

How Useful are Green Bond Use of Proceeds? Environmental Performance and Capital Market Response

Devine, Kok, Özgür, and Yönder

May 2024

Executive Summary

Green bonds are growing in popularity (USD 2.8 trillion in green bonds have been issued to-date, with 15% of that total issued in 2023ⁱ), both as a financial tool and a path toward responsible investing. A major debate exists whether the commitments associated with the stated use of proceeds for a green bond are implemented following issuance, or whether such green financing is instead simply “greenwashing.” This brings a demand for measurement of both financial performance and environmental performance of these instruments. That is, in the same way that we examine loan repayment history to inform risk analysis, we should evaluate how well firms kept their use of proceeds commitments on prior green bonds when considering the funding of future green bonds.

RESEARCH QUESTIONS

- Does REIT green bond issuance lead to an increase in environmentally focused investment?
- Do REITs that issue green bonds experience a lower cost of capital?
- How is REIT capital structure altered following a green bond issuance?

Although there is a growing literature investigating the financial performance of green bonds, both academia and the industry are largely silent on the measurement of environmental performance. We capitalize on the uniquely clean nature of REIT green building investments to measure the environmental performance of green bonds, and then analyze the response of capital markets to green bond issuance.

DATA & METHODOLOGYⁱⁱ

U.S. real estate firms offer an important and useful laboratory to study green bonds. Almost 80% of all green bond proceeds are used to invest in real assets, with one of every three green bond dollars financing green buildings directly. Nearly 40% of green bond use of proceeds for buildings occur through financial corporate green bonds, such as those issued by REITs. Further, the U.S. green bond real estate footprint is above the global average, with U.S. organizations issuing 12% of global green bonds, but 20% of global real estate green bonds (see Figure 1).

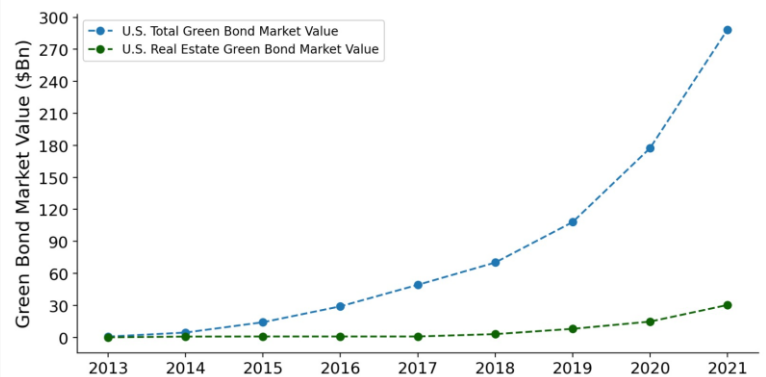


Figure 1: U.S. GREEN BOND ISSUANCE

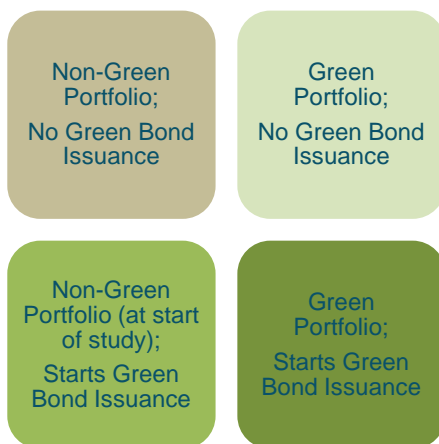
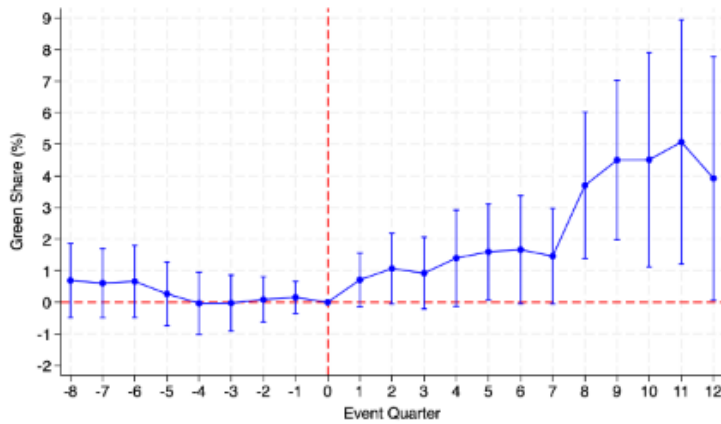


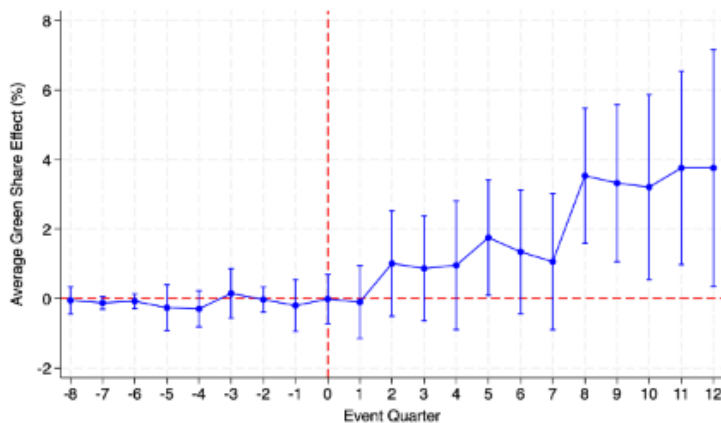
Figure 2: REIT CATEGORIES

We divide the sample REITs into four categories based on the greenness of the REIT portfolio (above/below the median share of green building certified space) and if the REIT began issuing green bonds during the study period (see Figure 2). For each of these categories we study the persistence of each REIT's environmental commitment after the issuance, the green bond premium, the equity market reaction to green bond issuance, and the possible changes in capital structure. During the study period of 2013-2022, green bonds exist in 2% of firm-quarters, and the average portfolio portion that is green building certified is 14%, yet scales from 0% to 84%.

We develop a difference-in-difference-style model (DiD) around REIT bond issuance. We use two-way fixed effects to isolate the impact of green bond issuance on green property ownership, controlling for both bond and year-quarter fixed effects. We also examine a Callaway-Sant'Anna DiD model which captures the impact of micro shocks,



(a) Two-Way Fixed Effects Difference in Difference



(b) Callaway Sant'Anna Difference in Difference

Figure 3: REIT ENVIRONMENTAL PERFORMANCE & GREEN BONDS USE OF FUNDS

such as when similar shocks have previously occurred in parallel markets (i.e. a new policy is introduced in California, and then a similar policy is introduced in New York two years later). We also study the bond spread in the secondary markets, and we evaluate the capital structure of REITs following the issuance of green bonds by documenting changes in the debt-to-equity ratio and access to the unsecured debt, measured as the proportion of unsecured debt to total debt. In all regressions, we cluster heteroskedasticity-robust standard errors by bonds. We also use propensity score weighting based on green bond issuance, to compare green bonds with the most comparable non-green bonds.

RESULTS

Figure 3 presents the traditional (Panel a) and more rigorous Callaway-Sant'Anna (Panel b) DiD models, presenting quarterly time horizons from two years prior until three years following the initial REIT green bond issuance; estimations include 90% confidence interval markers. All models include year- or quarter-borrower fixed effects, capturing unobservable time-varying REIT characteristics. The Y-axis presents REIT portfolio greenness, indicating that, within two years of green bond issuance, there is a substantial and statistically significant increase in green building certified properties held by a REIT. This lag in the impact is expected, as the three methods of increasing portfolio greenness (investing in green capital improvements and subsequently earning

green building certification; purchasing a green building-certified asset; or, purchasing an asset and then seeking green building certification) all require a substantial time commitment. Importantly, neither model presents evidence of a pre-trend, further supporting the observed outcome that REITs issuing green bonds are subsequently investing funds into green building certification-related activities.

Similar analyses are completed to examine how capital markets evaluate REIT green bond issuance. Results indicate green bond issuance is associated with an economically and statistically significant decrease in the bond spread. This is consistent with the literature on green bond spreads, and indicates that capital markets view green bonds as a signal of (financially) lower risk firms.

Finally, an analysis of the types of capital utilized by REITs subsequent to green bond issuance indicates an adjustment in capital sourcing, with a move toward less debt in the years following a green bond issuance. A similar analysis is completed for the unsecured debt-to-total debt ratio; these analyses provide little evidence indicating a move toward more unsecured debt. Taken together, these results indicate that capital markets are offering green bond issuers greater access to equity.

KEY FINDINGS

- REITs that issue green bonds **significantly increase the environmental performance of their portfolio** within two years following issuance.
- Capital markets evaluate **green bond issuers as lower risk investments**, offering **bond spread discounts** and **increased access to equity**.

¹ <https://www.climatebonds.net/>

² We utilize the S&P Global Market Intelligence, Trade Reporting and Compliance Engine, and Environmental Finance bond databases for REIT property and bond data, and the U.S. Green Building Council and the Environmental Protection Agency for LEED and EnergyStar green building certification data.