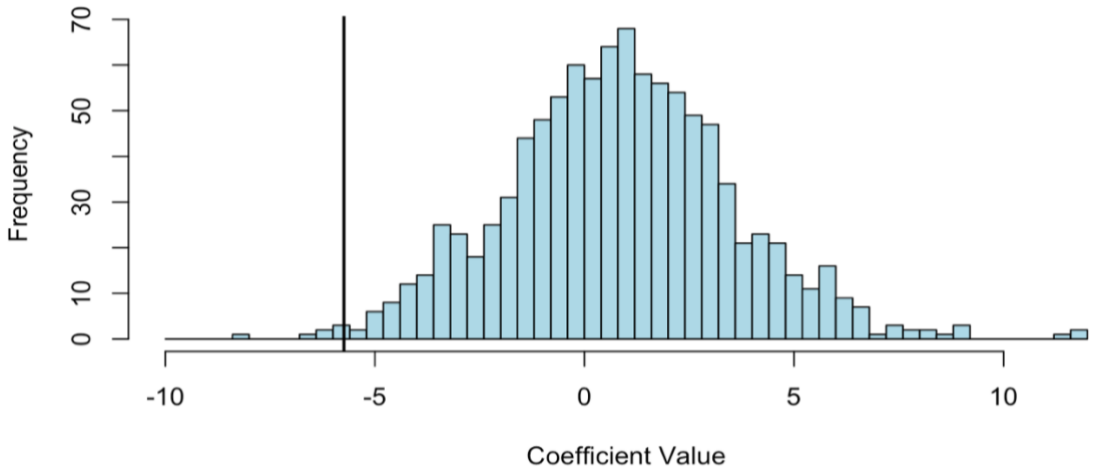


Figure 3. Coefficient Distributions of Placebo Tests
This figure shows histograms of the regression coefficients of a binary variable indicating bond issuance from 1000 placebo runs where we substitute green bond issuers with 703 conventional bond issuers randomly drawn from the sample of non-green bond issuers. Panels A and B graph the distributions of the coefficients when the dependent variables are analyst forecast accuracy and analyst forecast dispersion, respectively. The solid black vertical line in each panel represents the estimated coefficient in the baseline regression.

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 main variables. Panel C reports the mean and standard deviation of main variables for green bond issuers and conventional bond issuers separately. Definitions of variables are in Appendix A. Continuous variables are winsorized at the 1% and 99% percentile.

Panel A. Country breakdown

	#GB Issuers	#Bond Issuers	#GB Issuers w/ Analyst Forecast Details	#Bond Issuers w/ Analyst Forecast Details
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
RD	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
RD	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 forecasts. The dependent variables are measures of corporate information environment: analyst forecast accuracy (*AFE*) and analyst forecast dispersion (*AFD*). *After GB Issuance* is a dummy variable that equals to 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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error	Forecast Dispersion	Forecast Error	Forecast Dispersion
	(1)	(2)	(3)	(4)
After GB Issuance	-1.41***	-5.60***	-1.29***	-5.75***
	(-5.42)	(-5.03)	(-5.40)	(-5.03)
Log(size)			-0.77***	-6.94***
			(-2.87)	(-4.87)
Leverage			4.45***	16.88***
			(4.69)	(4.08)
M/B			-0.03*	-0.11
			(-1.71)	(-1.58)
ROA			-28.10***	-38.54***
			(-4.22)	(-3.44)
GDP per capita			-50.62***	-214.60**
			(-2.83)	(-2.53)
Capex			-15.77***	-97.23***
			(-4.39)	(-6.86)
PPE			3.97***	22.63***
			(3.19)	(2.73)
R&D			-22.80***	-57.78**
			(-3.40)	(-2.52)
Excess Yearly Return			-2.79***	-5.69***
			(-13.91)	(-6.24)
Stock Issuance			-0.18	0.16
			(-0.81)	(0.16)
Sales Growth			-1.93***	-1.14
			(-4.27)	(-1.44)
Analyst Count			-0.18***	-1.18***
			(-7.37)	(-7.95)
Horizon			0.29	9.08***
			(0.53)	(2.75)
Bid-Ask Spread			1.96***	14.58***
			(5.32)	(5.28)
Constant	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES
Observations	51280	43181	51280	43181
Adj. R2	0.25	0.46	0.34	0.48

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 corporate information environments. Dependent variable are shown above each column. *After GB Issuance* is a dummy variable that equals to 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 (columns (1) and (2)), a control group consisting of all listed firms including non-bond issuers (columns (3) and (4)), country-year fixed effects (columns (5) and (6)). Panel B reports estimation results of applying alternative calculation methods to the dependent variables. Panel C reports the robust regression (M-estimation) results and regression results on a sample that excludes banks. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Announcement dates an alternative control group						
	Announcement Dates		Alternative Control Group		Country-Year FE	
	Forecast Error	Forecast Dispersion	Forecast Error	Forecast Dispersion	Forecast Error	Forecast Dispersion
	(1)	(2)	(3)	(4)	(5)	(6)
After GB Announcement	-1.27***	-5.76***				
	(-5.36)	(-5.04)				
After GB Issuance			-1.05***	-5.57***	-1.382***	-3.228***
			(-4.69)	(-6.57)	(-5.99)	(-2.65)
Controls	YES	YES	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES	NO	NO
Country-year FE and Firm FE	NO	NO	NO	NO	YES	YES
Observations	51280	43181	133771	102136	51280	43179
Adj. R2	0.34	0.48	0.38	0.51	0.35	0.50

Panel B. Alternative analyst forecast measures						
	Three-period Average		Logged Values		Alternative Measures	
	Forecast Error	Forecast Dispersion	Logged AFE	Logged AFD	Forecast Error	Forecast Dispersion
	(1)	(2)	(3)	(4)	(5)	(6)
After GB Issuance	-0.97**	-3.71***	-0.07**	-0.11***	-15.05**	-3.34**
	(-2.41)	(-2.66)	(-2.20)	(-5.15)	(-2.56)	(-2.08)
Controls	YES	YES	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES	YES	YES
Dependent variable scaled by	Stock price	Stock price	Stock price	Stock price	Actual EPS	Median forecast
Observations	37679	31772	51280	43181	51225	43193
Adj. R2	0.52	0.66	0.48	0.78	0.15	0.26

Table 3. (continued)

Panel C. Robust regression and removing banks				
	Robust Regression		Excluding Banks	
	Forecast Error	Forecast Dispersion	Forecast Error	Forecast Dispersion
	(1)	(2)	(3)	(4)
After GB Issuance	-0.35***	-1.21***	-1.332***	-5.735***
	(-3.85)	(-6.34)	(-4.75)	(-4.71)
Controls	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES
Observations	51,280	43,181	45203	37933
Adj. R2	0.41	0.54	0.34	0.49

Table 4. Synthetic Matching

This table presents the synthetic matching results examining the impacts of the green bond issuances on corporate information environments in samples containing green bond issuers and their synthetic control units. The dependent variables are measures of average analyst forecast error and analyst forecast dispersion. *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. The synthetic control units are weighted averages of the conventional bond issuers. The table below presents the regression estimation results with the matched sample consisting of 590 green bond issuers and 590 corresponding synthetic control units. Definitions of variables are in Appendix A. The sample comprises firm-year observations from 2010 to 2022. Standard errors are clustered at industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error	Logged Forecast Error	Forecast Dispersion	Logged Forecast Dispersion
	(1)	(2)	(3)	(4)
After GB Issuance	-0.66***	-0.07***	-1.33**	-0.14***
	(-2.64)	(-3.01)	(-2.49)	(-5.58)
Log(size)	0.35	0.02	-2.30***	-0.14**
	-0.85	-0.77	(-3.04)	(-2.30)
Leverage	2.64	0.49***	9.05**	0.67***
	-1.64	-2.95	-1.99	-2.66
M/B	0.01	-0.01***	-0.17	-0.01**
	-0.24	(-3.74)	(-1.49)	(-2.44)
ROA	-35.81***	-2.79***	-54.58***	-3.35***
	(-4.11)	(-3.99)	(-3.44)	(-7.42)
GDP per capita	-39.71**	-8.36***	-23.36	-3.92
	(-2.21)	(-4.02)	(-0.35)	(-0.65)
Capex	-5.78	-0.51	-38.08***	-2.79***
	(-1.64)	(-1.35)	(-3.26)	(-4.23)
PPE	2.04	0.08	9.24	0.86***
	-1.57	-0.5	-1.41	-3.93
R&D	13.98	0.52	-64.01*	-0.33
	-0.83	-0.54	(-1.84)	(-0.19)
Excess Yearly Return	-2.66***	-0.31***	-1.72**	-0.10***
	(-6.98)	(-10.83)	(-2.02)	(-3.34)
Stock Issuance	0.46	0.02	1.16*	0.09*
	-1	-0.46	-1.77	-1.94
Sales Growth	-1.91**	-0.14**	-1.58	-0.08
	(-2.61)	(-2.29)	(-1.29)	(-1.18)
Analyst Count	-0.10**	-0.01***	-0.51***	-0.02***
	(-2.09)	(-3.54)	(-3.30)	(-3.86)
Horizon	-1.39	-0.48***	2.8	0.36***
	(-1.58)	(-5.08)	-0.84	-3.46
Bid-Ask Spread	0.5	0.16**	4.80*	0.29**
	-0.65	-2.19	-1.93	-2.46
Constant	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES
Observations	12,657	12,657	11,790	11,790
Adj. R2	0.3	0.53	0.39	0.97

Table 5. Instrumental Variable: Underwriter Green Bond History

This table presents the instrumental variable estimation results examining the impacts of the green bond issuances on corporate information environments. The dependent variables are average analyst forecast error (*AFE*) and analyst forecast dispersion (*AFD*). *After GB Issuance* is a dummy variable that equals to 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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	After GB Issuance	Forecast Error	Forecast Dispersion
	(1) First Stage	(2) Second Stage	(3) Second Stage
Log Cumulative GB Managed	0.042***		
	(7.53)		
After GB Issuance		-4.30**	-33.493***
		(-2.46)	(-2.78)
Log(size)	-0.001	-0.86**	-8.865***
	(-0.10)	(-2.48)	(-4.71)
Leverage	-0.02	5.36***	19.925***
	(-1.37)	(3.97)	(2.83)
M/B	0.001	-0.02	-0.012
	(1.43)	(-0.90)	(-0.12)
ROA	-0.03*	-41.74***	-61.291***
	(-1.81)	(-5.16)	(-3.97)
GDP per capita	-6.11***	-62.09***	-426.468***
	(-7.55)	(-2.95)	(-3.63)
Capex	0.18***	-13.34***	-88.464***
	(2.94)	(-2.60)	(-4.60)
PPE	-0.02	3.03*	21.165*
	(-0.85)	(1.76)	(1.76)
R&D	0.11	-28.34**	-104.921***
	(1.38)	(-2.44)	(-5.66)
Excess Yearly Return	-0.002	-2.74***	-6.330***
	(-0.87)	(-9.98)	(-4.69)
Stock Issuance	0.001	0.10	1.066
	(0.17)	(0.30)	(0.91)
Sales Growth	0.003*	-2.23***	-0.901
	(1.72)	(-4.17)	(-0.72)
Analyst Count	-0.001	-0.18***	-1.297***
	(-0.69)	(-5.34)	(-7.08)
Horizon	-0.012	-0.09	4.750
	(-1.16)	(-0.13)	(1.18)
Bid-Ask Spread	-0.01***	3.07***	26.874***
	(-2.83)	(3.93)	(3.28)
Constant	YES	YES	YES
Firm FE and year FE	YES	YES	YES
First stage Cragg-Donald F statistic		1180.3 (p = 0.00)	
Observations	31745	31745	27748
Adj. R2	0.51	0.13	0.05

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 variables are average analyst forecast error (*AFE*). *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. In columns (1) – (2), we run regressions in subsamples of firms based on their country's SBTi participation rate. In columns (3) – (4), we conduct regressions in subsamples that divides firms based on whether a firm operates in industries where at least one environmental factor is defined as financially material by SASB. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	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**
	(-5.37)	(-1.21)	(-4.28)	(-2.31)
Controls	YES	YES	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 4.22, p = 0.04**		F = 5.61, p = 0.02**	
Firm FE and year FE	YES	YES	YES	YES
Observations	25923	25357	35901	15379
Adj. R-squared	0.33	0.37	0.35	0.34

Table 7. Analyst-Level Heterogeneity in Green Bond Issuance Impacts

This table presents estimation results examining the how the impact of green bond issuances varies with analyst characteristics. The dependent variables are average analyst forecast error (*AFE*). *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. *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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)	Forecast Bias (3)
After GB Issuance	-1.86***	-1.76***	0.59**
	(-5.60)	(-5.31)	(2.16)
*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	YES
Firm FE and year FE	YES	YES	YES
Observations	34189	34189	51280
Adj. R-squared	0.34	0.34	0.32

Table 8. Green Bond Issuance Characteristics

This table contains regression results of analyses on green bond issuance characteristics within a subsample of green bond issuers. The dependent variables in this table is analyst forecast errors (*AFE*). *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. The sample for Panel A contains green bond issuers, and the sample used in Panel B contains bond issuers with available green revenue data. Columns (1) and (2) of Panel A focuses on subsamples of green bond issuers with large and small issuance volumes, respectively. Column (5) of Panel A apply covariate balancing propensity scores to continuous treatment following Fong et al. (2018). Columns (1) and (2) of Panel B uses subsamples consisting of pure play firms and normal firms, respectively. Columns Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A: Green bond issuance volume

	Large-Volume Issuers (1) OLS	Small-Volume Issuers (2) OLS	All Issuers (3) OLS	All Issuers (4) OLS	All Issuers (5) CBPS
After GB Issuance	-0.94**	-0.28	-0.25		
	(-2.27)	(-1.12)	(-0.91)		
*Large Volume Issuance * After GB Issuance*			-0.73**		
			(-2.25)		
GB Issuance Volume				-0.001**	-0.001**
				(-2.45)	(-2.05)
Controls	YES	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 3.21, p = 0.075*				
Observations	3339	3770	7146	7146	7298
Adj. R2	0.28	0.33	0.28	0.28	0.27

Panel B: Pure play firms

	Pure Play (1) OLS	Non-Pure Play (2) OLS	All Issuers (3) OLS
After GB Issuance	-2.49**	-1.13***	-1.11***
	(-2.49)	(-4.53)	(-4.43)
*Pure play * After GB Issuance*			-1.39**
			(-2.08)
Controls	YES	YES	YES
Firm FE and year FE	YES	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 1.92, p = 0.17		
Observations	1332	39583	40915
Adj. R2	0.32	0.3	0.30

Table 9. Information Accessibility

This table illustrates the regression results in subsamples with different levels of green bond information Accessibility. The dependent variable in this table is analyst forecast error (*AFE*). *Disclosure Accessibility Measures* are three variables measuring the accessibility of green bond information. *Disclosures Publicly Available* equals to 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 to 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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Error (2)	Forecast Error (3)
*Disclosures Publicly Available * After GB Issuance*	-0.83**		
	(-2.19)		
*Disclosures Available on Official Websites * After GB Issuance*		-0.79**	
		(-2.02)	
*Pre-issuance Disclosures Available * After GB Issuance*			-0.78**
			(-2.24)
After GB Issuance	0.07	0.04	-0.07
	(0.22)	(0.10)	(-0.25)
Controls	YES	YES	YES
Firm FE and year FE	YES	YES	YES
Observations	7144	7144	7144
Adj. R-squared	0.28	0.28	0.28

Table 10. Analyst and Media Coverage

This table illustrates the estimation results exploring the change in analyst and institutional investor attention after the issuance of the first corporate green bond. The dependent variables are the number of unique analysts that follow a firm (*Analyst Count*), a binary variable indicating whether a firm is covered by at least one analyst (*Analyst Coverage*), the logged number of news articles related to a firm (*News Coverage*), and the logged number of business news articles related to a firm (*Business News Coverage*). *After GB Issuance* is a dummy variable that equals to 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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Analyst Count	Analyst Coverage	News Coverage	Business News Coverage	Inst Ownership
	(1) Poisson	(2) Logit	(3) OLS	(4) OLS	(5) OLS
After GB Issuance	0.02*	1.11***	0.15**	0.15**	1.24***
	(1.65)	(3.06)	(2.15)	(2.10)	(3.40)
Controls	YES	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES	YES
Observations	50227	33,426	11514	11514	50365
Adj./Pseudo R2	0.53	0.33	0.77	0.76	0.93

Table 11. Financial Reporting Quality, Internal Control Practices and Earnings Stability
This table illustrates the estimation results exploring the change in financial reporting quality and internal control practices after the issuance of the first corporate green bond. *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. Panel A includes regression estimations showing the impact of green bond issuances on the chance of restatements, the number of earnings guidance provided, and EPS announcement delay. Panel B present regression results taking abnormal accruals as the dependent variable. Panel C presents the analyses where the dependent variables are earnings volatility and the logged value of earnings volatility. Earnings volatility are 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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

Panel A. Restatements, guidance, and EPS announcements

	Restatements	Guidance Count	EPS Announcement Delay
	(1) Logit	(2) Poisson	(3) Poisson
After GB Issuance	-0.437*	0.103**	-0.021*
	(-1.92)	(2.05)	(-1.71)
Constant	YES	YES	YES
Firm FE +Year FE	YES	YES	YES
Observations	13135	38303	51262
Adj./Pseudo R2	0.13	0.37	0.49

Panel B. Abnormal accruals

	Abnormal Accruals	Abnormal Accruals
	(1) OLS	(2) OLS
After GB Issuance	-0.017**	-0.001*
	(-2.01)	(-1.74)
Controls	YES	YES
Firm FE +Year FE	YES	YES
Abnormal Accrual Calculation Grouped By	Industry	Firms
Observations	38992	40098
Adj. R2	0.91	0.35

Panel C: Earnings Stability

	Earnings Volatility	Logged Earnings Volatility
	(1) OLS	(2) OLS
After GB Issuance	-0.26**	-0.06***
	(-2.02)	(-2.95)
Controls	YES	YES
Firm FE +Year FE	YES	YES
Observations	48455	48455
Adj. R2	0.70	0.86

Internet Appendix for
"Do Equity Analysts Care About Green Bonds?"

Appendix IA. Additional Figures and Tables

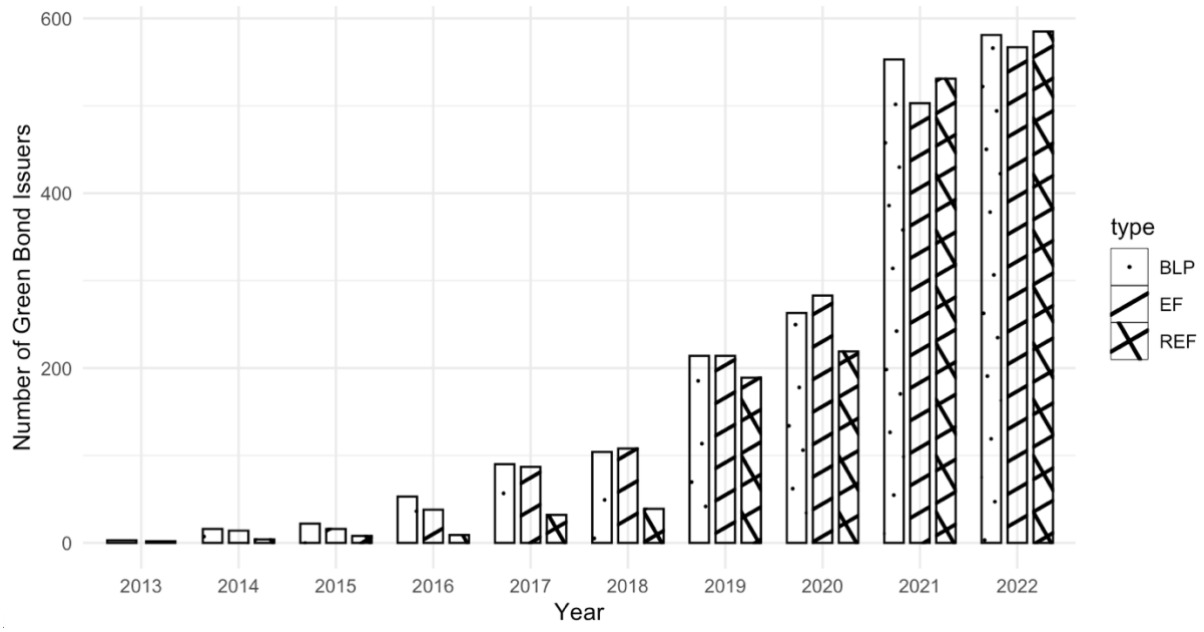


Figure IA1. Green Bonds Issued by Listed Companies in Three Data Sources
This figure indicates the number of green bonds issued by listed companies in the green bond issuance datasets provided by Bloomberg, Environmental Finance, and LSEG Refinitiv. The number of green bonds are sorted by year and each bar pattern represents a data source.

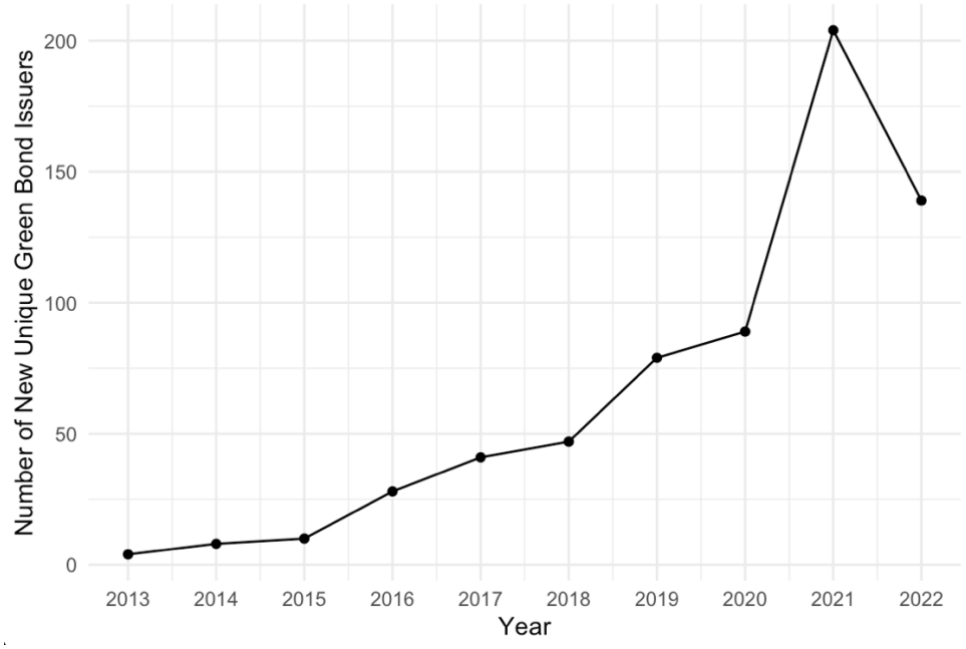


Figure IA2. New Unique Green Bond Issuers
This figure plots the number of new unique listed green bond issuers that enters the corporate green bond market each year from 2013 to 2022. The green bond data are gathered from Environmental Finance, Bloomberg, and Refinitiv.

Panel A. Number of Green Bond Issuances

Panel B. Green Bond Issuance Volume

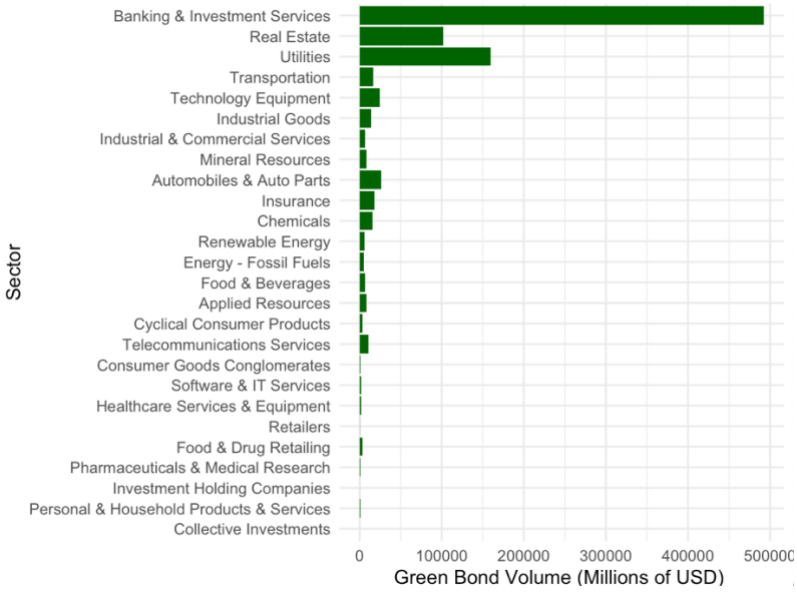


Figure IA3. Green Bond Issuance by Industry Sectors
This figure draws the number of green bonds issued (Panel A) and the total volume of green bond issued (Panel B) by industry. The two panels cover green bonds issued by firms in the sample of this paper only.

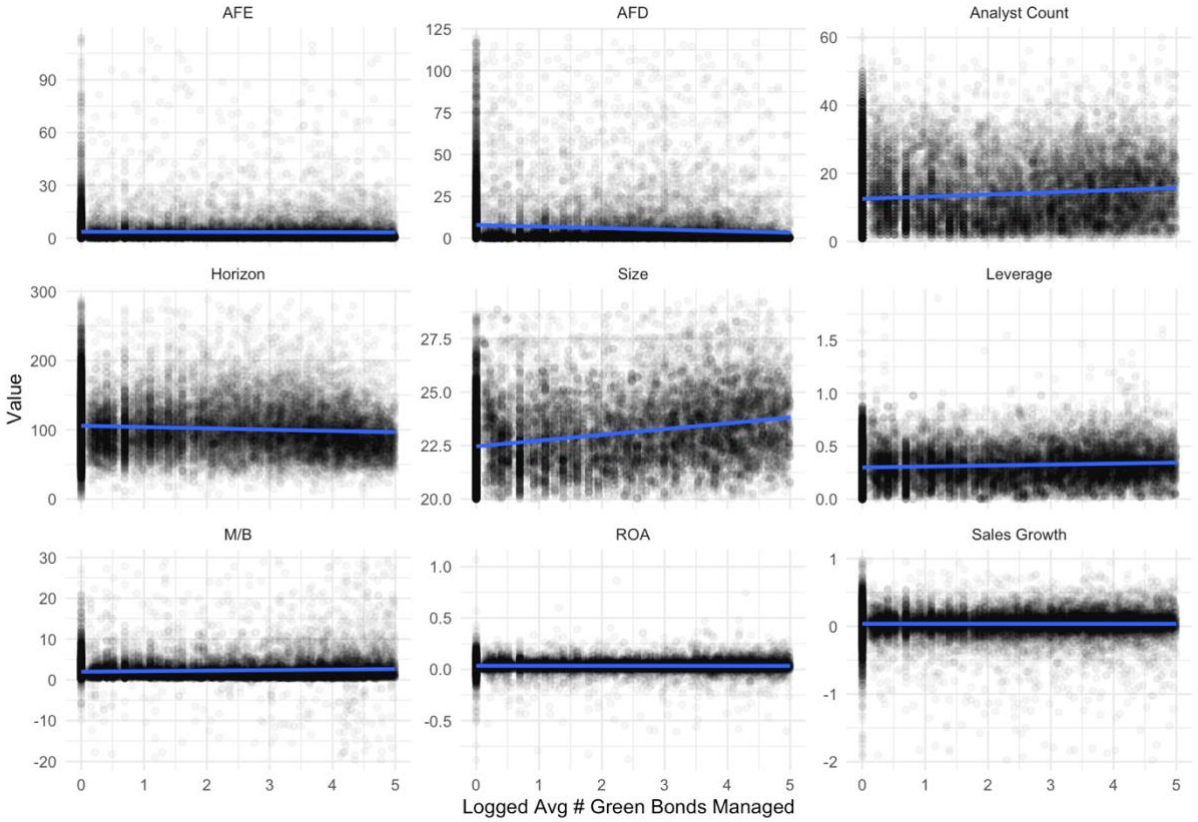


Figure IA4. Underwriter Green Bond Expertise and Firm Characteristics
This figure presents scatter plots visualizing the relationship between various firm characteristics (y-axis) and the logged average number of green bonds managed by underwriters that a firm worked with (x-axis, instrumental variable). Each plot include a blue solid line representing the OLS fitted line from regressing the firm characteristics on the instrumental variable.

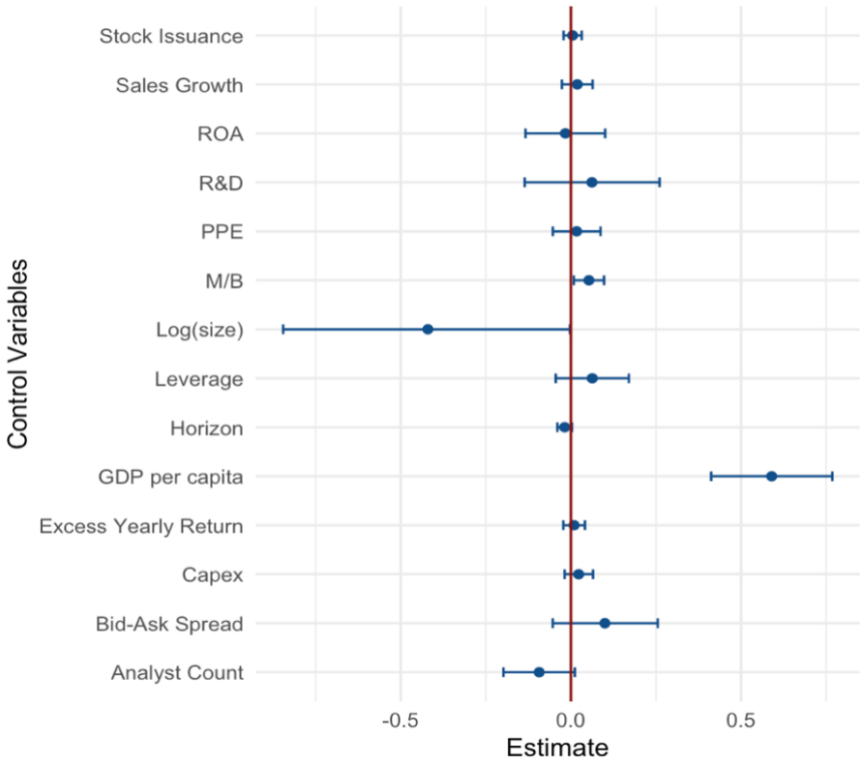


Figure IA5. Balance Test for Green Bond Issuance Volume
This figure draws the coefficient estimates and 95% confidence bands from regressing the green bond issuance volume on each control variables separately. All specifications include year fixed effects and firm fixed effects. The dependent and independent variables of interest are standardized.

Table IA1. 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 IA2. Alternative Difference-in-Differences Estimators

This table provides estimations of the effect of green bond issuances on corporate information environments measured by AFE and AFD using four alternative staggered DiD estimators. There alternative estimators follow Sun and Abraham (2021), Callaway and Sant'Anna (2021), Borusyak, Jaravel, and Spiess (2021) and De Chaisemartin and D'Haultfeuille (2020). Panel A presents the estimation results with analyst forecast error (*AFE*) as the dependent variable, while Panel B presents the results with analyst forecast dispersion (*AFD*) as the dependent variable. All regressions include firm-level and year-level fixed effects and control variables. Continuous variables are winsorized at the 1% and 99% percentile. Standard errors are clustered at industry level.

Panel A. Alternative estimators when dependent variable is analyst forecast error

	Sun and Abraham (1)	Callaway and Sant'Anna (2)	Borusyak, Jaravel, and Spiess (3)	De Chaisemartin and D'Haultfeuille (4)
Point Estimate	-1.35	-0.74	-1.33	-0.73
Standard Error	0.26	0.33	0.25	0.21
Lower Bound 95% CI	-1.87	-1.39	-1.82	-1.15
Upper Bound 95% CI	-0.84	-0.09	-0.84	-0.31

Panel B. Alternative estimators when dependent variable is analyst forecast dispersion

	Sun and Abraham (1)	Callaway and Sant'Anna (2)	Borusyak, Jaravel, and Spiess (3)	De Chaisemartin and D'Haultfeuille (4)
Point Estimate	-5.42	-5.95	-5.44	-3.63
Standard Error	0.67	2.51	1.19	0.067
Lower Bound 95% CI	-7.73	-10.86	-7.77	-3.76
Upper Bound 95% CI	-3.12	-1.04	-3.13	-3.51

Table IA3. Conventional Bond Issuances from Non-Green Bond Issuers

This table presents the results examining the impact of conventional bond issuances on corporate information environments. The dependent variables are measures of the analyst forecast error (*AFE*) and analyst forecast dispersion (*AFD*). *After Conventional Issuance* is a binary variable indicating whether a non-green bond issuer has issued a conventional bond. Definitions of variables are in Appendix A. The sample contains bond issuers excluding green bond issuers. The sample period is from 2010 to 2022. Standard errors are clustered at industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error	Logged Forecast Error	Forecast Dispersion	Logged Forecast Dispersion
	(1)	(2)	(3)	(4)
After Conventional Issuance	0.34	0.03	0.84	0.02
	(1.33)	(1.31)	(0.78)	(1.06)
Controls	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES
Observations	44134	44134	36681	36681
Adj. R-squared	0.34	0.48	0.48	0.78

Table IA4. Legal Origin and Green Bond Issuance Impacts

This table illustrates estimation results in subsamples for firms located in countries with different law systems. The dependent variables are average analyst forecast error (*AFE*). *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. In columns (1) – (4), we split the sample into subsamples based on the legal systems of the countries where the firms reside. Definitions of variables are in Appendix A. The sample period is from 2010 to 2022. Standard errors are clustered at industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error	Forecast Error	Forecast Error	Forecast Error
	(1)	(2)	(3)	(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)	(-3.29)	(-2.15)
Controls	YES	YES	YES	YES
Test for the difference between coefficients of *After GB Issuance*	F = 0.14, p = 0.71		F = 1.19, p = 0.28	
Firm FE and year FE	YES	YES	YES	YES
Observations	30517	20763	28556	1961
Adj. R-squared	0.35	0.36	0.35	0.43

Table IA5. Parents and Sister Firms of Green Bond Issuers

This table contains regression results of analyses on the changes in the information environments of the parent companies and firms that share the same ultimate parent as the green bond issuers (sister firms). In specifications (1) through (4), the sample contains all non-green bond issuers, including both conventional bond issuers and non-conventional bond issuers. In specifications (5) and (6), the sample contains all non-green bond issuers that are not an ultimate parent of any one of the firms. In columns (1) and (2), the dependent variable is *After Subsidiary Issuance*, which stands for whether any one of the subsidiaries of a firm has issued a green bond. In columns (3) and (4), the dependent variable is *After Immediate Subsidiary Issuance*, which equals one if any one of the immediate subsidiaries has issued a green bond. In columns (5) and (6) the independent variable, *After Sister Firm Issuance*, stands for whether the 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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error (1)	Forecast Dispersion (2)	Forecast Error (3)	Forecast Dispersion (4)	Forecast Error (5)	Forecast Dispersion (6)
	Ultimate Parents of Issuers		Immediate Parents of Issuers		Sister Firms of Issuers	
After Subsidiary Issuance	-0.58	-0.05*				
	(-1.23)	(-1.70)				
After Immediate Subsidiary Issuance			-0.85**	-0.06**		
			(-1.98)	(-2.33)		
After Sister Firm Issuance					-0.88*	-0.08***
					(-1.73)	(-2.86)
Controls	YES	YES	YES	YES	YES	YES
Firm FE and year FE	YES	YES	YES	YES	YES	YES
Observations	126505	95538	126505	95538	126505	95538
Adj. R-squared	0.38	0.50	0.38	0.50	0.38	0.50

Table IA6. Green Bond Maturity

This table presents the results examining the changes in corporate information environments following the maturity of the green bonds. The dependent variables are measures of the analyst forecast error (*AFE*) and analyst forecast dispersion (*AFD*). *After GB Maturity* 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 industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Forecast Error	Forecast Dispersion
	(1)	(2)
After GB Maturity	3.04	29.50
	(1.01)	(1.52)
Controls	YES	YES
Firm FE and year FE	YES	YES
Observations	7116	6460
Adj. R-squared	0.28	0.52

Table IA7. Trading Volume

This table presents the tests exploring the change in the total trading volume and institutional trading volume of the green bond issuers. The dependent variables are the median daily total trading volume and median daily trading volume from institutional investors. Each issuer's trading volumes are scaled by total assets (in thousands). *After GB Issuance* is a dummy variable that equals to one if the firm has issued its first green bond. Definitions of variables are in Appendix A. The sample contains green bond issuers. The sample period is covers the trading days two years before and after the issuance of a firm's first green bond. Standard errors are clustered at industry level. Continuous variables are winsorized at the 1% and 99% percentile. ∗, ∗∗, and ∗∗∗ denote significance at the 10%, 5%, and 1% level, respectively.

	Total Trading Volume	Institutional Trading Volume
	(1)	(2)
After GB Issuance	0.07**	0.05**
	-2.38	-2.32
Controls	YES	YES
Firm FE and Year-month FE	YES	YES
Observations	30275	30275
Adj. R-squared	0.82	0.82