Green Game in Town: Intra-Industry Spillover Effects of Corporate Green Bond Announcements in the US

This version: March 2025

Abstract

We investigate whether announcements of green bond issuances by firms have any effect on the value of their rivals. Using data on green bond announcements by US firms over the period 2013 – 2024, we find that a positive (negative) stock price reaction to a focal firm's green bond announcement is associated with a positive (negative) stock price reaction for non-announcing firms within the same industry. This suggests the presence of intra-industry contagion effects in response to green bond announcements. Further, this effect is stronger for first-time issues, relatively large issues, and issues announced by industry leaders. Our results remain robust to alternative explanations and a battery of checks.

Keywords: Green Bonds; Climate finance; Spillovers; Sustainability; Financing decisions, Contagion effects

JEL Classification: G12, G14, G32, Q54, Q56

Green Game in Town: Intra-Industry Spillover Effects of Corporate Green Bond Announcements in the US

1 Introduction

Green bonds are financial instruments that are issued to fund green or sustainable projects with the aim of enhancing environmental and social welfare.[1] Prior literature documents that the announcements of green bond issues by firms, on average, are associated with positive shareholder wealth effects (Flammer, 2021; Tang & Zhang, 2020a). The literature attributes a credible signal of commitment to the environment as a primary reason for these positive announcement effects. However, what remains relatively unknown is whether the announcements of green bond issues by firms have any effect on the stock prices of their rivals.[2] This question assumes significance in light of the fact that while green bond-issuing firms, on average, make only a minuscule proportion of the market capitalization of listed firms in a year, their rivals form a much higher proportion. Using data on green bond issues by US firms over the period 2013 – 2024, we examine in this paper whether green bond announcements influence the stock prices of rival firms and, if so, what factors drive these spillover effects.[3]

We find that a positive (negative) market reaction to the announcement of a green bond issue by an event firm also leads to a positive (negative) market reaction for its rival firms. Put differently, we observe a contagion effect of the announcement of a green bond issue by an

[1] See Baker et al. (2022) for an excellent review on the pricing and ownership of green bonds.
[2] We use the terms 'event firms', 'announcing firms', 'announcers', and 'focal firms' interchangeably throughout the paper, and we mean all of the terms to imply the firms that announce issuing green bonds in our sample.
[3] We identify the rivals of the event firm using the 10-K Text-based Network Industry Classification (TNIC-2) proposed by Hoberg and Phillips (2010, 2016). For our robustness checks, we also identify rivals based on the matching of four-digit, three-digit, and two-digit SIC codes of event firms with those of rival firms. Both approaches yield qualitatively similar results.

event firm on the value of its rivals.[4] Additionally, we also find that the contagion effect of green bond announcements on the value of rivals is stronger if the size of the green bond issue is relatively large or if the event firm has a greater market share in its industry.

To check the robustness of our results, we conduct several tests. First, our results remain qualitatively unchanged to the choice of the event window. Additionally, we conduct a falsification (placebo) test based on pseudo-event dates to ensure that our results are not driven by the correlation between the stock returns of firms that share the same industry. Finally, we also test whether our results are robust to an alternative identification of rivals. In particular, we shortlist firms that share the same *n*-digit Standard Industry Classification (SIC) code as that of the event firm (with $n = 2$, 3, and 4) and then identify a rival that is the closest match to the event firm based on the matching of several firm characteristics. Our results remain broadly unchanged to this alternative definition of rival identification.

Our study contributes to two major strands of literature. First, it contributes to the nascent but fast-growing literature on green bonds by showing that a green bond issue by a firm does not just affect the value of the issuing firm as documented previously (Flammer, 2021; Tang & Zhang, 2020a), but also the value of other firms in the issuer's industry. Our study provides evidence of how sustainability-linked financial decisions by a firm can affect its industry as a whole.

Additionally, our study contributes to the literature that examines the spillover effects of corporate financing decisions such as initial public offerings (IPOs) (Hsu et al., 2010; Li & Zhang, 2021; Spiegel & Tookes, 2020) and seasoned equity offerings (SEOs) (Bradley & Yuan, 2013). We contribute to this strand of literature by not only documenting a spillover (i.e.,

[4] While a contagion effect leads to changes in the stock prices of the event and rival firms in the same direction, a competitive effect, on the other hand, results in changes in the stock prices of the event and rival firms in the opposite direction.

contagion) effect of green bond announcements on the issuing firm's rivals but also that this effect varies depending on whether the issue is a first-time or seasoned issue, the relative size of the issue, and the relative market share of the issuing firm in its industry.

The remainder of this paper is organized as follows. In Section 2, we review the relevant literature on green bonds and develop our hypotheses. Section 3 describes the data used in the study. In Section 4, we present the empirical methodology and results, followed by alternative explanations and robustness checks in Section 5. Finally, we conclude with a discussion in Section 6.

2 Related literature and hypothesis development

2.1 Green bonds

Green bonds have emerged as a crucial financial instrument for promoting sustainability and action against climate change. Green bonds, as a new source of financing, offer a lower yield than conventional bonds (Zerbib, 2019). Reputational benefits, signaling, and climate change are the main motives for green bond issuance (Flammer, 2021; Sangiorgi & Schopohl, 2023). Green bonds are more likely to be issued in local currency in foreign markets than regular bonds to reduce the currency risk (Zheng, 2021). There exists an investor clientele supporting the company's investment decision on green bonds (Flammer, 2021), and in particular, international sustainable, responsible, and impact (SRI) investors who tolerate currency mismatch risk (Zheng, 2021). The ownership of green bonds is more concentrated than that of conventional bonds (Baker et al., 2022), which remain resilient during the recent pandemic (Fatica & Panzica, 2024). A more recent study shows a 3-8 basis points yield spread in green bonds lower than conventional bonds (Caramichael & Rapp, 2024)**.** The secondary market of green bonds also offers a green premium or "greenium" issued simultaneously over

the conventional bonds (Baker et al., 2022). Greenium considers green bond governance and external scrutiny but does not project credibility (Caramichael & Rapp, 2024).

Investors react positively to the announcement of green bond issuance (Flammer, 2021; Tang & Zhang, 2020a). However, the positive market reaction to green bonds issued between 2013 and 2020 follows a skewed distribution driven by large issuers (Aswani & Rajgopal, 2022). Further, no significant market response is evidenced to green bond announcements between January 2013 and January 2022 (Bhagat & Yoon, 2023). There is no evidence of greenwashing and the lower cost of capital of green bonds than their counterpart brown bonds (Larcker & Watts, 2020; Tang & Zhang, 2020). However, the cost of capital of a firm is higher for the first and one-time green bond issuance which reverses for repetitive and multiple issuers (Petreski et al., 2022). Moreover, the green bond issuance volume is negatively associated with future carbon emissions for financially constrained and high credit-risk firms (ElBannan & Löffler, 2024).

2.2 Intra-industry spillover effects

Prior research indicates that corporate decisions of a company have a spillover effect on the value of its industry rivals. These corporate decisions include announcements related to initial public offerings (IPOs) (Akhigbe et al., 2003; Hsu et al., 2010; Li & Zhang, 2021; Spiegel & Tookes, 2020), seasoned equity offerings (SEOs) (Slovin et al., 1992), dividend changes (Firth, 1996), mergers and acquisitions (Akhigbe & Madura, 1999; Clougherty & Duso, 2009; Davis et al., 2021; Derrien et al., 2021; Gaur et al., 2013; Mataigne et al., 2021; Song & Walkling, 2000; Yilmaz, 2023), capital investments (I. Chen & Chang, 2020; S. Chen et al., 2007), earnings (Foster, 1981), mass layoffs (Bordeman et al., 2021), and bankruptcy (Lang & Stulz, 1992), among others.

Figure 1 depicts the different corporate action announcements that result in spillover effects on the intra-industry rivals of the event firm documented in the prior literature. The announcement of the corporate events may have a positive (negative) impact on the event firm and subsequently impact the rivals in the same or opposite direction. Based on the direction, the spillover effect of corporate decisions on rivals can be classified into two broad categories: competitive effects and contagion effects. A corporate action may generate both contagion and competitive effects on their rivals. However, empirical analysis often reveals that, on average, one of these effects tends to be more dominant than the other. Competitive effects occur when the stock price of the rivals, on average, moves in the opposite direction to that of event firms, showing a competitive pressure on the rivals. Several studies document the competitive effect of corporate announcements on their rivals including IPO on product-market rivals (Chod & Lyandres, 2011), seasoned equity offerings (Slovin et al., 1992), and capital investments (S. Chen et al., 2007), among others. On the contrary, the contagion effect is characterized by the stock price of both the event firm and its rivals, on average, moving in the same direction, reflecting shared industry opportunities and standards. For instance, corporate actions lead to a contagion effect on the industry rivals such as corporate scandals (Yu et al., 2015), among others.

Corporate financing decisions such as IPOs and SEOs have mixed (competitive and contagion) effects on the rivals. Completed (withdrawn) IPOs have a negative (positive) spillover effect on the industry rivals, implying the competitive effect of financing decisions (Hsu et al., 2010). On the contrary, IPOs in China have a positive spillover effect, implying a contagion effect (Li & Zhang, 2021). Similarly, primary (secondary) SEOs transmit a competitive (contagion) spillover effect to their rivals (Bradley & Yuan, 2013).

Overall, prior literature documents that the financial decisions of a firm impact its industry rivals as well as its product market rivals. Peer firms also affect the corporate capital structure and financial policies (Leary & Roberts, 2014).

2.3 Hypothesis development

2.3.1 Spillover effects

The issuance of green bonds signals the investors about the commitment of the company towards the environment, and investor clientele concerned about sustainability exists. Investors react positively to the announcement of green bond issuance by a company (Flammer, 2021; Tang & Zhang, 2020a). However, this positive stock price reaction is only limited to financial firms and to specific issuers (Aswani & Rajgopal, 2022). Further, there is a negative stock price reaction to the announcement of green, sustainability, and sustainability-linked bonds, issued in the US during 2013-20, excluding Tesla from the sample (Aswani & Rajgopal, 2022). Thus, the announcement of the issue of green bonds by a company may be perceived as either good news or bad news. Investors may perceive green bond issuance as good news for many reasons, including environmental commitment, reduction in carbon footprints, and avoiding financial constraints. Positive news for the event firm is also likely to benefit the rivals for at least three reasons. First, when a company issues green bonds, it not only signals its own commitment but also the commitment of the industry towards the environment. This results in the reassessment of the perception of the investors toward the industry. Second, the successful issuance of green bonds by event firms opens the opportunity for their rivals to raise money through green bonds. Third, the issuance of green bonds may imply shared industry-wide benefits for the rivals, such as favorable policies, and investor demands. On the contrary, green bond issuance may be considered bad news due to the cost of disclosure, reduced transparency,

industry affiliation, and greenwashing. The negative news of the event firm may also be perceived as bad news for the rivals for at least three reasons. First, the increased cost of disclosure and reduced transparency of the event company may reveal the secrets of the industry, thereby exposing the rivals. Second, if there is skepticism about the issuing firm or greenwashing, it can damage the reputation of the rivals and the industry. Third, if the issuance is unsuccessful, it may signal green bonds as a reduced opportunity to raise money. Thus, we expect a contagion effect of green bond issuance by an event firm on its rivals. In other words, we predict that a positive (negative) stock price reaction due to good (bad) news about the issuance of green bonds is associated with a positive (negative) stock price reaction of their rivals.

However, the good (bad) news about the green bond issuance by a company may be perceived as bad (good) news for the rivals. There are at least three reasons why good news for event firms may be considered bad news for rivals. First, event firms may enjoy better access to capital, a higher reputation, and lower financing costs, which might lead to competitive pressure for rivals. Second, rivals may be forced to move similarly and issue green bonds, which might not be financially viable, resulting in a cascading effect. Third, signaling environmental commitment through green bonds may lead to an increase in industry standards, which the rivals may not match. Moreover, bad news for event firms may be considered good news for rivals. For instance, rivals can differentiate themselves from the event firm, avoid green bonds, and use other financing alternatives. Additionally, skepticism about the credibility of the event firm may strengthen the rivals. Thus, we can expect a competitive effect of green bond issuance on rival firms. In other words, we predict, on average, a positive (negative) stock price reaction for rivals on the green bonds issuance when there is a negative (positive) stock price reaction for the event firms.

The issuance of green bonds may exert either a contagion or a competitive effect on their rivals. It is possible that green bond issuance may result in both these effects simultaneously. However, we only get to observe the dominant effect. Based on the above discussion, we expect that the contagion effect dominates the competitive effect. We conjecture that, on average, a positive (negative) market reaction to a focal firm's green bond announcement results in a positive (negative) market reaction for its rivals.

Hypothesis 1: *The announcements of green bonds by focal firms are associated with a contagion effect on the stock prices of their rivals.*

2.3.2 The role of the time of issue

Companies issue green bonds to signal their environmental commitments to climate-conscious investors (Flammer, 2021). The first-time issuance of green bonds signals the environmental commitment of the firm with some surprising and novel information for investors that leads to a stronger positive market reaction (Aswani & Rajgopal, 2022; Flammer, 2021). Further, the novel information creates uncertainty and speculation in the industry about the success of the issuance. This stronger announcement returns for first-time issuance may extend to the industry rivals reflecting the overall industry standard. Additionally, the subsequent issues by the same company do not contain novel information. Investors may rebalance their portfolio after the announcement of the issuance of green bonds for the first time keeping in consideration the sustainability and financial strategy of the company. However, once the portfolio rebalancing has been done, investors are less likely to repeat it in subsequent issues by the same firm. Investors pay more attention to the first-time issuance of green bonds than subsequent issuance by a company, which can strengthen the contagion effects of green bond announcements. We conjecture that the contagion effect of green bond

issuance on the rivals is stronger for the first-time issuance of green bonds relative to subsequent issuance by a focal firm. Building on these arguments, our second hypothesis is below.

Hypothesis 2: *The contagion effect of green bond announcements by focal firms is stronger for the first-time issuance*.

2.3.3 The role of the issue size

Firms issuing green bonds of a larger size relative to market norms—can amplify the contagion effects. Given the substantial financial resources allocated to environment-friendly projects, larger issuances may signal a greater commitment to sustainability. Large issuances tend to attract heightened attention from investors, regulators, and stakeholders, thereby amplifying their impact on the market. The issue size of green bond issuance can strengthen the contagion effects through two channels. First, the size of the green bond issuance shows the credibility of the focal firm's environmental commitment. Second, large issuances can influence investor expectations regarding industry standards for sustainability and green financing. A large issue of green bonds is likely to set the industry standards to a higher level and make rivals follow a similar size of issuance. Thus, we conjecture that the contagion effect of green bond issuance is stronger for issues with large sizes and the following is our hypothesis

Hypothesis 3: *The contagion effects of green bond announcements by focal firms are stronger for large issues.*

2.3.4 The role of the issuing firm's market share

Firms with a higher market share dominate and often act as the industry leader, and their strategic moves are closely monitored by investors and stakeholders. An announcement of green bond issuance by a firm with high market share serves as a strong signal of commitment to environmental sustainability, potentially setting a new benchmark for industry practices. Additionally, such issues grab more media coverage and investor scrutiny, leading to a wider spread of the issuance. This can pressure rivals to adopt similar sustainability practices to maintain legitimacy and competitiveness. We conjecture that green bonds issued by firms dominating the industry have stronger contagion effects.

Hypothesis 4: *The contagion effects of green bond announcements by focal firms are stronger for firms with high market share.*

3 Data

We obtain our initial sample of green bond issue-level data from Refinitiv EIKON. The "Advance Search - Government and Corporate Bonds" database of EIKON provides detailed issue-level data on the issuance of green bonds.[5] EIKON labels green bonds according to the use of proceeds. We select green bonds issued by corporates in the US from January 2013 to October 2024.[6] Since only a few green bonds were issued before 2013, following prior studies, we consider green bonds issued from 2013 onwards (Flammer, 2021). We combine the green

[5] Recent literature on green bonds uses the Bloomberg fixed income database for issue-level data on green bonds (Flammer, 2021; Tang & Zhang, 2020a). Refinitiv EIKON is also an alternate database that provides issue-level green bond data. Zheng (2021) uses green bond data from EIKON to understand its association with climate policy.

[6] In the GOVSRCH app of EIKON, we set the 'Search' to be "Corporate Bonds" and include the bonds that meet the following filters. 'Issuer Type' is "Corporate"; 'Bond Type' is "Bonds," "Certificate of Deposits," and "Commercial Papers"; 'Status' is "Active" and "Inactive"; and 'Green Bond' is "Yes." In addition, we choose bonds that are issued by US companies. In particular, we apply the filter on 'Country of Issue' to be 'United States.'

bond issue data with the stock prices and accounting data from Compustat North America. We collect several variables related to the fundamentals of firms. Table 1 provides the definitions of accounting variables considered in this study. There are 682 corporate green bonds issued until 2022 in the US, almost four times the green bonds issued between 2013 and 2018 (Flammer, 2021). In case, where we find a green bond issued by the same company announced on the same day, we club all such issues together.[7] We exclude sample unique issuer-day observations if the stock price of the issuer is unavailable during the estimation window. We also exclude events in which we do not find any close rivals in the industry. The final sample consists of 202 unique issuer-days green bond issue announcements. Table 2 presents the sample selection procedure.

[INSERT TABLES 1 & 2 ABOUT HERE]

Table 3 summarizes the distribution of green bond announcements by year and industry. Among 202 unique issuer-days green bond issues, 150 (74.26%) were made between 2019 and 2023. Further, the use of green bonds is dominated by companies in the finance industry (35% of the overall sample), followed by companies in the utility sector (30% of the overall sample).

[INSERT TABLE 3 ABOUT HERE]

Panel A of Table 4 presents the descriptive statistics of the overall sample of event firms, while Panel B of Table 4 reports the descriptive statistics of focal firms, rival firms before matching, and closest rival firms after matching and the difference between them for several fundamental characteristics. The differences in the mean and median values of fundamental indicators between the event firms and rival firms are statistically insignificant in

[7] In the case where the announcement day is a non-trading day (Saturday and Sunday), we assume the next trading day as the announcement date (day zero).

almost all cases. This is in line with our expectations that the event firms and their closest rival firms are comparable.

[INSERT TABLE 4 ABOUT HERE]

4 Empirical methodology and results

4.1 Methodology

4.1.1 Event study

The event study methodology is widely used in literature to understand the announcement effects of the events on the markets and convey the overall investor's perception of the event. To understand the stock market reaction to the announcement of the issue of green bonds, we use event study methodology. We use the standard market model for the event study (Flammer, 2021). We estimate the daily returns of stock prices of companies collected from Compustat North America using the following equation.

$$\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} \quad (1)$$

where R_{mt} represents the return on the S&P 500 index on day t, R_{it} denotes the observed return of firm i on day t, and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are parameters estimated using the standard market model considering a 200-trading-day estimation window ending 20 trading days before the green bond issue announcement date. We then calculate the Abnormal Return (AR) of firm i on day t as follows.

$$AR_{it} = R_{it} - \hat{R}_{it} \quad (2)$$

Finally, we compute the cumulative abnormal returns (CAR) of firm i for the period ranging from T_1 and T_2 by using the following equation (Brown & Warner, 1985).

$$CAR_i(T_1, T_2) = \sum_{T_1}^{T_2} \left(R_{it} - (\alpha_i + \beta_i R_{mt})\right) \quad (3)$$

In our main analysis, we use (-1, 0) as the event window for calculating CAR. In the first event window, we consider the possibility of information leakage to the public before the announcement date of the issue of green bonds. We also consider different event windows such as (-2, 2), (-1, 1), (0, 1), (0, 2), and (0, 3) as part of robustness checks.

4.1.2 Rival identification

For the analysis of rivals, we choose firms operating in the same industry (Bordeman et al., 2021; Hsu et al., 2010). We identify the rivals of the event firm using the 10-K Text-based Network Industry Classification (TNIC-2) proposed by Hoberg and Phillips (2010, 2016, henceforth HP).[8] HP TNIC-2 is a bigger version of the standard TNIC-3, used as default in literature. This method of rival identification is based on web crawling and text parsing algorithms that process the text in the business descriptions of 10-K annual filings. The firm-by-firm pairwise similarity scores are based on a continuous measure of product similarity for every pair of firms in each year by parsing the product descriptions and forming word vectors for each firm.[9] For our analysis, we chose the rival firm with the highest similarity with the event firm in the year of the issue of the green bond.[10] In particular, in a given year, the rival of an event firm has the highest similarity score and stock prices available for the event study windows.

[8] As part of robustness checks, we also use a four-digit, three-digit, and two-digit SIC classification to match the rival firms with the event firms. The results are qualitatively similar while using SIC-based matching.
[9] For more information on HP classification, see Hoberg and Phillips (2010, 2016).
[10] Due to the unavailability of HP classifications for 2022-24, we assume that the rivals remain the same as in the previous year, i.e., 2021.

4.2 Univariate results on the contagion effect of green bond issuance

In Table 5, we report the cumulative abnormal returns (CARs) of event and rival firms pertaining to green bond issuance for different samples. Panel A focuses on the aggregate sample, while Panels B and C focus on subsamples where the focal firms' CARs are positive and negative, respectively. In Panel A of Table 5, we report the CARs of focal firms and rival firms for different event windows around the announcement of green bond issuance. We report the results in Table 5 in three slices where columns 1-3 correspond to the CARs of the focal firms, columns 4-6 correspond to the CARs of the closest rival firms of the focal firms, and columns 7-9 correspond to the CARs of the portfolio of the closest two rival firms of the focal firms. We report the univariate results for multiple event windows. In line with the literature, we find, no significant market reaction by the investors in different short event windows around the announcement of green bond issuance by focal firms (Bhagat & Yoon, 2023). This is in contrast with the findings of Flammer (2021) and Tang and Zhang (2020). Overall, the results of the aggregate sample show no clear evidence of the spillover effect on the rivals, indicating a biasness of no result. This might be due to the aggregation of two subsamples having opposite spillover effects. Thus, we split our aggregate sample into two subsamples based on the direction of the market reaction of the focal firms, and we see a clear pattern of effect on the rivals.

[INSERT TABLE 5 ABOUT HERE]

The two subsamples segregated based on the direction of the announcer's stock price reaction are events with positive and negative market reactions to the focal firm. In Panel B of Table 5, we report the univariate results of events with positive market reactions to focal firms. It is evident that for almost all the event windows, the stock market reaction to the issuance of green bonds of the rival firms is positive and significant. For the sub-sample having a positive

market reaction to the stock prices of focal firms, the CARs of the rival firms for event windows (-1, 1), (-1, 0), and (0, 1) are 0.67% (significant at 5% level), 0.78% (significant at 1% level) and 0.66% (significant at 1% level), respectively. Moreover, the significance of the univariate results of the portfolio of the closest two rivals is stronger (significant at 1% level) for the subsample of events with positive market reactions to focal firms. The CARs of event windows (-1, 1), (-1, 0), and (0, 1) of the portfolio of rival firms are 0.70%, 0.72%, and 0.62%, respectively. In Panel C of Table 5, we report the univariate results for the sub-sample where the market reaction to the focal firms is negative. Unlike the subsample of positive market reaction to event firms where not all CARs are strongly significant, the subsample of negative market reaction to event firms shows a strong and greater magnitude of CARs in almost all event windows for both closest rivals and the portfolio of two closest rivals. Overall, the univariate results show no net effect in the overall sample. The segregation of the overall sample according to the direction of the announcer's stock reaction provides a clearer picture and pattern of the spillover effect on the rivals. It is evident that the spillover effect of green bond announcements on rivals is contagion. The contagion effect of the industry dominates the competitive effect. Thus, this confirms our hypothesis H1 that focal firms' announcements of green bonds are associated with a contagion effect on their rivals.

4.3 Multivariate results on the contagion effect of green bond issuance

We conduct a multivariate analysis to test our hypothesis 1, which predicts that the announcement of the issue of green bonds affects the stock price of the industry rivals. We use the following equation and expect a positive association between rival firm CAR and event firm CAR:

$$RCAR_i(T_1, T_2) = \beta_0 + \beta_1 ECAR_i(T_1, T_2) + \sum_m \gamma_m Control_{it}^m + u_{it} \quad (4)$$

The dependent variable in Eq. (4) $RCAR_i(T_1, T_2)$ is the cumulative abnormal returns (CAR) of industry rivals for the period ranging from T_1 to T_2. Our primary variable of interest in this equation, $ECAR_i(T_1, T_2)$, is the CAR of the event firm for the period ranging from T_1 to T_2. We control several characteristics of announcer, industry, rival, and event in our estimation model given in Eq. (4).

In Table 6, we report the regression results for the event window (-1, 0). While models (1) – (2) include only the explanatory variable of interest, models (3) – (4) include the control variables related to industry, announcer, and rivals. Models (2) and (4) also include year and industry-fixed effects to account for unabsorbed heterogeneity related to time and industry, respectively.[11]

We find that, across all models, the coefficient of the variable of interest is positive and significant (at 1% level), which implies that the stock market reaction of the closest rival firm is positively associated with that of the focal firms. In particular, the coefficient of event CAR in the last model is +0.383, indicating that, on average, every one percentage change in the event firm's CAR due to the announcement of green bonds is associated with a 38 basis points (bps) change in the rival firms' CAR in the same direction even after controlling for year and industry-fixed effects. This suggests that the rival's stock market reactions are positively associated with the announcement of green bond issuance to the focal firms that issue green bonds. The finding is consistent with our earlier result that the contagion effect dominates the competitive effect for the overall sample. Overall, the multivariate results support hypothesis

[11] We use the four-digit SIC code of the event firm for industry fixed effects.

1, that the announcement of green bond issuance results in the movement of stock prices of focal and rival firms in the same direction.

[INSERT TABLE 6 ABOUT HERE]

4.4 The role of the first-time issue

In our second hypothesis, we predict a stronger contagion effect of green bond issuance on rivals if the issuance is for the first time than subsequent issues by the same event firm. We add a dummy variable if the issuance is for the first time by the company in our sample and its interaction term with the event firm CAR and use the following regression model:

$$RCAR_i(T_1, T_2) = \beta_0 + \beta_1 ECAR_i(T_1, T_2) + \beta_2\, First\ Time\ Indicator + \beta_3\, ECAR_i(T_1, T_2) \times First\ Time\ Indicator + \sum_m \gamma_m Control_{it}^m + u_{it} \quad (5)$$

The variable of interest, $First\ Time$, is an indicator variable that denotes whether the green bond issue is the company's first issuance. Based on our hypothesis, we expect the interaction term between event CAR and the indicator variable to be positive and significant.

In Table 7, we report the results. In line with the results reported in Table 6, the CARs focal firms are positively associated with rival firms, even after controlling for several characteristics. In line with our expectations, the interaction between $event\ CAR$ and $First\ Time\ Indicator$ indicates a more pronounced contagion effect from first-time green bond issuance. In particular, a coefficient of +0.369 of the interaction term suggests, on average, one percentage point increase (decrease) in the market reaction for first-time issue by event firms is associated with 37 bps more increase (decrease) in the market reaction of rivals relative to subsequent issuance. The evidence supports the notion that the intra-industry effects

of the announcement of green bond issuance are stronger when the issuance is first time by the issuer.

[INSERT TABLE 7 ABOUT HERE]

4.5 The role of the issue size

In our third hypothesis, we predict that the contagion effect is stronger for green bond issuance where the issue amount is large and use the following equation:

$$RCAR_i(T_1, T_2) = \beta_0 + \beta_1 ECAR_i(T_1, T_2) + \beta_2\, Large\ issue\ indicator + \beta_3\, ECAR_i(T_1, T_2) \times Large\ issue\ indicator + \sum_m \gamma_m Control_{it}^m + u_{it} \quad (6)$$

Where $Large\ issue\ indicator$ is an indicator variable that takes the value of one if the issue size is more than the median issue size in the sample. We further add an interaction term between the large issue indicator and the event CAR, which reflects the coefficient of large issues as compared to the small issues. We expect a positive and significant coefficient for the interaction term.

In Table 8, we report the results. In line with our expectations, we find a positive and significant coefficient for the interaction term between $ECAR_i(T_1, T_2) \times Large\ issue\ indicator$, suggesting that the contagion effect for green bond issuance is stronger for issues with large issue amounts. In particular, the coefficient of the interaction term showing +0.343 implies that, on average, a one percent increase in the market reaction to the announcement of the issuance of a large size of green bonds is associated with a 34 bps higher increase in the market reaction for the closest rival firm, relative to issuance of small issue size of green bonds.

Overall, the results indicate a pronounced contagion effect of green bond issuance with a larger size.

[INSERT TABLE 8 ABOUT HERE]

4.6 The role of the event firm's market share

To test our fourth hypothesis, i.e., stronger contagion effects for green bond issuance by companies with large market share. We test this using the following equation:

$$RCAR_i(T_1, T_2) = \beta_0 + \beta_1 ECAR_i(T_1, T_2) + \beta_2\, Large\ Market\ Share\ Indicator + \beta_3\, ECAR_i(T_1, T_2) \times Large\ issuer\ indicator + \sum_m \gamma_m Control_{it}^m + u_{it} \quad (7)$$

$Large\ Market\ Share\ Indicator$ is a dummy variable that takes the value of one if the green bond issuing firm's market share is more than the median market share in the sample and zero otherwise. We expect a positive and significant coefficient for the interaction term between event CAR and the indicator variable.

We report the results in Table 9. In line with our hypothesis, we find a positive and significant coefficient on the interaction term $ECAR_i(T_1, T_2) \times Large\ issuer\ indicator$, indicating that green bond issued by firms with large market share is associated with greater contagion effect on the closest rival. In terms of economic significance, the coefficient of +0.404 on the interaction term in model 2 indicates that, on average, one percent increase in market reaction to the announcement by a firm with high market share is associated with 40 bps higher increase in market reaction for the rival firm, relative to the issuance by firms with low market share.

[INSERT TABLE 9 ABOUT HERE]

5 Alternative explanations and robustness checks

5.1 Different event windows

To assess the robustness of the findings, we examine whether the results remain consistent with our prediction across different event windows. In Table 10, we report the results of multivariate analysis for five different event windows. In particular, we run the regression models (3) and (4) of Table 6 for several event windows: (-2, 2), (-1, 1), (0, 1), (0, 2), and (0, 3). The results indicate that the contagion effect of green bond issuance remains qualitatively similar across all models and event windows. This further supports our hypothesis 1 on the presence of contagion effect of the announcement of green bonds by focal firms on their rivals.

[INSERT TABLE 10 ABOUT HERE]

5.2 Placebo test

Our results may be subject to endogeneity concerns, particularly due to the potential co-movement of stock prices among firms within the same industry. To mitigate these issues, we conduct a placebo (falsification) test using pseudo-event dates, shifting the actual event dates 40 days prior to the actual announcement of the green bond issue (Li & Zhang, 2021). This approach allows us to infer whether the observed effects are genuinely driven by the announcement of the green bond issuance rather than by the stock price co-movements in the industry. We expect an insignificant coefficient on our variable of interest in the placebo test, as any significant effect on these pseudo-event dates would indicate potential biases.

Table 11 reports the results of the placebo test. Consistent with our prediction, the coefficient of Event CAR is statistically insignificant, suggesting that the observed spillover effect is attributable to the issuance of green bonds rather than industry-wide stock price co-

movement. This further strengthens our results by ruling out alternative explanations for the contagion effects.

[INSERT TABLE 11 ABOUT HERE]

5.3 Different methods of rival selection

To ensure the consistency of the results, we choose different methods of rival selection. In our main results, we choose the nearest product market rivals identified based on text-based TNIC classification (Hoberg & Phillips, 2010, 2016). This classification is broadly based on the product a company offers and reports in their 10-K reports. However, investors' perception of a firm's closest rival may not align with this method of rival selection.

To address potential issues arising out of appropriate rival selection, we employ an alternative method of rival selection, using the four-digit SIC of the firm to identify the rivals operating in the same industry as the focal firm.[12] Additionally, to choose the nearest rival with characteristics similar to that of the focal firms, we employ propensity score matching (PSM) and choose the nearest neighbor of the focal firms. We use four characteristic variables, Tobin Q, market share, R&D intensity, and cash flow ratio of the event firms for a given year of green bond issue announcement. In particular, rival firms refer to the nearest rival firm in the same industry (four-digit SIC) of the event firm identified using PSM based on Tobin Q, market share, R&D intensity, and cash flow ratio in the preceding year of the announcement of the green bond issue. Following this approach, we re-estimate the regression models (3) and (4) of Table 6 for different event windows and report the results in Table 12. The findings remain qualitatively similar based on rivals identified using four-digit SIC. This further supports both

[12] Alternatively, we identify rivals based on three- and two-digit SIC codes, and the results reported in the appendix are qualitatively similar.

hypotheses that there is a contagion effect on rivals on the announcements of green bonds by focal firms.

[INSERT TABLE 12 ABOUT HERE]

6 Discussion and conclusion

In this paper, we examine the spillover effect of the announcement of green bonds on the industry rivals. Based on the announcement of green bonds between January 2013 and October 2024 by US firms, we document a contagion valuation effect of green bond announcements by firms on their rivals. Further, the contagion effect is more pronounced when the issue is first-time, the issue size is large, and the event firm is the leader in market share. The results remain constant for a battery of tests. Our results are robust across different short and long event windows. The results remain even after the falsification test with pseudo-event dates. Additionally, results are constant to different methods of identification of closest rival, such as four-, three- and two-digit SIC and product market rivals based on Text-based Network Industry Classification of Hoberg and Phillips (2010, 2016).

The literature on spillover effects within industry rivals has been confined to only financing, corporate restructuring, earnings, scandals, and other managerial decisions. However, examining the contagion effects of green bond issuance across different countries could reveal important variations in spillover dynamics between developed and developing economies. Furthermore, an extension of the sample period to incorporate any political regime change and shifts in climate policies, specially following the 2024 US elections. Additionally, future research could explore the long-term implications of green bond issuance for both event and rival firms.

References

Akhigbe, A., Borde, S. F., & Whyte, A. M. (2003). Does an industry effect exist for initial public offerings? *Financial Review*, *38*(4), 531–551. https://doi.org/10.1111/1540-6288.00059

Akhigbe, A., & Madura, J. (1999). The industry effects regarding the probability of takeovers. *Financial Review*, *34*(3), 1–17. https://doi.org/10.1111/j.1540-6288.1999.tb00459.x

Aswani, J., & Rajgopal, S. (2022). *Rethinking the Value and Emission Implications of Green Bonds*. https://doi.org/10.2139/ssrn.4215882

Baker, M., Bergstresser, D., Serafeim, G., & Wurgler, J. (2022). The pricing and ownership of US green bonds. *Annual Review of Financial Economics*, *14*(1), 415–437. https://doi.org/10.1146/annurev-financial-111620-014802

Bhagat, S., & Yoon, A. (2023). Corporate Green Bonds: Market Response and Corporate Response. In *HKU Jockey Club Enterprise Sustainability Global Research Institute*. https://doi.org/10.2139/ssrn.4492883

Bordeman, A., Kannan, B., & Pinheiro, R. (2021). Rival Growth Prospects and Equity Prices: Evidence from Mass Layoff Announcements. *Journal of Money, Credit and Banking*, *53*(8), 1969–1997. https://doi.org/10.1111/jmcb.12816

Bradley, D., & Yuan, X. (2013). Information spillovers around seasoned equity offerings. *Journal of Corporate Finance*, *21*, 106–118. https://doi.org/10.1016/j.jcorpfin.2013.01.006

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns. *Journal of Financial Economics*, *14*(1), 3–31. https://doi.org/10.1016/0304-405X(85)90042-X

Caramichael, J., & Rapp, A. C. (2024). The green corporate bond issuance premium. *Journal of Banking and Finance*, *162*(January 2023), 107126. https://doi.org/10.1016/j.jbankfin.2024.107126

Chen, I., & Chang, S. (2020). Spillover effects of capital expenditure announcements within business groups. *British Journal of Management*, *31*(4), 709–727. https://doi.org/10.1111/1467-8551.12379

Chen, S., Ho, L., & Shih, Y. (2007). Intra-industry effects of corporate capital investment announcements. *Financial Management*, *36*(2), 1–21. https://doi.org/10.1111/j.1755-053X.2007.tb00089.x

Chod, J., & Lyandres, E. (2011). Strategic IPOs and product market competition. *Journal of Financial Economics*, *100*(1), 45–67. https://doi.org/10.1016/j.jfineco.2010.10.010

Clougherty, J. A., & Duso, T. (2009). The impact of horizontal mergers on rivals: Gains to being left outside a merger. *Journal of Management Studies*, *46*(8), 1365–1395. https://doi.org/10.1111/j.1467-6486.2009.00852.x

Davis, F., Davis, S., Sha, X., & Walker, T. (2021). The impact of takeover anticipation on rival firms. *Journal of Business Finance & Accounting*, 1–25. https://doi.org/10.1111/jbfa.12577

Derrien, F., Frésard, L., Slabik, V., & Valta, P. (2021). Industry asset revaluations around public and private acquisitions. *Journal of Financial Economics*.

https://doi.org/10.1016/j.jfineco.2021.10.003

ElBannan, M. A., & Löffler, G. (2024). How effectively do green bonds help the environment? *Journal of Banking and Finance*, *158*(November 2023). https://doi.org/10.1016/j.jbankfin.2023.107051

Fatica, S., & Panzica, R. (2024). Sustainable investing in times of crisis: Evidence from bond holdings and the COVID-19 pandemic. *Journal of Banking and Finance*, *166*(June), 107238. https://doi.org/10.1016/j.jbankfin.2024.107238

Firth, M. (1996). Dividend changes, abnormal returns, and intra-industry firm valuations. *Journal of Financial and Quantitative Analysis*, *31*(2), 189. https://doi.org/10.2307/2331179

Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*, *142*(2), 499–516. https://doi.org/10.1016/j.jfineco.2021.01.010

Foster, G. (1981). Intra-industry information transfers associated with earnings releases. *Journal of Accounting and Economics*, *3*(3), 201–232. https://doi.org/10.1016/0165-4101(81)90003-3

Gaur, A. S., Malhotra, S., & Zhu, P. (2013). Acquisition announcements and stock market valuations of acquiring firms' rivals: A test of the growth probability hypothesis in China. *Strategic Management Journal*, *34*(2), 215–232. https://doi.org/10.1002/smj.2009

Hoberg, G., & Phillips, G. (2010). Product Market Synergies and Competition in Mergers and Acquisitions: A Text-Based Analysis. *Review of Financial Studies*, *23*(10), 3773–3811. https://doi.org/10.1093/rfs/hhq053

Hoberg, G., & Phillips, G. (2016). Text-Based Network Industries and Endogenous Product Differentiation. *Journal of Political Economy*, *124*(5), 1423–1465. https://doi.org/10.1086/688176

Hsu, H. C., Reed, A. V., & Rocholl, J. (2010). The new game in town: Competitive effects of IPOs. *Journal of Finance*, *65*(2), 495–528. https://doi.org/10.1111/j.1540-6261.2009.01542.x

Lang, L. H. P., & Stulz, R. (1992). Contagion and competitive intra-industry effects of bankruptcy announcements. *Journal of Financial Economics*, *32*(1), 45–60. https://doi.org/10.1016/0304-405X(92)90024-R

Larcker, D. F., & Watts, E. M. (2020). Where's the greenium? *Journal of Accounting and Economics*, *69*(2–3), 101312. https://doi.org/10.1016/j.jacceco.2020.101312

Leary, M. T., & Roberts, M. R. (2014). Do Peer Firms Affect Corporate Financial Policy? *Journal of Finance*, *69*(1), 139–178. https://doi.org/10.1111/jofi.12094

Li, Y., & Zhang, W. (2021). Another game in town: Spillover effects of IPOs in China. *Journal of Corporate Finance*, *67*(January), 101910. https://doi.org/10.1016/j.jcorpfin.2021.101910

Mataigne, V., Manigart, S., & Luypaert, M. (2021). Acquisitions: A curse or blessing for direct competitors? The impact of target ownership structure. *Journal of Corporate Finance*, *69*(May), 101988. https://doi.org/10.1016/j.jcorpfin.2021.101988

Petreski, A., Schaefer, D., & Stephan, A. (2022). Green Bonds' Reputation Effect and Its

Impact on the Financing Costs of the Real Estate Sector. In *DIW Berlin Discussion Paper* (2019). https://doi.org/10.2139/ssrn.4248052

Sangiorgi, I., & Schopohl, L. (2023). Explaining green bond issuance using survey evidence: Beyond the greenium. *British Accounting Review*, *55*(1), 101071. https://doi.org/10.1016/j.bar.2021.101071

Slovin, M. B., Sushka, M. E., & Polonchek, J. A. (1992). Informational externalities of seasoned equity issues. *Journal of Financial Economics*, *32*(1), 87–101. https://doi.org/10.1016/0304-405X(92)90026-T

Song, M. H., & Walkling, R. A. (2000). Abnormal returns to rivals of acquisition targets: A test of the `acquisition probability hypothesis'. *Journal of Financial Economics*, *55*(2), 143–171. https://doi.org/10.1016/S0304-405X(99)00048-3

Spiegel, M., & Tookes, H. (2020). Why does an IPO affect rival firms? *Review of Financial Studies*, *33*(7), 3205–3249. https://doi.org/10.1093/rfs/hhz081

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

Yilmaz, U. (2023). The effects of foreign acquisitions on the value of industry peers. *Journal of Financial and Quantitative Analysis*, forthcoming. https://doi.org/10.1017/S0022109023000339

Yu, X., Zhang, P., & Zheng, Y. (2015). Corporate governance, political connections, and intra-industry effects: Evidence from corporate scandals in China. *Financial Management*, *44*(1), 49–80. https://doi.org/10.1111/fima.12064

Zerbib, O. D. (2019). The effect of pro-environmental preferences on bond prices: Evidence from green bonds. *Journal of Banking & Finance*, *98*, 39–60. https://doi.org/10.1016/j.jbankfin.2018.10.012

Zheng, H. (2021). *Climate Policy and Corporate Green Bond Issuances* (88). https://doi.org/10.2139/ssrn.3878791

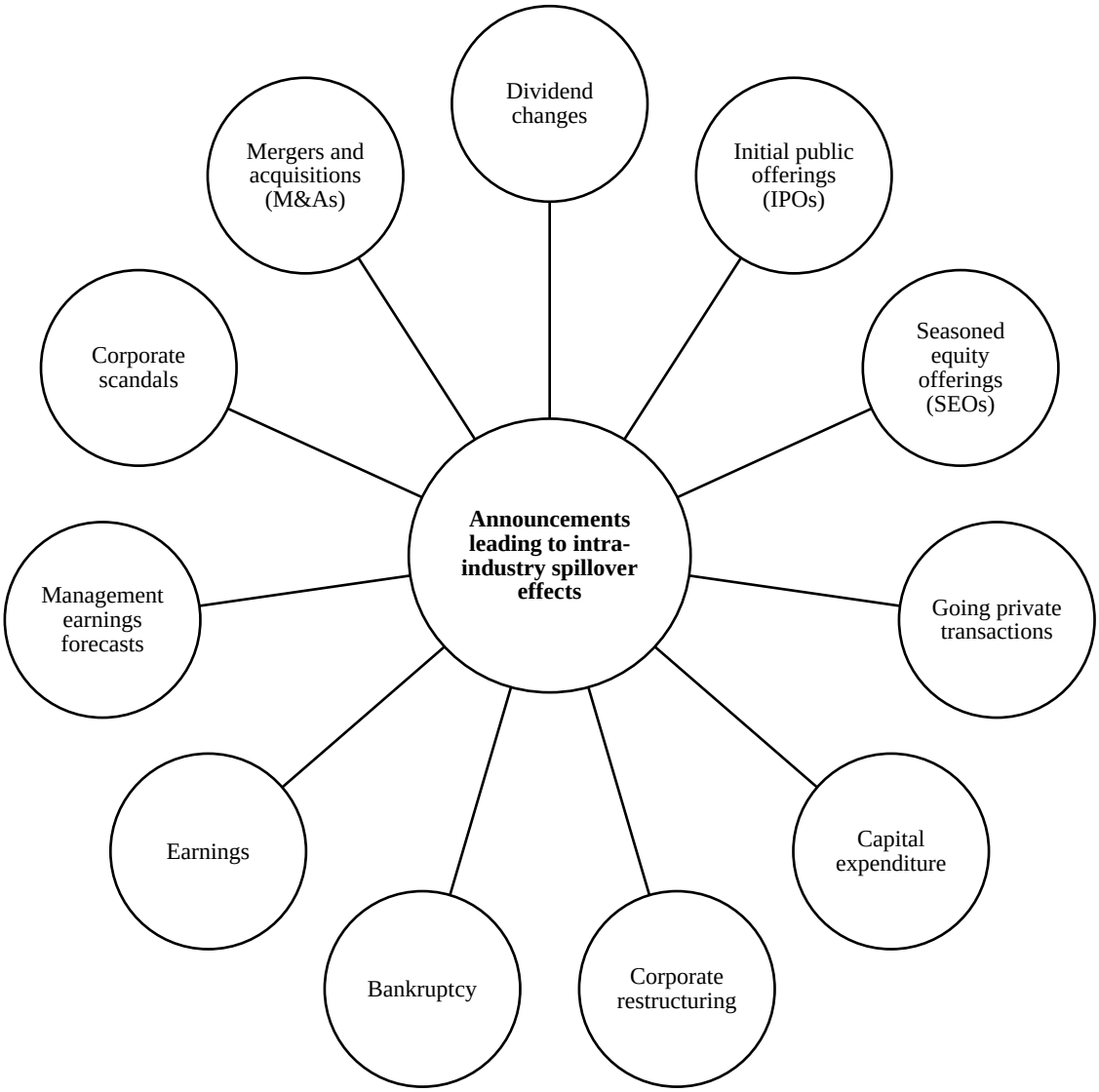


Figure 1. Announcements that have spillover effects on the event firm's industry rivals

This figure represents the list of announcements on corporate decisions that lead to intra-industry spillover effects as documented in the prior literature.

Table 1 Variable definitions

Variable	Description	Source
Announcer's Characteristics		
Announcer's market share	Total sales of the announcing firm divided by total industry sales for the fiscal year prior to the announcement.	Compustat
Announcer's growth opportunities	Tobin's q: the ratio of the market value of the firm's assets to the book value of the firm's assets for the fiscal year preceding the announcement, where the market value of assets equals the market value of equity plus the liquidating value of preferred stock plus the book value of long-term debt minus the net working capital.	Compustat
Announcer's return on assets	Measured as earnings before interest, taxes, depreciation, and amortization scaled by total assets.	Compustat
Announcer's cash holdings	Cash plus marketable securities scaled by lagged total assets.	Compustat
Announcer's log (total assets)	The natural logarithm of total assets adjusted for inflation.	Compustat
Industry Characteristics		
Returns correlation	Correlation of stock returns between the announcer and its competitors for the year preceding the announcement	Compustat
Rival's Characteristics		
Rivals' growth opportunities	Tobin's q: the ratio of the market value of the firm's assets to the book value of the firm's assets for the fiscal year preceding the announcement, where the market value of assets equals the market value of equity plus the liquidating value of preferred stock plus the book value of long-term debt minus the net working capital.	Compustat
Rivals' free cash flow	Operating income before depreciation minus interest expense, taxes, preferred dividends, and common dividends, divided by the book value of total assets, for the fiscal year preceding the announcement.	Compustat
Rivals' financial leverage	The ratio of the book value of total debt to the market value of total assets for the fiscal year prior to the announcement.	Compustat
Rivals' R&D intensity	R&D intensity as the ratio of R&D expenditures to net sales for the fiscal year prior to the announcement.	Compustat
Rivals' Return on assets	Measured as earnings before interest, taxes, depreciation, and amortization scaled by total assets. The final value is lagged and winsorized at 1%	Compustat
Rivals' Cash holdings	Cash plus marketable securities scaled by lagged total assets. The final value is lagged and winsorized at 1%.	Compustat

Rivals' Log(total assets)	The natural logarithm of total assets adjusted for inflation. The final value is lagged and winsorized at 1%.	Compustat
Event Characteristics		
First-time issue	Equal to 1 if the issue is first-time issue of the company, otherwise zero.	Refinitiv EIKON
Large issue	The indicator variable for large issues takes one if the issue size is more than median and zero otherwise.	Refinitiv EIKON
Large Issuer Indicator	Equal to 1 if the issuing firm's market share is more than the median market share in the sample, otherwise zero.	Refinitiv EIKON

Note:
Sources of data:
Green bond announcement data: Refinitiv Eikon
Financial and stock return data: Compustat
Inflation data: https://www.minneapolisfed.org/about-us/monetary-policy/inflation-calculator/consumer-price-index-1913-

Table 2 Sample selection

This table details the step-by-step procedure to arrive at the final sample of 150 unique green bond issues during 2013 - Oct 2024 in the US.

Step	Count
Number of green bonds announcements in the US from 2013 to 2022	682
Less: reduction in observations due to clubbing of green bonds announcements made by the same firm on the same day	(177)
Less: green bonds announcements by private companies	(235)
Less: announcements with stock price data unavailable for estimation window for issuing firms	(9)
Less: announcements with green bond issuing firms without any close rivals	(40)
Less: announcements with fundamental data unavailable for issuing firms green bond issuing firms	(19)
Final sample	202

Table 3

This table lists the distribution of green bond issues between January 2013 and October 2024. Panel A reports the number, as well as the percentage, of green bond issues by US public companies. Panel B provides the distribution of green bond issues based on the industry classification of the issuing firms. The industry classification is based on the Fama-French 12-industry codes.

Panel A: Distribution of green bond announcements by year

Year	Number	Percentage
2013	1	0.50
2014	4	1.98
2015	31	15.35
2016	5	2.48
2017	1	0.50
2018	10	4.95
2019	25	12.38
2020	26	12.87
2021	46	22.77
2022	33	16.34
2023	20	9.90
Total	202	100.00

Panel B: Distribution of green bond announcements by industry

Industry	Number	Percentage
Consumer Non-Durables	3	1.49
Consumer Durables	31	15.35
Manufacturing	7	3.47
Energy	1	0.50
Chemicals	2	0.99
Business Equipment & Software	10	4.95
Telecommunication	6	2.97
Utilities	60	29.70
Wholesale & Retail	3	1.49
Healthcare	1	0.50

Finance	72	35.64
Other	6	2.97
Total	202	100.00

Table 4: Descriptive statistics

This table presents the summary statistics for the sample of US public companies that announced green bond issues from 2013 to Oct 2024 and their competitors. Event firms refer to the firms issuing green bonds in the US during the sample period. Rivals refer to the nearest rival firm of the event firm identified based on Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. Panel A presents the descriptive statistics of the overall sample of event firms. Panel B presents the descriptive statistics of event and rival firms and their differences. A two-sample t-test (Wilcoxon-Mann-Whitney rank sum test) was used to determine whether the difference in means (medians) of a variable between the event firms and rival firms is significantly different from zero. All variables are winsorized at the 1st and 99th percentile. All the fundamental values are based on the previous year. Absolute values are in USD millions. The definitions of variables are provided in the Appendix. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. 'NS' indicates not significant.

Panel A: Descriptive statistics for the overall sample

Variable	N	Mean	SD	Min	Q1	Median	Q3	Max
Market share	202	0.08	0.17	0.00	0.01	0.02	0.06	0.81
Tobin's Q	202	1.55	1.48	0.05	0.73	1.00	1.56	4.90
ROA	202	0.06	0.05	0.00	0.01	0.05	0.08	0.22
Cash holding	202	0.09	0.11	0.00	0.01	0.03	0.13	0.33
Ln(Total assets)	202	10.30	1.60	7.54	8.95	10.27	11.03	14.71
Financial leverage	202	0.28	0.35	0.00	0.00	0.10	0.42	1.00

Panel B: Descriptive statistics for event firms and closest rivals

	Event firms (A)		Rival firms before matching (B)		Rival firms after matching (C)		Test of difference (B-A)		Test of difference (C-A)	
Variable	Mean	Median	Mean	Median	Mean	Median	t-test (p-value)	Wilcoxon z test (p-value)	t-test (p-value)	Wilcoxon z test (p-value)
Market share	0.08	0.02	0.04	0.01	0.04	0.02	***	***	***	NS
Tobin's Q	1.55	1.00	1.20	0.90	0.90	0.82	***	***	***	***
ROA	0.06	0.05	0.06	0.07	0.06	0.07	NS	**	NS	NS
Cash holding	0.09	0.03	0.11	0.04	0.08	0.03	**	**	NS	NS
Ln(Total assets)	10.30	10.27	8.67	8.61	10.13	10.19	***	***	NS	NS
Financial leverage	0.28	0.10	0.33	0.23	0.32	0.23	*	***	NS	NS
Cash Flow Ratio	0.03	0.03	0.03	0.04	0.04	0.05	NS	*	NS	*
R & D Intensity	0.03	0.00	0.04	0.00	0.02	0.00	*	NS	NS	NS

Table 5: Univariate results

This table presents univariate results of the average cumulative abnormal returns (CAR) around green bond issues announcements for announcers and rivals. Event firms refer to the firms issuing green bonds in our sample. The CAR centered at the acquisition announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the rivals identified using Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. Results are presented for the overall sample and samples based on positive and negative market reactions to the event firm stock prices. Panel A refers to univariate results of the overall sample of event firms and rival firms. Panel B refers to the univariate results of sample events having a positive market reaction to the stock prices of event firms. Panel C refers to the univariate results of sample events having a negative market reaction to the stock prices of event firms. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Announcements by event firms

	Event Firms			Closest rival firm			Portfolio of closest two rival firms		
Event window	N	CAR (%)	p-value	N	CAR (%)	p-value	N	CAR (%)	p-value
(-2, 2)	221	-0.02	0.954	221	-0.26	0.334	221	-0.36	0.123
(-2, 1)	221	-0.23	0.446	221	-0.10	0.710	221	-0.22	0.444
(-2, 0)	221	-0.14	0.593	221	-0.00	0.991	221	-0.01	0.973
(-1, 1)	221	-0.25	0.314	221	-0.08	0.707	221	-0.26	0.405
(-1, 0)	221	-0.16	0.429	221	0.01	0.946	221	-0.06	0.840
(0, 1)	221	-0.04	0.855	221	-0.15	0.372	221	-0.33	0.173
(0, 2)	221	0.18	0.465	221	-0.31	0.105	221	-0.31*	0.083
(0, 3)	221	0.17	0.540	221	-0.28	0.233	221	-0.32	0.104

Panel B: Announcements by event firms with positive market reaction

	Event Firms			Closest rival firm			Portfolio of closest two rival firms		
Event window	N	CAR (%)	p-value	N	CAR (%)	p-value	N	CAR (%)	p-value
(-2, 2)	119	2.86***	0.000	119	1.04***	0.002	119	1.08***	0.000
(-2, 1)	118	2.46***	0.000	118	1.07***	0.002	118	1.03***	0.001
(-2, 0)	110	2.29***	0.000	110	1.11***	0.001	110	1.07***	0.000
(-1, 1)	121	1.82***	0.000	121	0.67**	0.024	121	0.70***	0.004
(-1, 0)	110	1.76***	0.000	110	0.78***	0.003	110	0.72***	0.000

(0, 1)	121	1.61***	0.000	121	0.66***	0.004	121	0.62***	0.000
(0, 2)	125	2.15***	0.000	125	0.65***	0.004	125	0.69***	0.001
(0, 3)	118	2.54***	0.000	118	0.62**	0.031	118	0.52**	0.044

Panel C: Announcements by event firms with negative market reaction

	Event Firms			Closest rival firm			Portfolio of closest two rival firms		
Event window	N	CAR (%)	p-value	N	CAR (%)	p-value	N	CAR (%)	p-value
(-2, 2)	102	-3.38***	0.000	102	-1.77***	0.000	102	-1.98***	0.000
(-2, 1)	103	-3.32***	0.000	103	-1.43***	0.000	103	-1.53***	0.000
(-2, 0)	111	-2.56***	0.000	111	-1.10***	0.000	111	-1.29***	0.000
(-1, 1)	100	-2.76***	0.000	100	-0.99***	0.001	100	-1.18***	0.000
(-1, 0)	111	-2.06***	0.000	111	-0.75***	0.003	111	-0.92***	0.000
(0, 1)	100	-2.04***	0.000	100	-1.13***	0.000	100	-1.05***	0.000
(0, 2)	96	-2.39***	0.000	96	-1.56***	0.000	96	-1.61***	0.000
(0, 3)	103	-2.56***	0.000	103	-1.32***	0.000	103	-1.33***	0.000

Table 6 Multivariate analysis

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the acquisition announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival identified using Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the Fama-French 12-industry classification. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1)	(2)	(3)	(4)
	Rival CAR (-1, 0)	Rival CAR (-1, 0)	Rival CAR (-1, 0)	Rival CAR (-1, 0)
Event CAR (-1, 0)	0.422***	0.418***	0.416***	0.383***
	(0.000)	(0.001)	(0.000)	(0.003)
Announcer's market share			0.010	0.141
			(0.426)	(0.328)
Announcer's growth opportunities			-0.003	-0.005
			(0.437)	(0.282)
Announcer's ROA			0.054	0.130
			(0.314)	(0.213)
Announcer's cash holdings			0.043	0.139
			(0.436)	(0.215)
Announcer's log (total assets)			-0.001	-0.001
			(0.755)	(0.804)
Returns correlation			0.006	0.005
			(0.466)	(0.664)
Rivals' growth opportunities			0.004	0.003
			(0.287)	(0.520)
Rivals' free cash flow			0.041	0.095
			(0.362)	(0.293)
Rivals' financial leverage			-0.000	0.011
			(0.977)	(0.477)
Rivals' R&D intensity			0.037	0.141**
			(0.263)	(0.047)
Rivals' Return on assets			-0.112*	-0.072

			(0.062)	(0.528)
Rivals' Cash holdings			-0.019	-0.004
			(0.447)	(0.929)
Rivals' Log(total assets)			-0.001	0.002
			(0.811)	(0.254)
Constant	-0.000	0.008	0.006	-0.160*
	(0.959)	(0.102)	(0.794)	(0.096)
Industry FE	No	Yes	No	Yes
Year FE	No	Yes	No	Yes
R-squared	0.220	0.423	0.286	0.499
N	202	202	197	197

Table 7 The role of first-time issue

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the acquisition announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival identified using Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. We measure the announcer's abnormal return over the interval beginning on the day of the green bond issuance announcement and ending one day after the day of the announcement. The First-Time dummy is equal to one if the issue is first-time by the event firms and zero otherwise. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1) Rival CAR (-1, 0)	(2) Rival CAR (-1, 0)
Event CAR (-1, 0)	0.354***	0.279**
	(0.003)	(0.023)
First-Time Indicator	0.001	0.008
	(0.775)	(0.143)
First-Time Indicator × Event CAR (-1, 0)	0.183	0.369**
	(0.238)	(0.041)
Controls	Yes	Yes
Industry FE	No	Yes
Year FE	No	Yes
R-squared	0.304	0.533
N	197	197

Table 8: The role of issue size

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the acquisition announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival identified using Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. We measure the announcer's abnormal return over the interval beginning on the day of the green bond issuance announcement and ending one day after the day of the announcement. The large issue indicator is equal to one if the issue size (amount) is more than the median issue size in the sample, and zero otherwise. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1) Rival CAR (-1, 0)	(2) Rival CAR (-1, 0)
Event CAR (-1, 0)	0.289**	0.249**
	(0.010)	(0.045)
Large Issue Indicator	0.005*	0.000
	(0.053)	(0.920)
Large Issue Indicator × Event CAR (-1, 0)	0.296***	0.343***
	(0.007)	(0.008)
Controls	Yes	Yes
Industry FE	No	Yes
Year FE	No	Yes
R-squared	0.321	0.526
N	196	196

Table 9: The role of the event firm's market share

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the acquisition announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival identified using Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. We measure the announcer's abnormal return over the interval beginning on the day of the green bond issuance announcement and ending one day after the day of the announcement. The large issuer indicator is equal to one if the event firm's market share is more than the median market share size in the sample, and zero otherwise. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1) Rival CAR (-1, 0)	(2) Rival CAR (-1, 0)
Event CAR (-1, 0)	0.281***	0.246**
	(0.008)	(0.023)
Large Market Share Indicator	0.005	0.000
	(0.217)	(0.956)
Large Market Share Indicator × Event CAR (-1, 0)	0.333***	0.404**
	(0.008)	(0.039)
Controls	Yes	Yes
Industry FE	No	Yes
Year FE	No	Yes
R-squared	0.318	0.532
N	197	197

Table 10: Robustness checks: Different event windows

This table presents multivariate results for five different windows for robustness. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the acquisition announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival identified using Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Rival CAR (-2, 2)		Rival CAR (-1, 1)		Rival CAR (0, 1)		Rival CAR (0, 2)		Rival CAR (0, 3)	
Event CAR	0.316***	0.262*	0.363**	0.343*	0.403***	0.445***	0.430***	0.471***	0.422***	0.462**
	(0.009)	(0.063)	(0.023)	(0.058)	(0.004)	(0.010)	(0.002)	(0.003)	(0.007)	(0.025)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.180	0.485	0.185	0.405	0.239	0.448	0.302	0.518	0.284	0.524
N	197	197	197	197	197	197	197	197	197	197

Table 11: Placebo checks

This table presents multivariate results for pseudo-event dates. The pseudo-event dates are dates 40 days prior to the actual event date. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the acquisition announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival identified using Hoberg and Phillips (2010, 2016) 10-K Text-based Network Industry Classifications. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1) Rival CAR (-1, 0)
Event CAR (-1, 0)	0.366
	(0.108)
Constant	0.013
	(0.928)
Controls	Yes
Industry FE	Yes
Year FE	Yes
R-squared	0.440
N	191

Table 12: Robustness checks: Different rival classification (4-digit SIC)

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the green bond issue announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival firm in the same industry (four-digit SIC) of the event firm identified using propensity score matching based on Tobin Q, market share, R&D intensity, and cash flow ratio in the preceding year of the green bond issue announcement date. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
						Rival CAR				
	(-2, 2)	(-2, 2)	(-2, 0)	(-2, 0)	(-1, 1)	(-1, 1)	(-1, 0)	(-1, 0)	(0, 1)	(0, 1)
Event CAR	0.485**	0.551**	0.464**	0.492*	0.484**	0.497*	0.421**	0.399*	0.332**	0.328*
	(0.027)	(0.048)	(0.033)	(0.066)	(0.014)	(0.056)	(0.015)	(0.051)	(0.027)	(0.080)
Constant	-0.017	-0.014	-0.006	0.012	-0.008	-0.180*	0.004	-0.106	-0.015	-0.132
	(0.578)	(0.914)	(0.787)	(0.886)	(0.695)	(0.059)	(0.796)	(0.170)	(0.318)	(0.122)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.084	0.133	0.139	0.205	0.138	0.224	0.158	0.241	0.098	0.191
N	231	231	231	231	231	231	231	231	231	231

Appendix

Table A1: Robustness checks: Different rival classification (2-digit SIC)

This table presents multivariate results for different rival classification approach. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the green bond issue announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival firm in the same industry (two-digit SIC) of the event firm identified using propensity score matching based on financial leverage in the preceding year of the green bond issue announcement date. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
						Rival CAR				
	(-2, 2)	(-2, 2)	(-2, 0)	(-2, 0)	(-1, 1)	(-1, 1)	(-1, 0)	(-1, 0)	(0, 1)	(0, 1)
Event CAR	0.441***	0.463***	0.494***	0.482***	0.422***	0.390***	0.470***	0.501***	0.275**	0.200**
	(0.003)	(0.010)	(0.001)	(0.005)	(0.000)	(0.000)	(0.001)	(0.004)	(0.024)	(0.034)
Constant	0.005	0.148	-0.008	0.047	0.002	0.106	0.008	0.061	-0.001	0.147*
	(0.956)	(0.194)	(0.847)	(0.583)	(0.954)	(0.253)	(0.833)	(0.452)	(0.977)	(0.091)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.184	0.417	0.291	0.444	0.161	0.426	0.154	0.355	0.121	0.399
N	230	230	230	230	230	230	230	230	230	230

Table A2: Robustness checks: Different rival classification (3-digit SIC)

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the green bond issue announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival firm in the same industry (three-digit SIC) of the event firm identified using propensity score matching based on ROA, total assets, financial leverage, and cash flow ratio in the preceding year of the green bond issue announcement date. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Rival CAR									
	(-2, 2)	(-2, 2)	(-2, 0)	(-2, 0)	(-1, 1)	(-1, 1)	(-1, 0)	(-1, 0)	(0, 1)	(0, 1)
Event CAR	0.406***	0.377**	0.462***	0.418***	0.481***	0.556***	0.496***	0.488***	0.336***	0.399***
	(0.004)	(0.010)	(0.000)	(0.008)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.059	-0.378	-0.024	-0.020	-0.011	-0.118	-0.021	-0.064	-0.005	-0.117***
	(0.338)	(0.293)	(0.289)	(0.862)	(0.569)	(0.123)	(0.249)	(0.494)	(0.746)	(0.006)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.171	0.311	0.257	0.373	0.265	0.476	0.276	0.411	0.211	0.441
N	232	232	232	232	232	232	232	232	232	232

Table A3: Robustness checks: Different rival classification (2-digit SIC)

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the green bond issue announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival firm in the same industry (two-digit SIC) of the event firm identified using propensity score matching based on financial leverage and R&D intensity in the preceding year of the green bond issue announcement date. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Rival CAR									
	(-2, 2)	(-2, 2)	(-2, 0)	(-2, 0)	(-1, 1)	(-1, 1)	(-1, 0)	(-1, 0)	(0, 1)	(0, 1)
Event CAR	0.442**	0.346*	0.517***	0.514***	0.433***	0.327***	0.555***	0.546***	0.364***	0.226*
	(0.010)	(0.088)	(0.001)	(0.006)	(0.000)	(0.003)	(0.000)	(0.003)	(0.003)	(0.068)
Constant	-0.038	0.187	0.020	0.168	-0.001	0.128	0.037	0.161	-0.008	0.123
	(0.655)	(0.206)	(0.689)	(0.167)	(0.984)	(0.227)	(0.431)	(0.109)	(0.836)	(0.178)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.126	0.323	0.179	0.317	0.118	0.339	0.153	0.335	0.128	0.326
N	230	230	230	230	230	230	230	230	230	230

Table A4: Robustness checks: Different rival classification (3-digit SIC)

This table presents multivariate results. The dependent variables are is the cumulative abnormal returns (CAR) of industry rivals centered at the green bond issue announcement date and computed using the following equation: $CAR_i(T_1, T_2) = \sum_{T_1}^{T_2}(R_{it} - (\alpha_i + \beta_i R_{mt}))$, where R_{mt} represents the return on the S&P 500 index, R_{it} denotes the observed return of the rival firm i, and α_i and β_i are parameters of the market model estimated using a 200-trading-day estimation window ending 20 trading days prior to the green bond issue announcement date. We use the same equation to compute the CAR of event firms. Rival firms refer to the nearest rival firm in the same industry (three-digit SIC) of the event firm identified using propensity score matching based on financial leverage in the preceding year of the green bond issue announcement date. The control variables are defined in Table Variable definitions. Industry fixed effects are based on the event firm's industry using the four-digit SIC codes. All continuous variables are winsorized at the 1st and 99th percentile. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. p-values have been reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Rival CAR									
	(-2, 2)	(-2, 2)	(-2, 0)	(-2, 0)	(-1, 1)	(-1, 1)	(-1, 0)	(-1, 0)	(0, 1)	(0, 1)
Event CAR	0.320*	0.333	0.459***	0.421***	0.383***	0.402***	0.471***	0.475***	0.334**	0.307**
	(0.078)	(0.114)	(0.000)	(0.005)	(0.001)	(0.001)	(0.000)	(0.000)	(0.011)	(0.012)
Constant	-0.054	0.067	-0.062	-0.011	-0.049	0.009	-0.020	-0.009	-0.032	0.075
	(0.540)	(0.502)	(0.140)	(0.818)	(0.283)	(0.877)	(0.529)	(0.848)	(0.364)	(0.153)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.114	0.527	0.264	0.527	0.153	0.567	0.239	0.518	0.147	0.536
N	227	227	227	227	227	227	227	227	227	227