The impact of corporate governance on green bond issuances

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Abstract This paper examines the impact of governance quality on the corporate preferences for green bond financing. In an international sample of 336 green versus 13408 conventional bond issues from 30 advanced and emerging economies, we construct two issuer-level measures of internal governance following Dutordoir et al. (2014) and external governance using six dimensions of worldwide governance indicators. I derive and test three sets of hypotheses: 1) the relationship between governance quality and the corporate likelihood of green bond issuances from the perspectives of CSR overinvestment and debt-monitoring-enhancement hypotheses under the agency theory, conflict-resolution hypothesis under the stakeholder theory, and substitution/complementarity hypothesis; 2) management entrenchment hypothesis on the entrenched managers' preferences for green financing; 3) ownership heterogeneity in green preferences. The empirical evidence suggests that well-governed firms prefer green bonds over conventional bonds and entrenched managers are reluctant to green bond financing, supporting the debt-monitoring-enhancement, conflict-resolution, and management entrenchment hypotheses. Ownership analysis shows different types of shareholders have contrasting preferences on bond financing tools: while pension funds and state owners support green financing, activist investors and hedge funds prefer the opposite. The analysis of the impact of governance on the firm value creation via green bonds demonstrates that although green and conventional issuers have similar announcement returns on the stock market, those with better environmental governance are more likely to positively react to green bond issuances.

Keywords: Green bonds, Corporate governance, Sustainable finance, Corporate social responsibility (CSR), Bond choice

JEL-Code: M14, G32, G14

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1 Introduction

Sustainable financing responds to demands for carbon-neutral economies. Green bonds are debt instruments issued to finance for climate change solutions, specifically environmental-friendly projects (ICMA, 2021). In contrast to conventional bonds, the proceeds of green bonds are exclusively earmarked for projects with environmental benefits (OECD, 2017). As a key tool to fund the transition to net-zero emissions, the green bond market, however, is far from mature, accounting for only a small percentage of the credit universe. This can be partly attributed to the limited supply (Managi et al., 2022). To facilitate the growth of green bonds, it is essential to channel more corporate issuers into the market, as they play an active role in sustainable activities (Lopez et al., 2020).

Using Sweden as a case, Maltais & Nykvist (2020) summarize three types of motivations that drive issuers to the green market: potential financial benefits, such as post-issuance improved performance, lower risk and/or diversification benefits; non-financial business case incentives, including branding, operational efficiency, new market expansion, and reduced risk; legitimacy and/or institutional-oriented drivers, e.g. government and stakeholder pressures. Taking measurability into consideration, empirical papers mainly analyze green bond initiatives from two aspects: 1) post-issuance financial benefits (e.g., Flammer, 2021; Tang & Zhang, 2020; Wang et al., 2020)) and 2) issuance-related drivers (e.g., Barua & Chiesa, 2019; Chiesa & Barua, 2019; Dan & Tiron-Tudor, 2021), which include bond-level, issuer-level, and market characteristics.

However, the current two streams have major limitations. First, most of the literature focuses on the sole green bond market rather than compare it with the conventional bond market. Secondly, despite ex ante in nature, the analysis oversees the impact of corporate governance and corporate social responsibility (CSR) on corporate green initiatives (Bhutta et al., 2022; Cortellini & Panetta, 2021). The understanding of governance and CSR motivations underneath the issuance could help examine why organizations orient towards sustainable and socially responsible practices beyond what is legally mandated, as well as help unlock the reasons behind corporate reluctance on green practices.

This paper intends to fill the void by researching the motives of corporate green bond issuances from the perspective of corporate governance. Specifically, we study whether issuers' governance characteristics impact their likelihood to issue green bonds versus regular bonds[1]. As the choice of issuing green bonds is part of corporate financing strategies but also as CSR engagement associated with the investment in long-term environmental projects (Tang & Zhang, 2020), we develop three categories of hypotheses from debt, investment, and control mechanism perspectives regarding corporate tendency of green bond issuances. First, the CSR-overinvestment hypothesis predicts that effective governance is associated with a lower likelihood of green bond issues for the purpose of limiting managers' expropriation behavior from the investment view of agency theory, while the debt-monitoring-enhancement hypothesis under the debt view of agency and the

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[1] Regular bonds, conventional bonds and brown bonds are used interchangeably throughout the paper. Bloomberg defines corporate bonds as a debt security issued by a corporation, whose payment ability works as the backing.

conflict-resolution hypothesis under stakeholder theory, predict the opposite, as green bonds subject managers to an enhanced outside monitoring: not just bondholders, but also green stakeholders, whose conflicts are resolved as well. Secondly, managerial entrenchment, usually a proxy of poor governance (e.g., Faleye, 2007; Hu & Kumar, 2004; Ji et al., 2020), similarly holds conflicting views on the likelihood of corporate green bond issuances based on the self-serving hypothesis versus CSR-entrenchment hypothesis. Thirdly, since both green bond issuances and effective governance can reduce information asymmetry between insiders and outside bondholders: green disclosures can send a credible signal to investors (Flammer, 2021) and good governance aligns the conflicts of interests (Shleifer & Vishny, 1997), these two control mechanisms with similar functions can be substitutes or complements.

Based on the hypotheses above, we extract all non-financial public corporate green and conventional bonds from 2013 to Mid-2021 on Bloomberg and select conventional issuers that have never issued green bonds before Mid-2021. A final sample of 336 green and 13408 conventional bonds issued by firms headquartered in 30 economies is obtained. We collect data for seven internal governance characteristics, following Dutordoir et al. (2014), and six dimensions of worldwide governance indicators (WGI) from the World Bank to represent external governance. By constructing external and internal governance quality indexes, issuers' bond choices (green bonds versus conventional bonds) are examined via multinomial logit regressions using corporate governance characteristics as main variables and firm-level and macro-economic variables as controls.

Our results show that strong-governed bond issuers tend to issue green bonds over conventional counterparts, consistent with the debt view of agency theory, conflict-resolution hypothesis, and complementary hypothesis. Further test on the managerial entrenchment finds evidence that entrenched managers are reluctant to green bond financing. For example, we find that long served and dual CEOs are associated with a lower likelihood of green issues, while executives with larger ownerships aligning with the shareholders' interests contribute to a higher likelihood. The ownership breakdown provides evidence that different types of shareholders have contrasting preferences on bond financing tools: while pension funds and state owners support green financing, activist investors and hedge funds prefer the opposite. After calculating three types of event windows for stock market reactions to bond announcements, we find no salient difference in announcement returns between green and conventional bonds. Yet, issuing green bonds triggers higher announcement returns for issuers with stronger environmental governance (proxied by prior environmental score) than conventional ones. Our results are robust to potential endogeneity and omitted variable concerns and alternative regression specifications.

Our contributions to the literature are three-fold. This study is related to the growing stream of studies that examine the factors that influence a firm's green behavior and CSR involvement (e.g., Arora & Dharwadkar, 2011; Ghoul et al., 2017; Harjoto & Jo, 2011; Jo & Harjoto, 2012; Liang & Renneboog, 2017; Oh et al., 2018). By investigating the impact of corporate governance quality on the corporate likelihood of green bond issuances, our findings support that firm-level governance plays a vital role in CSR engagement and being environmentally friendly. Secondly, we also contribute to the growing green bond literature (e.g., Flammer, 2021; Larcker & Watts, 2020; Tang & Zhang, 2020), filling the void in examining the effects of governance quality. While scholars have outlined the relationship between firm-level characteristics and green initiatives (Bancel & Glavas, 2017; Daubanes et al., 2021), they have not directly linked CSR and governance

theories to the empirical relationship between the quality of corporate governance and the corporate likelihood of green issues. We provide empirical evidence on the rationales for corporate involvement in green behavior. Thirdly, while existing empirical papers provide various explanations for the choice of bank debt versus public debt versus private debt (e.g., Denis & Mihov, 2003; Lin et al., 2013), demonstrating the vital role of governance mechanisms in corporate debt-financing choices, few studies focus on the choice of different bond types, except the contrast between convertible bonds/Sukuks and regular bonds (Abdul Halim et al., 2017; Dutordoir et al., 2014). Investigating the impact of governance on the corporate choice of green versus conventional bonds can help uncover the determinants of corporate bond structure, adding to the literature on debt choices.

The rest of the paper is organized as follows. Following the introduction in Section 1, Section 2 reviews the green bond and CSR-related literature and develops the hypotheses, and Section 3 describes the sample selection procedure and details the research methodology. Empirical findings are presented in Section 4, and Section 5 concludes.

2 Theoretical Framework

2.1 An overview of green bonds

Against the backdrop of climate change adaptation, climate finance has become a key topic for a low-carbon economy. As climate and energy objectives are being translated into corresponding investment needs, green bonds have emerged as a powerful financing tool for such sustainable investing. As the label "green" implies, the green bond is differentiated from a regular bond by its commitment to exclusively apply the raised capital to finance or refinance "green" projects that benefit the environment (OECD, 2017; ICMA, 2021). Over the last five years, global issuances of green bonds have exploded, and according to Climate Bond Initiative (2021), a trillion in the annual issuance is within reach for 2023.

The issuance of green bonds has experienced a strong growth, especially for corporate issuers. As Fig.1. indicates, non-financial corporate issuers have gradually become the largest class of green issuers. However, the green market is far from mature. It is still relatively young and small: green bonds represent just a little more than 1 percent of the 53 trillion global bond market. Increasing eco-friendly investment initiatives, such as renewable energy, green buildings, and energy efficiency, leave plenty of room for green borrowing to grow. By shifting more private capital towards climate-smart projects, green bond issuances can be expected to help reduce greenhouse gas emissions and more broadly address climate change and attain sustainable development goals (SDGs).

Green bond literature develops with the growing market. Green initiatives under empirical research can be divided into two strands: 1) post-issuance financial benefits (e.g., Flammer, 2021; Tang & Zhang, 2020; Wang et al., 2020) and 2) issuance-related drivers (e.g., Barua & Chiesa, 2019; Chiesa & Barua, 2019; Dan & Tiron-Tudor, 2021). The ex-post effect of green issuances can be further divided into two streams: changes in corporate performances and pricing effects. Corporations can positively (e.g., Tang & Zhang (2020) in the international green bond market and Wang et al. (2020) within the Chinese green market) or negatively (e.g., Lebelle et al. (2020)

for a merged dataset) react towards green bond announcements, as captured by abnormal stock returns. Green bond issuances are also associated with the enhanced financial performance: long-term financials (Flammer, 2020; Yeow & Ng, 2021), value-creation through channels of stock liquidity, information asymmetry, and cost of capital (Zhang et al., 2021; Zhou & Cui, 2019), the change of ownership suggested by Flammer (2021), who find evidence for an increase in the long-term and green investors, and improved environmental performance, such as reduced carbon emissions and higher environmental ratings (Fatica & Panzica, 2020; Flammer, 2021). The research of pricing effects provides insights into whether green bonds offer a lower cost of financing as a cheaper tool compared with conventional bonds. However, the empirical papers testing the existence of 'greenium' in the primary market are mixed. Recent papers, such as Flammer (2021), Larcker & Watts (2020), and Tang & Zhang (2020), suggest that there are almost no essential green pricing benefits for corporate and municipal issuers; the green certification attached with pre-issuances, however, can sometimes outweigh pricing advantages over additional costs (Bachelet et al., 2019; Hyun et al., 2021; Kapraun & Scheins, 2019).

The second aspect of green issuer's initiatives is examined on issuance-related factors. Barua & Chiesa (2019) indicate that firm size and ROA and bond-level credit rating both have positive effects on issuance size, while revenue growth, leverage and bond coupon rate and maturity have negative effects; the impacts of currency and market development are also examined. Similarly, Chiesa & Barua (2019) suggest that bond-level coupon rate and rating and issuers' financial health are positively correlated with the size of green issuance. Dan & Tiron-Tudor (2021), focusing on the European Union, find that macroeconomic stability, such as inflation, fiscal balance, and GDP per capita, contributes to a larger issue size. Daubanes et al. (2021) support the role of managerial incentives, captured by stock-price sensitivity, in green bond commitments, based on a signaling model.

2.2 Corporate governance and green bonds

In this paper, we classify that corporate issuance of green bonds is not only a bond choice, constituting the bond structure, but also a CSR engagement (Tang & Zhang, 2020) because it is tied with the investments of environmental projects (CBI, 2021), signaling corporate efforts towards climate change solutions and being environmentally responsible. Since the distinction between green and conventional bonds lies solely in the label, our hypotheses are developed surrounding the 'green', associated with strengthened monitoring by outside stakeholders. We will analyze theoretical arguments from two perspectives: 1) the impact of governance on CSR engagement; 2) the similar roles of green bond issuances and effective governance in mitigating adverse selection and agency costs.

2.2.1 'Green' label help reduce adverse selection and agency costs

Information asymmetry occurs when information is asymmetrically distributed among different groups, so those who hold private information can take advantage of it and make better decisions (Connelly et al., 2011). Within the capital market context, it can happen between the management of the firm and its shareholders or investors (Leuz & Verrecchia, 2000). The first aspect of information asymmetry arises from the separation of ownership and control for the firm, posing the management team who is in charge of daily operations at an information advantage about the firms' prospects (Jensen & Meckling, 1976), which provides the potential for serving their interests

at the expense of shareholders' interests. On the other hand, the adverse selection problem exists in the market for a firm's securities when there is asymmetric information between insiders and investors about the firm's value (Hughes, 1986).

We argue that the issuance of green bonds, signaled by its additional label, helps resolve both principal-agent conflicts and insider-investor conflicts. Signaling theory fundamentally resolves information asymmetry and adverse selection risks (Spence, 2002). According to Flammer (2021), issuing green bonds can signal the company's commitment towards the environment. Moreover, issuing green bonds typically requires additional disclosure (i.e., green prospectus) on green project implementation and environment-related performances ex-ante to label as 'green', putting managers under greater monitoring from outside stakeholders. During the implementation of green projects, green managers need to follow strictly the guidelines on green bonds and timely disclose relevant information (i.e., environmental impacts), which may mitigate information asymmetry between managers and shareholders and investors and limit managers' self-serving behavior (Frankel & Li, 2004). Andrade et al. (2014) show that transparent corporate disclosure under the impact of the Sarbanes-Oxley (SOX) Act contributes to lower recognizable investment risks. By conducting a difference-in-difference (DID) model for Chinese green bonds, Zhang et al. (2021) find that green bond issuance mitigates firms' information asymmetry and perceived risk.

2.2.2 Corporate governance as another control mechanism

Widely acknowledged 1992 Cadbury code defines corporate governance as the system by which companies are directed and controlled. And Shleifer & Vishny (1997) define it within a multi-stakeholder framework, as how suppliers of finance to corporations gain investment returns. Under their framework, more intensive monitoring from board members and institutional investors may mitigate information asymmetry and reduce agency costs. Effective governance systems in place are expected to better align manager and shareholder incentives (Becker-Blease & Irani, 2008), thereby reducing adverse selection costs.

2.2.3 The impact of governance on corporate CSR engagement

The effects of various governance mechanisms on CSR have attracted extensive attention (Arora & Dharwadkar, 2011; Harjoto & Jo, 2011; Jo & Harjoto, 2012), analyzed from the viewpoints of board attributes, such as board size, independence and expertise (Hung, 2011; Oh et al., 2019; Shaukat et al., 2016), ownership structure (Dam & Scholtens, 2012; Dyck et al., 2019; Johnson & Greening, 1999), and managerial characteristics and compensation structure (Francoeur et al., 2017; Hong et al., 2016); however, empirical research has provided inconclusive results. As Oh et al. (2018) point out, this may be attributed to the separate analysis of "independent" governance mechanisms. In fact, a variety of governance mechanisms tend to collectively and interactively influence firms' decision-making, as referred to a bundle of governance mechanisms by Rediker & Seth (1995). From the 'environmental governance' perspective, Kock et al. (2012) show that a variety of 'good' governance mechanisms lead to corporate lower pollution levels. Arora & Dharwadkar (2011) suggest that effective governance leads to higher CSR scores. Similarly, by constructing the quality of governance system using board independence, institutional ownership, blockholder ownership, and the number of following analysts, Jo & Harjoto (2012) find a positive association between governance quality and CSR engagement. This study follows the bundle of governance mechanisms to examine the quality of governance on green bond choices.

However, mixed results on the relationship between corporate governance and CSR involvement cannot solely be attributed to the separate analysis of governance characteristics. There can be some friction between shareholders and stakeholders. Early studies in support of shareholder (agency) theory (e.g., Friedman, 1962, 1970), state that corporate goal is set to maximize shareholders' benefits, and stakeholder consideration would be a waste of resources. Therefore, CSR engagement is not always in line with the maximization of shareholder value. Accordingly, effective corporate governance characteristics designed for shareholders' interests, may adversely affect CSR performances (Borghesi et al., 2014; Masulis & Reza, 2015). In contrast, under the framework of Freeman's (1984) stakeholder theory, the corporate governance value-enhancing view asserts that stakeholders' interests and shareholders' wealth can be jointly maximized. Holding this statement, better governance is beneficial to firms' owners, but also valuable to stakeholders (Dyck et al., 2019; Kock et al., 2012).

2.3 Hypothesis development

The CSR-overinvestment hypothesis, developed by Barnea & Rubin (2010) under the CSR view of agency theory, states that CSR decisions can be an outcome of the principal-agent conflict between shareholders and managers because managers may overly engage in CSR investments for their private benefits (i.e., reputation-building) at the expense of shareholders (e.g., Harjoto & Jo, 2011; Jo & Harjoto, 2012). Effective governance mechanisms that center on shareholder value maximization can efficiently limit managers' self-serving behavior, thereby reducing the over-investment in environmental projects, for instance, those funded by green bonds.

According to substitution views, different control mechanisms with the same functions can substitute for each other (Misangyi & Acharya, 2014). Since both green issuances and effective governance mechanisms can work as a tool to reduce agency and adverse selection costs, firms with lower quality governance are more likely to issue green bonds as an attractive signal of a positive commitment to the environment.

H1a: Better governance is associated with a lower likelihood of green bond issues, whereby well-governed issuers will create worse firm value, proxied by the cumulative abnormal returns (CARs) on the stock market.

However, Barnea & Rubin (2010) also state that debt-servicing obligations may restrain over-investment behavior by selfish insiders, as debt is always considered an outside monitoring mechanism to alleviate agency conflicts (Agrawal & Knoeber, 1996; Berger et al., 1997; Mande et al., 2012). Despite conventional and green bonds being both debt financing tools, green bond issues subject insiders to more frequent monitoring by stakeholders, not just bondholders' monitoring. Well-governed firms may use the green bond issuance to strengthen the monitoring, thereby attenuating the management-shareholder conflict. Furthermore, under the Freeman's (1984) stakeholder framework, CSR engagement can work as a mechanism to resolve conflicts among stakeholders (Buchanan et al., 2018; Cai et al., 2011; Harjoto & Jo, 2011), contributing to the maximization of the existing shareholder wealth.

Converse to the substitution hypothesis, the complementarity hypothesis states that a single mechanism may be insufficient to reduce firms' agency and adverse selection costs. This means, rather than act as substitutes, the issuance of green bonds and good governance can act as

complements to one another. Hence, we hypothesize the opposite that effective governance mechanisms will lead to more active involvement in green bonds and better shareholder wealth.

H1b: Better governance is associated with a higher likelihood of green bond issues, whereby well-governed issuers will create better firm value, proxied by the cumulative abnormal returns (CARs) on the stock market.

Poor governance is always proxied by management entrenchment (Bebchuk et al., 2009; Ji et al., 2020). Berger et al. (1997) define entrenchment as "the extent to which managers fail to experience discipline from the full range of corporate governance and control mechanisms." In such principal-agent context, managers may pursue their own benefits at the expense of shareholders. Investing in environmental projects linked with green financing can help issuers enhance corporate reputation, establish a climate-friendly image, and enjoy the long-term benefits of funding (Maltais & Nykvist, 2020). But such projects tend to be long-run without immediate financial performances (Liao et al., 2015), which contradict managers' short and performance-linked contracts (Haque, 2017; Tauringana & Chithambo, 2015). Inefficient managers may underinvest green projects, and correspondingly green financing is reduced. Furthermore, entrenched managers inherently wish to accumulate excess cash for personal objectives (Jiang & Lie, 2016; Myers & Rajan, 1998; Opler et al., 1999). Fundings raised from green bonds are ring-fenced for green initiatives, constraining entrenched managers from diverting free cash flow for their self-interests.

Another possibility is that self-managers dislike green bonds because they may receive stricter and more frequent monitoring by external green stakeholders (Hyun et al., 2020) and ESG-mandated green investors, which works as an additional disciplinary mechanism.

H2a: Entrenched managers prefer conventional bonds over green bonds.

Entrenched managers can involve themselves in CSR to gain private benefits (Cespa & Cestone, 2007), who suggest the discretionary use of CSR as an entrenchment strategy. As CSR can sometimes be simply a manifestation of managerial agency problems, as hypothesized in H1a, entrenched managers may conduct CSR practices to gain support from stakeholders and establish a green image in their careers (Prior et al., 2008).

H2b: Entrenched managers prefer green bonds over conventional bonds.

Different types of shareholders may have different objectives and decision-making horizons, impacted by either financial or social incentives (Hoskisson & Hitt, 2002). Take the institutional ownership as an example, it is found to be either positively linked with firms' environmental initiatives, for instance, Dyck et al. (2019) provide empirical support that institutional ownership contributes to better environmental performances in some countries, or negatively connected in (Borghesi et al., 2014), depending on intertwined governance mechanisms. But this connection is driven by both social and financial considerations.

H3: Different types of owners have different green bond issuance preferences.

3 Variable selection and methodology

3.1 Measures of corporate governance quality as independent variables

As discussed above, good corporate governance encompasses the necessary internal controls and procedures to ensure that management acts in the interest of shareholders. Apart from internal governance procedures, scholars also view governance mechanisms from external control perspectives (Gillan, 2006), such as law and regulation (Djankov et al., 2008; La Porta et al., 1998), the market for corporate control (Bebchuk et al., 2009; Jensen, 1986) and other external pressures. Considering effective governance is an integrated system with a set of both internal and external controls, however, without unanimity on empirical measures (Bebchuk & Weisbach, 2010), we construct two quintile governance quality indexes: the internal index follows Dutordoir et al. (2014) using seven proxies covering top five large shareholders, the board size, the proportion of independent directors, CEO tenure, CEO age, outside CEO promotion, and founder-CEO, with the first three representing the monitoring mechanisms and last four for the alignment between shareholders and managers; the external governance index is constructed using six dimensions of Worldwide Governance Indicators from World Bank. For each continuous variable, all firms are ranked into quintiles based on the direction of the relationship with good governance in their corresponding fiscal year prior to the given bond announcement, where the strongest (weakest) relationship assumes a value of five (one).

Large institutional shareholders Prior research has found that large shareholder ownership is linked to better monitoring of managers (e.g., Huddart, 1993; Shleifer & Vishny, 1986). And the greater institutional concentrated ownership induces greater monitoring (Burns et al., 2010). We use the top five largest institutional ownership collected from FACTSET, which is also used in (Agrawal & Mandelker, 1990; Bhojraj & Sengupta, 2003; Kim & Lu, 2011). Alternative measures, such as the ownership concentration ratio (Herfindahi-Hirschman index) and the largest institutional ownership, have similar results.

Board Size The board of directors serves two important functions: monitoring managers on behalf of shareholders and providing resources (Hillman & Dalziel, 2003). Prior studies have documented a negative relation between board size, operating efficiency and firm performance (e.g. Cheng, 2008; Yermack, 1996), demonstrating that it takes efforts to coordinate across larger boards thereby lowering the monitoring effects. We assume that smaller boards relate to better governance and measure the number of board of directors as board size.

Board independence Boards with a higher proportion of independent directors provide superior governance because they can perform effective monitoring roles by evaluating management and limiting agents' opportunistic behavior (Core et al., 1999; Dahya & McConnell, 2005).

CEO tenure is measured as the length of years the CEO hold the position in the organizations. Long-serving CEO who tend to gain more power is more likely to pursue their own interests at the expense of shareholders (Hill & Phan, 1991; Hu & Kumar, 2004). It is assumed a negative relation between CEO tenure and the quality corporate governance.

CEO age is measured as the age of CEO at the fiscal-year end before the green bond issuance. We assume that older CEOs tend to execute their responsibilities in the interests of shareholders, because they receive more stock stakes as salary bonuses (Gibbons & Murphy, 1992), coinciding

their interests with those of outside shareholders, and Lin et al. (2014) provide empirical evidence that younger CEOs are associated with poor internal control mechanisms.

Outside CEO Relative to CEOs promoted from outside the company, inside successors are less familiar with internal control processes (Jongjaroenkamol & Laux, 2017). During pre-appointment service, inside CEOs have time to accumulate ownership stakes in the firm, aligning themselves with the outside shareholders (Dutordoir et al., 2014). There is a negative relationship between outside CEO promotion and governance quality.

Founder CEOs demonstrate a solid commitment to the firms and highly appreciate their reputational stake (Jayaraman et al., 2000). There is empirical evidence arguing that founder-CEOs can be positively linked with shareholder wealth (Adams et al., 2005; Fahlenbrach, 2009), and they tend to have larger ownership than non-founder CEOs (Nelson, 2003), further contributing to their alignment with shareholders' interests. Hence, the founder CEO is estimated to be positive with corporate governance.

To measure the quality of external governance, we calculate six dimensions of Worldwide Governance Indicators (WGIs), which cover over 200 countries since 1996 and range from around −2.5 to 2.5, with higher values indicating better governance. These six measures include voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law and control of corruption, capturing legal framework, country-level governance policies and environment, widely used in international studies (e.g., Keig et al., 2015) for governance research.

3.2 Firm-control variables

To control for firm characteristics in our regressions, we firstly consider factors that have been found to affect the choice of debt financing/ debt structure. In line with Denis & Mihov (2003) and Lin et al. (2013), we control **1)** Firm Size is the natural logarithm of total assets; **2)** Probability is measured by return on assets as operating income before depreciation scaled by total assets; **3)** Tobin's Q is calculated as the market value of assets to book value of assets (total assets −book value of equity + Market Capitalization)/total assets, and Houston & James (1996) highlight the role of growth opportunities in determining debt structure captured by market-to-book ratios; **4)** Firm leverage is the ratio of long-term debt scaled by the book value of total assets. These three financial ratios above are also considered in the green bond literature (Barua & Chiesa, 2019; Flammer, 2021; Tang & Zhang, 2020); **5)** Sales growth is measured as the difference between the pre-issue fiscal-year's sales and its previous year's, scaled by pre-issue year's sales. Barua & Chiesa (2019) find significant evidence on the relation of revenue growth and green bond supply size; **6)** Tangibility, calculated as net property, plant, and equipment scaled by assets, is also expected to affect green bond initiatives, as firms' ex ante asset structures may affect their preferences for green projects with long-term in nature; **7)** Environment pillar score, collected from DataStream ASSET4, is included to reflect issuers' ex ante environmental performance, covering emission reduction and production innovation aspects, for which green bonds are specifically designed (Hong et al., 2020); **8)** We also include Debt Maturity as the ratio of long-term debt over total debt as one of debt-related financing cost proxy; **9)** As suggested in Stellner et al. (2015), Stock Volatility is used to control firm financial risk, calculated as the annualized standard deviation of continuously compounded daily stock returns at the year prior to bond issuances; **10)** Firm Age is the number of years since a firm's IPO, as examined in Jo & Harjoto (2011), who

evidence that older firms are more likely to be engaged in CSR-related activities; **11)** To control macro-economic environment, we use Credit Spread as the difference in yields between Baa and Aaa corporate bonds and Term Spread as difference in yields between the 10-year and 1-year to represent the degree of convenience on borrowing from the bond market.

- Insert Table 1: Definition of variables and predicted signs-

3.3 Methodology

We conduct multinomial logit regressions to estimate the likelihood of corporate green bond issuances. The baseline model is as follows:

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\begin{aligned}
Green\ Indicator&(0/1)_{it} \\
&= \beta_0 + \beta_1 IG_{it} + \beta_2\ EG_{it} + \beta_3\ Issuer\ Controls_{it} + \beta_4\ Macro\ Controls_{it} \\
&+ Country\ Dummies + Industry\ Dummies + Year\ Dummies + \varepsilon_{it}
\end{aligned}
$$

Where $Green\ Indicator\ (0/1)_{it}$, as dependent variable, is an indicator taking the value of one if a particular bond issue i in year t is labelled as 'green' on Bloomberg, and zero otherwise; IG_{it} indicates internal governance quality index for issuer i in year t and EG_{it} external governance quality index on issuer i in year t, and ε_{it} is a random error term. Independent variables have been measured at the fiscal-year end prior to the bond announcement dates to mitigate endogeneity issues.

4 Empirical Research

4.1 Bond selection and filtering

All 4160 corporate green bond issues from 2007 until June 2021 in Bloomberg's fixed income database are extracted, that is, the corporate bonds labelled as "Green". Following Flammer (2021), we exclude 659 bonds whose issuer's BICS (Bloomberg Industry Classification System) is "Government". We also follow S&P firm type classification to delete 17 issues classified by government institutions (i.e., Mexico City Airport Trust), educational institutions (i.e., Massachusetts Institute of Technology, National University of Singapore). The remaining number of green bonds is 3484.

Following corporate governance research, we exclude firms belonging to financial services industry (SIC codes: 6000 – 6900) because they are subject to different financial regulations. The remaining non-financial corporate 457 issues are further restricted to corporate ESG availability because corporate CSR initiatives are an essential determinant of their ESG practices, which yields the final sample of 336 duplicate issue-date green bonds issued by 157 unique firms from 2013 to June 2021.

Following the same procedure as green bond selection, 13408 ESG-available corporate non-financial conventional bonds are extracted from Bloomberg and subject to the issuers that have never previously issued green-labeled bonds (see Table 2 for a summary).

- Insert Table 2: Summary of all bond issues -

Table 2 maps the country/region, year and SIC industry (division) distributions of 336 green (Panel A) and 13408 conventional (Panel B) bond issues. Our non-financial corporate sample starts from 2013 when this type of issuers went into the green bond market. There is an increasing trend in

terms of the number or the proportion of green issues over the period between 2013 and Mid-2021. Regarding country distribution, 336 green bonds vary in the number or percentage of issues across 30 countries/regions in 5 continents, and comparative conventional bonds are restricted to the same country/region scope. More than 10% of green bonds are from South Korea and Japan in our sample, and American issues account for 9.23%. The variation in the bond issues is also reported in Table 2 across SIC-1-digit (division) categories, where the portions of the two types of bonds show similar patterns. Bonds in the transportation and public utilities (Division 4) account for the largest for both green (42.26%) and conventional (24.75%) issues, whereas the agricultural division (Division 0) issues the smallest portion of bonds, about 0.3% for green and conventional bonds.

- Insert Table 3: Descriptive statistics for bond-level and governance characteristics -

Panel A of Table 3 provides summary statistics across the green and conventional bond categories. The mean issue yield for available 239 green bonds is 1.78%, lower than that of 10279 conventional bonds (3.14%), consistent with prior literature (Flammer, 2021; Tang & Zhang, 2020). Panel A does not show noticeable differences across bond categories on Investment Grade and Time to Maturity (in Years).

Panel B contrasts governance characteristics between green and conventional issues. For the whole sample, although the quality scores of internal and external governances for conventional issuers are slightly better than green issues, there is no statistical significance for this difference. Regarding the internal governance dimensions, the descriptive summary indicates that green issuers tend to sit on a larger board with a lower percentage of independent directors, smaller ownership concentration, and a shorter-tenure and younger CEO.

- Insert Table 4: Descriptive statistics for control variables -

Descriptive statistics of control variables are presented in Table 4. The average value of AT is higher for green bonds than the conventional sample. However, ROA, Tobin Q, and leverage of green issuers are lower than conventional issuers, which implies that issuers with lower profitability, market growth, and leverage tend to prefer green bonds over conventional bonds. We also find that green issuers have higher average values of ASSET4 ESG and Environment scores than conventional issuers.

4.2 Empirical research on the corporate likelihood of green bond issuances

- Insert Table 5: The impact of internal and external governance characteristics on green bond issuances -

Table 5 summarizes the coefficient estimates of baseline regressions of the impact of internal and external governance on green bond issuances. The governance characteristics and firm control variables can explain around 30% of the overall variance in the tendency of green issues.

The breakdown variables of the internal governance index are the main independent variables across the first seven models, respectively. In Model 1, board size has a positive and statistically significant coefficient ($\beta = 0.0946$). This indicates that firms with a larger board are more likely to issue green bonds over conventional counterparts, consistent with de Villiers et al. (2011), who suggest that firms with a greater number of directors on board exhibit higher environmental performance due to the functioning of resource-provision. Model 2 incorporating %independent

directors with a positive coefficient ($\beta = 0.3562$), despite being insignificant statistically, shows that boards with a higher percentage of outside directors tend to take stakeholder interests into consideration, demonstrating a higher likelihood of green bond issuances. CEO tenure, in Model 3, has a negative coefficient with significance ($\beta = -0.2647$) and implies that CEOs in their early career are more likely to be engaged in green issuances, in contrast with longer-tenure CEOs. This is in line with Chen et al. (2019), who find evidence that CSR performance is higher in CEOs' early tenure than in their later tenure. Similarly, CEO age in Model 4 is also negatively associated with green initiatives, revealing that younger CEOs tend to support green bond issuances. There is also a negative relation with statistical significance ($p < 0.01$) between Outside CEO and green bond issuances, suggesting CEOs promoted from outside are less supportive of green bonds than inside CEOs. Founder CEO contributes to green issuances with a positive coefficient ($\beta = 0.2781$). Surprisingly, the variable of top5 has a negative coefficient ($\beta = -5.0249$) on green bond issuances, indicating that concentrated institutional investors prefer conventional bonds over green bonds.

Regressions from Model 8 to Model 10 examine the impact of internal and external governance indexes on the likelihood of green bond issuances. Both internal and external governance indexes are strongly, significantly, and positively associated with corporate green initiatives, supporting the H1a hypothesis that firms with high-quality governance are more likely to be involved with green issuances.

Regarding the firm-level control variables, firm profitability (ROA), leverage, environment score and sale growth, firm age, and stock volatility all have significant associations with green initiatives. In general, firm profitability and age are negatively correlated with the likelihood of green issues, while firm leverage, environment score, sale growth and firm volatility have positive coefficients. This suggests that older and more profitable firms are less likely to be engaged in green bonds. Nevertheless, high-levered, volatile, environmental-friendly firms with more growth opportunities tend to issue green bonds. Among the variables showing marginal significance at 5%, the coefficients of firm size (AT) and tangibility are estimated to be positive, and Tobin's Q seems to be negatively correlated with green initiatives.

- Insert Table 6: The impact of entrenchment dimensions on green bond issuances-

To test the entrenchment hypothesis, we investigate the effect of entrenchment variables on the probability of green issuances. Panel A in Table 6 displays the coefficients of executive variables linked with entrenchment research that are not used for the construction of governance quality index, including CEO duality, CEO long service, New CEO, % CEO ownership, and % Executive ownership. CEO duality, long service, and New CEO, which are strongly significantly and negatively associated with green bond issuances, especially when combining all entrenchment variables in Model 6. Separating the role of the chairperson from CEO is believed to benefit green issuances. Supporting the negative coefficient of a New CEO, CEO concerns about short-term firm performance are more substantial in the early phase of their tenure because they need to establish their legitimacy and convey an image of ability (Ali & Zhang, 2015; Pan et al., 2016). Such CEOs prefer non-green projects that generate immediate financial benefits. Executives' ownership, in some cases, appears to be an effective alignment mechanism (Boyd & Solarino, 2016). According to Kim & Lu (2011), CEOs tend to have the most influence on decision making, so if insider ownership has any identifiable effects, the impact should be most visible with CEO ownership. As CEO ownership increases, there can be a closer alignment between managers and outside

shareholders (Coles et al., 2001). We find similar empirical evidence for the impact of managerial ownership on the green involvement. The test on managerial entrenchment hypothesis support H2a that entrenched managers prefer more on conventional bonds to green financing.

We further examine the impact of different types of ownerships on the likelihood of green bond issuances, as shown in Table 7. Based on the S&P Capital I&Q data availability, we define different ownership types following Capital I&Q. By borrowing from ownership and CSR literature, we estimate the signs with green bond initiatives prior to the conduction of regressions. Since shareholder activism may reduce corporate CSR initiatives because such activism can divert resources from CSR to political activities to resist external pressure (David et al., 2007), activist investors are expected to have negative preferences towards issuing green bonds. As hedge funds and Venture Capital/Private Equity (VC/PE) tend to focus on short-term investment returns, their ownership is predicted to be negatively associated with the likelihood of green bond issuances, supporting our findings. Pension funds typically have long horizons along with long liabilities (Derrien et al., 2013), we have reasons for a positive relationship between the ownership of pension funds and green bond likelihood. The positive association between state ownership and the preferences for green bonds confirms previous findings: Boubakri et al. (2019) show that state-owned firms use CSR to build their reputations in the context of privation, and Bénabou & Tirole (2010) also suggest the positive effects of state-ownership for philanthropy. Multiple types of ownerships have varying preferences on bond financing tools: while pension funds and state owners support green financing, activist investors and hedge funds prefer the opposite, in line with the hypothesis H3.

- Insert Table 7: The impact of ownership breakdown on green bond issuance –

For robustness checks, **1)** Propensity Score Matching (PSM) is implemented to construct a green-conventional bond pair to verify the effect of governance factors. As matching procedures for green-conventional bond pairs applied in Flammer (2021) and Tang & Zhang (2020) are within the same issuers, which hence cannot examine the impact of governance characteristics across different issuers, we apply "Nearest Neighbor Matching" on bond characteristics: bond issue price, issue size, years to maturity, coupon, and S&P investment rating (0/1) with the caliper of 0.2, and control green and conventional issues exactly in the same SIC-1-digit industry, issue year, country, coupon type, and market type. The matched sample of 132 pairs is obtained. We replicate the regressions for the matched sample, and there are no significant changes in the results. **2)** Alternative ESG score on Bloomberg and ASSET4 governance score replace ASSET4 environment score and internal governance quality index, respectively, in regressions, which confirm previous findings. **3)** The entrenchment index (E-index), developed by Bebchuk et al. (2009), is also tested for the management entrenchment hypothesis within the US context, shown in Panel B in Table 6, supporting that managerial entrenchment is negatively associated with the likelihood of green bond issuances. **4)** To address potential omitted variable bias, we further include R&D development cost (R&D expenses/total sales) as a control variable, which surprisingly show a negative sign with green indicator in regressions, but main examining variables keep constant.

4.3 Empirical research on the stock returns around bond announcements

To test the firm value creation by issuing bonds, stock returns around bond announcements are proxied for the shareholder wealth. This section examines whether stock market investors react

differently towards the announcements of green and conventional bonds and whether governance characteristics impact the different reactions.

Following Tang & Zhang (2020), we restrict bond issuers to have at least 300 trading days returns data prior to announcement dates and 30 trading days after the announcement, with the bond announcement date is set as day 0. To calculate the estimated return of a given bond issuer's stock, we adopt the market model[2], market-adjusted model, Fama-French 3-factor, and 5-factor market models[3]. OLS regressions are applied to estimate various market models, considering daily returns for each issuer over an estimation window of 300-50 days prior to the bond announcement.

For instance, during the estimation of the CAPM market model, daily abnormal returns (ARs) in Eq. (2) are obtained by subtracting estimated returns on day t for issuer i with parameters estimated in Eq. (1) from the actual stock return on day t for issuer i.

$$R_{i,t} - r_f = \mu_i + \beta_i \left(R_{m,i,t} - r_f \right) + \varepsilon_{i,t} \quad \text{(Eq. 1)}$$

$$AR_{i,t} = R_{i,t} - \hat{R}_{i,t} \quad \text{(Eq. 2)}$$

Where $\left(R_{m,i,t} - r_f \right)$, as the market premium, is the difference between market return $(R_{m,t})$ and 10-year Treasury bond yield (r_f) for stock i in date t, and $(R_{i,t} - r_f)$ is the stock return premium, the difference between the actual return $(R_{i,t})$ on the stock market for issuer i on day t and r_f. $\hat{R}_{i,t}$ is the estimated stock return in Eq. (1) for issuer i on day t. $R_{m,i,t}$ is the market return, proxied by the MSCI world index and MSCI Emerging Market Index, representing respective developed and developing markets. We also employ market return data on which the firm's stock is listed, collected from Datastream, which generates similar results.

We consider three different event windows [0,0], [-3,+3] and [-5,+5] and compute the cumulative abnormal returns (CARs) as the sum of daily excess returns over each type of selected event windows.

Table 8 displays CARs and significant tests by bond type (green versus conventional bonds) for all samples and matched samples regarding the CAPM market-adjusted model with the market return proxied by MSCI indexes. P(Signed-rank) is the p-value for the non-parametric signed-rank test on whether CARs for a particular bond type are significantly different from 0, and Student, Wilcoxon rank-sum and Kruskal-Wallis tests provide p-values for bond comparisons on whether CARs are significantly different from each other. Across the three event windows, we find that CARs can be negative across the two bond types for the smaller windows [0,0] and [-3,+3], but positive for the largest event window [-5,+5] with strong significance different from 0. For both before-matched and matched-sample, three types of comparison tests suggest that CARs are not significantly different across bond categories. Hence, green, and conventional issuers have similar announcement returns on the stock market.

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[2] $R_{i,t} = \mu_i + \beta_i R_{m,i,t} + \varepsilon_{i,t}$, where $R_{i,t}$ is the actual return on the stock market for issuer i on day t, and $R_{m,i,t}$ is the market return.

[3] See Fama & French (1992)

- **Insert Table 8: CAR comparisons by bond type using CAPM market-adjusted model with MSCI index -**

To analyze the role of internal and external governance on the different stock market reactions to green and conventional bond announcements, we estimate regressions of CARs using multiple market models for both before-matched and matched samples following the OLS specification below:

$$CAR_{it} = \beta_0 + \beta_1 Green\ Indicator_{it} + \beta_2\ IG_{it} * Green\ Indicator_{it}$$
$$+ \beta_3\ Environmental\ Score_{it} * Green\ Indicator_{it} + \beta_4\ Issuer\ Controls_{it}$$
$$+ \beta_5\ Macro\ Controls_{it} + Country\ Dummies + Industry\ Dummies$$
$$+ Year\ Dummies + \varepsilon_{it}$$

Where the dependent variable in regressions are CARs calculated using market model and CAPM market-adjusted models with both MSCI and multi-market indexes, and Fama-French 3-factor and 5-factor models over the three types of estimation windows. Previous multinomial logit regressions have noted that the corporate likelihood of green bond issuances is positively affected by the corporate environmental score, measured at the fiscal year end prior to the bond announcement. This can be considered corporate environmental governance prior to bond issuance decisions. $IG_{it} * Green\ Indicator_{it}$ examines whether internal governance exert different effects on stock reactions by bond type, and $Environmental\ Score_{it} * Green\ Indicator_{it}$ investigates the impact of prior environmental governance on the firm value creation by bond type.

Table 9 provides the estimated regression coefficients for six market models over the event window [0,0]. We consider two market indexes as discussed above for the market model and CAPM market-adjusted model. The coefficient of the Green indicator is negative with marginal statistical significance, indicating that conventional bond announcements generally trigger higher CARs than green bonds. Considering different bond samples, whether the stock market reacts more favorably to green bond announcements than conventional ones by firms with stronger corporate internal governance mechanisms remains questionable. However, $Environmental\ Score_{it} *$ $Green\ Indicator_{it}$ are found to be consistently positive, suggesting that green bond issuers with better environmental governance ex-ante benefit more from short-run stock market reactions and create better firm value than conventional issuers.

- **Insert Table 9: Regression coefficients for all estimated market models over [0,0] –**

5. Conclusion

This paper examines the impact of governance mechanisms on the corporate green bond choices and firm value creation via this green financing, proxied by the stock market reactions around announcements (CARs). An international dataset of 336 green versus 13408 conventional bond issues from 30 advanced and emerging economies is employed over the period between 2013 and June 2021. Two issuer-level measures of internal governance following Dutordoir et al. (2014) and external governance using six dimensions of worldwide governance indicators are constructed to proxy for the quality of corporate governance internally and at the national-level. We derive and test three sets of hypotheses, 1) the impact of governance mechanisms on the corporate likelihood of green bond issuances and firm value creation, which is developed from debt and investment

perspectives under the agency theory, conflict-resolution hypothesis under the stakeholder theory, and substitution/complementary hypothesis on two similar control mechanisms; 2) management entrenchment hypotheses predict green preferences for entrenched managers, which can work as complements to the first set of hypotheses because entrenchment is always linked with poor governance; 3) Ownership heteroscedasticity in their preferences for green bond financing.

The empirical evidence suggests that well-governed firms prefer green bonds over conventional bonds, indicating that better governance contributes to a higher likelihood of corporate green bond issuances, under debt-monitoring-enhancement view of agency theory, the conflict-resolution view, and the complementary view. The findings also show that entrenched managers are reluctant to green bond financing, enhancing the first set of hypotheses and supporting the adverse effect of managerial entrenchment on the corporate tendency towards green bonds. Ownership analysis shows different types of shareholders have contrasting preferences on bond financing tools: while pension funds and state owners support green financing, activist investors and hedge funds prefer the opposite. To further investigate the effect of governance mechanisms on the firm value via bond announcements, multiple market models are employed to calculate cumulative abnormal returns (CARs) around bond announcements, in other words, the stock market reactions towards announcements by bond type. We find green and conventional issuers have similar announcement returns on the stock market, and in some further regressions with the dependent variable as CARs, the stock market reacts more actively towards the issuances of conventional bonds than green bonds with marginal significance. However, after adding the interaction term of Environment Score $\times$ Green, the OLS regression results provide a more reasonable explanation. This interaction term has a statistically significant positive coefficient, revealing that stock investors are not simply investing in green announcements; they refer to firms' prior environmental performances. Green issuers with better environmental performance prior to bond announcements have higher announcement returns than comparable conventional issuers.

In summary, better governance (internal, external, and environmental) is associated with a higher likelihood of corporate green bond issues, whereby well-governed issuers will create better firm value, proxied by the cumulative abnormal returns (CARs) on the stock market. This statement is further strengthened by the finding that entrenched managers prefer conventional bonds than green bonds. Firms wishing to access the green bond market should pay attention to their governance mechanisms, such as the overall quality of governance, environmental governance, management entrenchment dimensions, and ownership heterogeneity, because these are beneficial to their shareholder wealth once they enter the green bond market.

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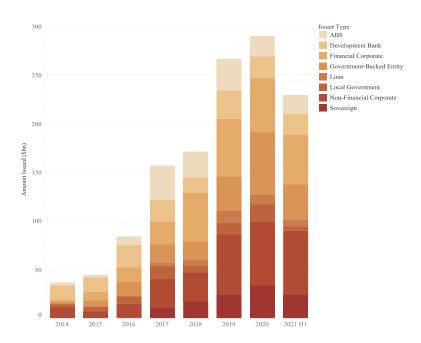
Fig.1. Green bond amount issued by issuer type between 2014 and 2021 H1
Source: Author's Calculation based on Climate Bond Initiative

Table 1: Definition of variables and predicted signs

Dependent Variable	Predicted sign	Definition	Database
Green Bond Issuance (0/1)		The dummy variable with the value of 1 when the bond issue is labelled as 'green' on Bloomberg, and 0 otherwise	Bloomberg
Corporate Governance Variables	**Predicted sign with good governance**		
Internal Governance Index			
Five Largest institutional shareholders	+	Ownership by top 5 institutional investors in percentage of market capitalization	Factset, 13f Institutional Filings
Board size (log)	-	The natural logarithm of total number of directors on the company's board	Thomson Eikon, Bloomberg, Corporate filings
% indep	+	Percentage of independent board members relative to the total number of directors on board	Thomson Eikon, Bloomberg, Corporate filings

CEO tenure (log)	-	Number of years the company's CEO has been in the position at bond issue date	Bloomberg, BoardEx, Execucomp
CEO age	+	The age of CEO in the fiscal-year end prior to bond issue	Thomson Eikon, Bloomberg, Corporate filings
Founder CEO	+	Indicator variable taking the value one if the CEO is the founder of the company	Bloomberg, BoardEx
Outside CEO	-	Indicator variable taking the value one if the CEO is promoted from outside of the company	Bloomberg, Corporate filings
External Governance Index (WGI)			
Voice and accountability (VA)	+	VA measures citizens' ability to participate in government selection, along with freedom of expression and association and a free media	World Bank
Political stability and absence of violence (PV)	+	PV measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means	
Government effectiveness (GE)	+	GE measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	
Regulatory quality (RQ)	+	RQ measures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	
Rule of law (RL)	+	RL measures perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence	
Control of corruption (CC)	+	CC measures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	
Control Variables	**Predicted sign with green bond issuance**		
AT	+	Firm size is the natural logarithm of the book value of total assets (millions USD)	Compustat
ROA (%)	-	Return on Assets (ROA) is the ratio of operating income before depreciation over book value of total assets, as a probability measure	Self-calculation based on

Tobin's Q	+/-	Sum of the market value of equity and the book value of debt divided by total assets	Compustat and company reports
Leverage	+/-	Long-term debt over book value of total assets	
Sales growth	+	The difference between the pre-issue fiscal-year's sales and its previous year's, scaled by pre-issue year's sales	
Tangibility	+	The ratio of property, Plant and Equipment scaled by total assets	
Debt Maturity	-	The ratio of long-term debt over total debt	
Environment score	+	ASSET4 ESG sub-category score	Thomson Eikon
Stock Volatility	-	Annualized standard deviation of continuously compounded daily stock returns for the respective most recent bond issue year	Self-calculation based on Thomson Eikon, Compustat
Firm Age (in Years)	+/-	The difference between the year prior to bond issuance and listing year	Compustat, Bloomberg
Credit Spread	-	Difference in yields between Moody Baa and Moody Aaa corporate bonds	World Bank
Term Spread	-	Difference in yields between the 10-year and 1-year Treasury securities	

Table 2: Summary of all bond issues

This table shows the number of issues by year, country, and SIC-1-digit (Division structure), along with percentages, for samples of green bonds (Panel A) and conventional bonds (Panel B) issued by public non-financial companies during the period between 2013 and June 2021. Issue data is collected from Bloomberg.

Panel A: Green Bonds				Panel B: Conventional Bonds		
Year	No. Issues	Percent (%)		Year	No. Issues	Percent (%)
2013	2	0.60		2013	27	0.20
2014	7	2.08		2014	1167	8.70
2015	6	1.79		2015	1149	8.57
2016	5	1.49		2016	1375	10.26

	No. Issues	Percent (%)		No. Issues	Percent (%)
2017	16	4.76	2017	1773	13.22
2018	20	5.95	2018	1618	12.07
2019	71	21.13	2019	2244	16.74
2020	103	30.65	2020	2925	21.82
2021	106	31.55	2021	1130	8.43
Total	**336**	**100.00**	**Total**	**13408**	**100.00**
Country/Region	**No. Issues**	**Percent (%)**	**Country/Region**	**No. Issues**	**Percent (%)**
AUSTRALIA	1	0.30	AUSTRALIA	60	0.45
AUSTRIA	5	1.49	AUSTRIA	48	0.36
BRAZIL	4	1.19	BRAZIL	220	1.64
CANADA	2	0.60	CANADA	566	4.22
CHILE	2	0.60	CHILE	47	0.35
CHINA	21	6.25	CHINA	524	3.91
DENMARK	1	0.30	DENMARK	15	0.11
FINLAND	14	4.17	FINLAND	59	0.44
FRANCE	32	9.52	FRANCE	641	4.78
GERMANY	20	5.95	GERMANY	390	2.91
GREECE	1	0.30	GREECE	2	0.01
HONG KONG	19	5.65	HONG KONG	217	1.62
INDIA	1	0.30	INDIA	418	3.12
ITALY	18	5.36	ITALY	123	0.92
JAPAN	39	11.61	JAPAN	1609	12.00

MEXICO	1	0.30	MEXICO	135	1.01
NETHERLANDS	2	0.60	NETHERLANDS	81	0.60
NEW ZEALAND	7	2.08	NEW ZEALAND	10	0.07
NORWAY	10	2.98	NORWAY	138	1.03
POLAND	2	0.60	POLAND	10	0.07
PORTUGAL	4	1.19	PORTUGAL	17	0.13
SOUTH KOREA	45	13.39	SOUTH KOREA	677	5.05
SPAIN	2	0.60	SPAIN	77	0.57
SWEDEN	9	2.68	SWEDEN	188	1.40
SWITZERLAND	2	0.60	SWITZERLAND	137	1.02
TAIWAN	8	2.38	TAIWAN	66	0.49
THAILAND	24	7.14	THAILAND	292	2.18
TURKEY	3	0.89	TURKEY	22	0.16
UNITED KINGDOM	6	1.79	UNITED KINGDOM	170	1.27
UNITED STATES	31	9.23	UNITED STATES	6449	48.10
Total	**336**	**100.00**	**Total**	**13408**	**100.00**
SIC-1-digit (Division)[4]	**No. Issues**	**Percent (%)**	**SIC-1-digit (Division)**	**No. Issues**	**Percent (%)**
0	1	0.30	0	37	0.28
1	19	5.65	1	948	7.07
2	65	19.35	2	2850	21.26

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[4] Standard Industrial Classification (SIC) code system is broken down into 10 divisions: **Division 0:** Agriculture, Forestry, and Fishing; **Division 1:** Mining and Construction; **Division 2 & Division 3:** Manufacturing; **Division 4:** Transportation, Communications, Electric, Gas, and Sanitary Services; **Division 5:** Wholesale Trade and Retail Trade; **Division 6:** Finance, Insurance and Real Estate; **Division 7 & Division 8:** Services; **Division 9:** Public Adminstration

3	79	23.51	3	3105	23.16
4	142	42.26	4	3318	24.75
5	7	2.08	5	1233	9.20
7	5	1.49	7	1281	9.55
8	1	0.30	8	339	2.53
9	17	5.06	9	297	2.22
Total	**336**	**100.00**	**Total**	**13408**	**100.00**

Table 3: Descriptive statistics for bond-level and governance characteristics

Panel A in Table 3 compares the bond characteristics across the two types. Panel B displays the comparison of corporate governance characteristics between green and conventional bonds. Panel C shows the entrenchment dimensions. All the continuous variables are winsorized at the 1% and 99% levels to minimize the effects of outliers.

Variable		Mean	SD	Median	Min	Q1	Q3	Max	T-test
Panel A: Bond-level characteristics									
A1: Green Bonds									
Yield at Issuance (%)	239	1.78	7.53	1.68	0	0.47	2.62	7.48	14.29***
Issue Price	323	99.85	129.74	100	96.5	99.74	100	107	0.56
Amount	336	372.88	651391.89	194.73	7.29	88.87	565.34	2848.06	8.6***
Investment Grade	336	0.324	0.469	0	0	0	1	1	0.42
Time to Maturity (in Years)	336	10.19	1584.81	6.01	0.25	5.00	10.01	120.35	0.01
A2: Conventional Bonds									
Yield at Issuance (%)	10279	3.14	111.60	2.98	-1.12	1.25	4.499	99.563	
Issue Price	12353	99.87	257.12	100	95.89	99.84	100	190.35	

Amount	13283	560.70	6479289.6	401.24	0.002	150	750	26359.3	
Investment Grade	13408	0.335	0.472	0	0	0	1	1	
Time to Maturity (in Years)	13408	10.28	2715.24	7.01	0.06	5.00	10.01	390.66	
Panel B: Corporate governance characteristics									
B1: Green Bonds									
Internal Governance Index	336	3.637	5.17	3.60	1.8	3.2	4.2	6.6	0.65
External Governance Index (WGI)	336	2.99	7.51	2.83	1	2.33	4	5	0.08
Board Size	336	12.77	169.61	11.70	5.07	8.8	14.8	28.4	-4.75***
% Indep	336	0.53	0.28	0.51	0.06	0.363	0.678	1	7.92***
CEO tenure	336	3.92	38.16	2.842	0.24	1.98	4.94	13.147	7.52***
CEO age	336	58.65	903.29	59	44	54	64	79.9	4.87***
Founder CEO	336	0.03	0.16	0	0	0	0	1	4.54***
Outside CEO	336	0.38	0.49	0	0	0	1	1	0.69
Five largest institutional ownership	336	0.09	0.02	0.07	0.01	0.05	0.11	0.36	20.67***
Control of Corruption	336	1.07	1.53	1.30	-0.41	0.71	1.65	2.271	2.33**
Governance Effectiveness	336	1.277	1.11	1.42	-0.35	1.15	1.61	1.984	3.02**
Political Stability	336	0.44	0.50	0.559	-0.89	0.09	0.95	1.5	-0.18
Regulatory quality	336	1.145	1.17	1.327	-0.32	1.03	1.64	2.032	2.64**
Rule of law	336	1.178	1.23	1.438	-0.33	1.14	1.61	2.079	3.96***
Voice and Accountability	336	0.727	0.77	0.988	-1.65	0.82	1.24	1.725	3.24***
World Governance Indicator	336	0.98	0.97	1.216	-0.46	0.82	1.41	1.834	3.01***

B2: Conventional Bonds

Internal Governance Index	13408	3.67	5.62	3.80	1.2	3.2	4.2	6.4
External Governance Index (WGI)	13408	3	7.03	3.33	1	2.333	3.83	5
Board Size	13408	11.41	78.43	11.2	5	9.2	13.21	20.4
% Indep	13408	0.63	0.29	0.73	0.02	0.433	0.87	0.94
CEO tenure	13408	5.18	101.84	3.70	0.44	2.175	6.88	27.22
CEO age	13408	60.68	860.88	61	41	56	66	79
Founder CEO	13408	0.07	0.25	0	0	0	0	1
Outside CEO	13408	0.40	0.49	0	0	0	1	1
Five largest institutional ownership	13408	0.18	0.05	0.18	0.02	0.07	0.27	0.45
Control of Corruption	13408	1.17	1.09	1.37	-0.53	1.22	1.48	2.19
Governance Effectiveness	13408	1.37	0.92	1.49	-0.21	1.39	1.59	1.98
Political Stability	13408	0.43	0.44	0.47	-0.99	0.30	0.68	1.34
Regulatory quality	13408	1.24	0.94	1.35	-0.39	1.22	1.62	2.12
Rule of law	13408	1.33	0.96	1.52	-0.43	1.41	1.62	2.01
Voice and Accountability	13408	0.88	0.60	1.05	-1.61	0.96	1.11	1.67
World Governance Indicator	13408	1.09	0.72	1.25	-0.40	1.23	1.32	1.78

Panel C: Entrenchment dimensions

C1: Green Bonds

CEO duality	336	0.16	0.37	0	0	0	0	1	4.47***
CEO long service	336	0.003	0.055	0	0	0	0	1	4.31**
New CEO	336	0.054	0.226	0	0	0	0	1	0.85

	N	Mean	SD	Median	Min	Q1	Q3	Max	T-test
CEO ownership (%)	299	2.331	450.52	0.004	0	0	0.028	54.67	28.63***
Executive ownership (%)	300	27.39	2635.18	10.54	0	0	57.33	100	5.04**
C2: Conventional Bonds									
CEO duality	13408	0.25	0.43	0	0	0	1	1	
CEO long service	13408	0.02	0.13	0	0	0	0	1	
New CEO	13408	0.04	0.20	0	0	0	0	1	
CEO ownership (%)	9040	1.04	92.09	0.05	0	0.01	0.28	27.64	
Executive ownership (%)	10739	23.09	2969.67	0.788	0	0.06	41.67	100	

Table 4: Descriptive statistics for control variables

Control Variables	N	Mean	SD	Median	Min	Q1	Q3	Max	T-test
Panel A: Green Bonds									
AT	336	11.79	74.75	11.46	6.25	9.62	13.15	18.96	-5.65***
ROA	336	0.09	0.01	0.09	0.01	0.07	0.11	0.29	6.82***
Tobin Q	336	1.04	1.92	0.94	0.35	0.67	1.18	3.42	16.21***
LEV	336	0.70	0.25	0.74	0.06	0.602	0.86	0.97	4.67***
ASSET4 ESG Score	336	59.92	1975.7	64.29	15.37	47.80	72.38	90.26	-7.68***
ASSET4 Environment Score	336	56.79	2784.39	67.55	0	38.80	78.39	95.64	-3.95***
Tangibility	336	0.505	0.278	0.48	0.03	0.32	0.71	0.98	-6.87***
Sale growth	336	0.05	0.17	0.02	-0.51	-0.05	0.09	0.97	-0.55
Debt maturity	336	0.71	0.24	0.73	0.181	0.58	0.88	0.97	6.45***
Stock volatility	336	0.432	0.73	0.35	0.15	0.25	0.48	2.31	-3.55***

Firm age	336	25.57	1948.04	20.01	1.05	12.45	30.03	109.61	6.53***
Credit Spread	336	0.93	0.271	0.9	0.71	0.87	0.91	1.49	2.24**
Term Spread	336	0.49	1.19	0.08	0.06	0.06	0.82	2.57	17.01***
Panel B: Conventional Bonds									
AT	13408	10.90	59.26	10.506	5.909	8.981	12.57	16.96	
ROA	13408	0.11	0.02	0.11	-0.12	0.08	0.15	0.31	
Tobin Q	13408	1.57	5.46	1.3	0.396	0.82	1.90	5.83	
LEV	13408	0.76	0.28	0.82	0	0.66	0.92	1	
ASSET4 ESG Score	13408	52.34	2068.03	55.07	8.49	36.22	68.78	88.93	
ASSET4 Environment Score	13408	50.48	2681.95	56.79	0	27.24	75.63	95.54	
Tangibility	13408	0.41	0.28	0.35	0.02	0.16	0.63	0.99	
Sale growth	13408	0.04	0.11	0.04	-0.68	-0.02	0.11	0.86	
Debt maturity	13408	0.78	0.25	0.84	0.06	0.69	0.92	1	
Stock volatility	13408	0.36	0.36	0.30	0.132	0.22	0.41	1.611	
Firm age	13408	33.23	2198.81	25.53	1.397	15.75	46.32	100.28	
Credit Spread	13408	0.94	0.49	0.87	0.71	0.77	1.11	1.49	
Term Spread	13408	1.07	1.928	1.19	0.06	0.08	1.68	3.16	

Table 5: The impact of internal and external governance characteristics on green bond issuance

Table 5 displays the coefficient estimates of baseline regressions. Dependent variable is a dummy variable taking the value of 1 if the bond is labelled as "green" on Bloomberg. Independent variables include Internal Governance Index (Qut1) and External Governance Index (WGI), which are constructed using quintile average across internal and external governance categories, respectively. Internal characteristics include Board Size, the percentage of independent directors (%Indep), CEO tenure, CEO age and five largest institutional ownership (top5) plus dummy

variables of Founder CEO and outside CEO, while external governance covers six dimensions of Worldwide Governance Indicators (WGI).

DV: Green Issuance (0/1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Internal Governance Index (Qut1)								1.2166***		1.2090***
								(0.0970)		(0.0983)
External Governance Index (WGI)									0.5939***	0.5136***
									(0.0993)	(0.0969)
Board Size	0.0946***									
	(0.0222)									
% Indep		0.3562								
		(0.4167)								
CEO tenure			-0.2647***							
			(0.0778)							
CEO age				-1.3209**						
				(0.6001)						
Outside CEO					-0.8982***					
					(0.1418)					
Founder CEO						0.2781**				
						(0.2779)				
top5							-5.0249***			
							(1.4757)			
AT	0.0455	0.1011*	0.1225**	0.1250**	0.0799	0.1107**	0.0667	0.1125**	0.0618	0.0734
	(0.0573)	(0.0555)	(0.0554)	(0.0553)	(0.0553)	(0.0549)	(0.0557)	(0.0567)	(0.0556)	(0.0573)
ROA	-3.0303**	-4.1368***	-4.1179***	-3.9523***	-3.9350***	-4.0673***	-3.8365***	-5.0137***	-3.9012***	-4.9271***
	(1.4082)	(1.3674)	(1.3553)	(1.3580)	(1.3683)	(1.3720)	(1.3718)	(1.3630)	(1.3658)	(1.3573)

33

DV: Green Issuance (0/1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
TobinQ	-0.3164**	-0.2900*	-0.2686*	-0.2818*	-0.2812*	-0.2793*	-0.3065**	-0.3011**	-0.3462**	-0.3844**
	(0.1558)	(0.1517)	(0.1504)	(0.1508)	(0.1505)	(0.1525)	(0.1521)	(0.1509)	(0.1604)	(0.1601)
LEV	1.5495***	1.5815***	1.5625***	1.5099***	1.7216***	1.5773***	1.5765***	1.7986***	1.5944***	1.8059***
	(0.5334)	(0.5282)	(0.5290)	(0.5288)	(0.5361)	(0.5289)	(0.5292)	(0.5515)	(0.5334)	(0.5557)
Environment Score	0.0076***	0.0087***	0.0086***	0.0089***	0.0083***	0.0088***	0.0087***	0.0086***	0.0093***	0.0093***
	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0025)	(0.0027)	(0.0025)	(0.0027)
Tangibility	0.4835*	0.6151**	0.6427**	0.6111**	0.4505*	0.5986**	0.5120*	0.5989**	0.4695*	0.4999*
	(0.2689)	(0.2641)	(0.2646)	(0.2644)	(0.2678)	(0.2638)	(0.2656)	(0.2722)	(0.2670)	(0.2744)
Sale growth	1.1538***	1.0741***	1.0208***	1.0718***	1.0330***	1.0959***	1.1358***	0.7294***	0.9901***	0.6769**
	(0.2727)	(0.2687)	(0.2652)	(0.2690)	(0.2663)	(0.2698)	(0.2709)	(0.2665)	(0.2719)	(0.2697)
Debt Maturity	-0.5369	-0.4638	-0.5297	-0.2962	-0.7421	-0.4518	-0.3250	-1.2042*	-0.4430	-1.2033*
	(0.6155)	(0.6088)	(0.6076)	(0.6124)	(0.6127)	(0.6086)	(0.6089)	(0.6293)	(0.6170)	(0.6372)
firm age	-0.5044***	-0.5014***	-0.4522***	-0.4971***	-0.5904***	-0.5030***	-0.4877***	-0.5696***	-0.4829***	-0.5633***
	(0.0835)	(0.0842)	(0.0846)	(0.0838)	(0.0875)	(0.0842)	(0.0834)	(0.0909)	(0.0855)	(0.0918)
stock volatility	0.9426***	0.8077***	0.8303***	0.8126***	0.8487***	0.8436***	0.9105***	0.6164**	0.8337***	0.6700***
	(0.2393)	(0.2420)	(0.2423)	(0.2408)	(0.2410)	(0.2404)	(0.2392)	(0.2540)	(0.2399)	(0.2514)
Credit Spread	-2.4174***	-2.5240***	-2.4775***	-0.9767	-2.2314***	-2.4295***	-2.2252***	-3.9516***	-3.2788***	-4.5238***
	(0.5509)	(0.5467)	(0.5480)	(0.9271)	(0.5555)	(0.5463)	(0.5469)	(0.5894)	(0.5621)	(0.6019)
Term Spread	-2.9978***	-3.3317***	-3.2648***	-3.2125***	-3.1520***	-3.1274***	-3.0247***	-3.5813***	-3.5372***	-3.5713***
	(0.2446)	(0.2433)	(0.2506)	(0.3319)	(0.2532)	(0.2437)	(0.2433)	(0.3003)	(0.2351)	(0.2827)
Constant	-0.6579	-0.2234	-0.2483	2.7848*	0.0839	-0.3883	-0.2261	-2.7244***	-1.5350*	-4.0246***
	(0.8410)	(0.8345)	(0.8353)	(1.4424)	(0.8481)	(0.8336)	(0.8345)	(0.9050)	(0.8575)	(0.9269)
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

DV: Green Issuance (0/1)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Num.Obs.	13744	13744	13744	13744	13744	13744	13744	13744	13744	13744
AIC	2376.2	2394.0	2383.0	2389.9	2352.7	2394.1	2382.6	2216.8	2359.3	2191.3
McFadden R2	28.42%	27.86%	28.21%	27.99%	29.17%	27.85%	28.22%	33.47%	28.97%	34.35%

Table 6: The impact of entrenchment dimensions on green bond issuances

Table 6 explores the impact of managerial entrenchment on green bond initiatives. The dependent variable is the green bond issuance dummy variable. Panel A presents key entrenchment variables for the full bond sample, by conducting individual multinomial logit regressions for each entrenched variable, including CEO duality, CEO long service, New CEO, % CEO ownership, % Executive ownership as well as the same control variables as in Table 5. CEO duality is a dummy variable that takes the value 1 when the bond issuer's CEO is also the chairman of the board, and 0 otherwise. CEO long service is a dummy variable that takes the value 1 if the tenure of the issuer's CEO is above the median of all bond sample, and 0 otherwise. New CEO is a binary variable with the value of 1 if the bond is issued in the year of a CEO change, and 0 otherwise. % CEO ownership (% Executives ownership) is the percentage of shares that the CEO (Executives) hold in the fiscal-year end prior to bond issue. Panel B displays the six dimensions together with E-index (Bebchuk et al., 2009) for the US bond issues.

Panel A						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
CEO duality	-0.4556**					-0.5918***
	(0.1774)					(0.2257)
CEO long service		-0.5352***				-0.7200***
		(0.1318)				(0.1538)
New CEO			-0.1454			-1.4722***
			(0.2772)			(0.4967)
% CEO ownership				0.0260**		0.0295**
				(0.0109)		(0.0119)
% Executives ownership					0.0040	0.0022
					(0.0026)	(0.0029)
AT	0.1253**	0.1209**	0.1084**	0.1329**	0.1834***	0.2271***
	(0.0554)	(0.0551)	(0.0548)	(0.0613)	(0.0591)	(0.0657)
ROA	-4.0235***	-3.9451***	-4.0383***	-3.5913**	-2.8873*	-3.2431**

Panel A

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	(1.3645)	(1.3544)	(1.3664)	(1.5171)	(1.4737)	(1.5884)
TobinQ	-0.2764*	-0.2665*	-0.2867*	-0.2376	-0.2996*	-0.2140
	(0.1509)	(0.1492)	(0.1518)	(0.1521)	(0.1668)	(0.1618)
LEV	1.5178***	1.5231***	1.5666***	2.4339***	2.2341***	2.3145***
	(0.5311)	(0.5276)	(0.5278)	(0.6181)	(0.5789)	(0.6479)
Environment Score	0.0083***	0.0083***	0.0088***	0.0085***	0.0083***	0.0066**
	(0.0025)	(0.0025)	(0.0025)	(0.0029)	(0.0026)	(0.0030)
Tangibility	0.6023**	0.6191**	0.6018**	0.3224	0.5646**	0.3178
	(0.2646)	(0.2646)	(0.2633)	(0.2924)	(0.2799)	(0.3089)
Sale growth	1.1077***	1.0113***	1.0874***	0.9344***	1.0069***	0.8821***
	(0.2691)	(0.2654)	(0.2698)	(0.2942)	(0.2830)	(0.3043)
Debt Maturity	-0.4333	-0.5649	-0.4348	-1.5184**	-1.0064	-1.5947**
	(0.6104)	(0.6064)	(0.6078)	(0.6500)	(0.6362)	(0.6704)
firm age	-0.4866***	-0.4609***	-0.5050***	-0.5527***	-0.5055***	-0.4776***
	(0.0848)	(0.0845)	(0.0850)	(0.0975)	(0.0951)	(0.1056)
stock volatility	0.8107***	0.8576***	0.8315***	0.9260***	0.8526***	1.0135***
	(0.2402)	(0.2435)	(0.2402)	(0.2670)	(0.2645)	(0.2876)
Credit Spread	-2.4907***	-2.4429***	-2.4833***	9.2215***	-1.5070***	4.1588***
	(0.5474)	(0.5488)	(0.5472)	(0.4246)	(0.5512)	(0.4327)
Term Spread	-3.1053***	-3.1110***	-3.2696***	-2.1800***	-3.2809***	0.3213*
	(0.2377)	(0.2574)	(0.2461)	(0.1696)	(0.1961)	(0.1717)
Constant	-0.5214	-0.4400	-0.2545	11.5851***	-2.4933***	6.1609***
	(0.8352)	(0.8365)	(0.8349)	(0.6366)	(0.8379)	(0.6450)
Country	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Num.Obs.	13744	13744	13744	9339	11165	8441

Panel A

Variables	(1)	(2)	(3)	(4)	(5)	(6)
AIC	2387.8	2377.8	2394.4	1823.4	2146.7	1727.6
McFadden R2	28.06%	28.08%	27.84%	35.48%	26.27%	35.61%

Panel B

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bylaw amendment limits	-0.7046***						
	(0.0000)						
Charter amendments limits		-0.7304***					
		(0.0000)					
Supermajority			-7.9291***				
			(0.0000)				
Golden parachutes				-0.5760***			
				(0.0000)			
Poison pills					-0.0262***		
					(0.0000)		
Staggered boards						-0.1384***	
						(0.0000)	
E-index							-2.5754***
							(0.0000)
Constant	-0.7464***	-0.7464***	-0.1493***	-0.7464***	-0.7464***	-0.7464***	-0.7464***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B							
Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Num.Obs.	4693	4693	4693	4693	4693	4693	4693
AIC	5209.8	5209.8	5209.8	5209.8	5209.8	5209.8	5209.8

Table 7: The impact of ownership breakdown on green bond issuance

The table presents the multinominal logit model with the dependent variable equal to one if the bond is labelled as 'green' on Bloomberg. The total institutional ownership (io) is the total institutional ownership ratio in percentage of market capitalization. ibh_5pct represents the ownership by institutional blockholders (>=5%) in percentage of market capitalization. Column 3 to Column 10 examine the effect of ownership categories on issuers' bond choices, including activist investors (%), family offices (%), insurance companies (%), traditional investment managers (%), hedge fund (%), venture capital/ private equity (%), pension fund (%) and state ownership (%). Activist investors are defined by Capital I&Q as those who apply defined tactics to deal with target firms to affect firms' strategies (Bredwood, 2021). Family offices are organizations that manage the wealth of business families by taking actions (i.e., investments) to sustain and grow their wealth (Block et al., 2019). Standard errors are clustered by firm and year, and p-values are reported in parentheses with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% level, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
io	-1.9907***									
	(0.5795)									
ibh_5pct		-3.0476**								
		(1.4729)								
% Activist Investors			-0.4676**							
			(0.2079)							
% Family Offices/Trusts				-1.8594***						
				(0.4993)						
% Insurance companies					0.6651***					
					(0.1723)					
% Traditional Investment Managers						-0.0372***				
						(0.0048)				
% Hedge Fund							-0.1993***			
							(0.0360)			
% VC/PE								-0.0196		
								(0.0173)		
% Pension Fund									0.1231***	
									(0.0257)	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
% State										0.0611***
										(0.0129)
AT	0.1095**	0.0801	-0.3030***	-0.1909*	-0.3510***	0.0216	0.0462	0.0788**	0.0297	0.0151
	(0.0544)	(0.0561)	(0.1052)	(0.0993)	(0.1068)	(0.0355)	(0.0353)	(0.0361)	(0.0370)	(0.1446)
ROA	-3.0563**	-4.2333***	-0.3777	-1.1689	0.1918	-3.0023*	-5.4659***	-4.5844***	-4.5185***	-20.1977***
	(1.3911)	(1.3749)	(3.7701)	(3.5324)	(3.7122)	(1.5975)	(1.7100)	(1.6173)	(1.5983)	(3.3863)
TobinQ	-0.2922*	-0.2939*	-0.7251**	-0.2510	-0.6749**	-0.3765***	-0.4796***	-0.6270***	-0.6149***	0.4834***
	(0.1498)	(0.1520)	(0.3121)	(0.2759)	(0.3064)	(0.1438)	(0.1540)	(0.1573)	(0.1568)	(0.1640)
LEV	1.5856***	1.5897***	1.0133	0.2300	1.3154	-0.3039	-0.2664	-0.4636	-0.1924	1.5962
	(0.5277)	(0.5276)	(1.5616)	(1.4667)	(1.3479)	(0.6476)	(0.6588)	(0.6401)	(0.6480)	(1.4142)
Environment Score	0.0093***	0.0086***	0.0143**	0.0130**	0.0170***	0.0154***	0.0105***	0.0146***	0.0152***	0.0100
	(0.0025)	(0.0025)	(0.0065)	(0.0065)	(0.0065)	(0.0029)	(0.0029)	(0.0029)	(0.0029)	(0.0073)
Tangibility	0.4733*	0.6015**	0.5548	0.4267	0.6632	-0.0151	0.2112	0.1591	0.0456	-0.3935
	(0.2676)	(0.2636)	(0.6240)	(0.6199)	(0.6211)	(0.3017)	(0.3064)	(0.2957)	(0.2925)	(0.6574)
Sale growth	1.1507***	1.1139***	0.2922	0.1217	0.3078	0.6659**	0.7703***	0.8025***	0.7945***	0.0425
	(0.2727)	(0.2702)	(0.6100)	(0.5901)	(0.6178)	(0.2914)	(0.2961)	(0.2866)	(0.2930)	(0.8935)
Debt Maturity	-0.2948	-0.3764	-2.8836*	-1.7804	-3.8268***	1.2475*	0.6717	0.1262	0.0196	-3.4651**
	(0.6077)	(0.6086)	(1.7229)	(1.6052)	(1.4722)	(0.6923)	(0.6964)	(0.6776)	(0.6858)	(1.5765)
firm age	-0.4781***	-0.4964***	-0.2382	-0.0975	-0.4250*	-0.4151***	-0.5929***	-0.5470***	-0.4711***	-0.7064***
	(0.0839)	(0.0835)	(0.2387)	(0.2378)	(0.2362)	(0.0981)	(0.0936)	(0.0918)	(0.0950)	(0.1918)
stock volatility	0.8773***	0.8839***	2.5764***	2.0107***	2.2206***	0.8340***	1.0512***	0.8878***	0.8726***	-4.9977***
	(0.2393)	(0.2394)	(0.5312)	(0.5290)	(0.5417)	(0.2871)	(0.2751)	(0.2861)	(0.2817)	(1.5953)
Credit Spread	-2.4580***	-2.3139***	-3.9547***	-4.4162***	-5.0699***	6.0861***	4.5383***	3.1713***	10.0261***	-6.3939***
	(0.5450)	(0.5462)	(0.6689)	(0.6739)	(0.6861)	(0.2677)	(0.2662)	(0.2726)	(0.2688)	(0.6678)
Term Spread	-3.1768***	-2.9997***	-0.3704	-0.7094	-0.1047	-3.2264***	-2.5239***	-3.8876***	-3.8817***	-0.8137***
	(0.2444)	(0.2418)	(0.5796)	(0.5881)	(0.5826)	(0.1458)	(0.1452)	(0.1434)	(0.1434)	(0.2957)
Constant	-0.4283	-0.4120	2.2710***	1.1853	3.6261***	17.2964***	12.9303***	12.4071***	26.6097***	-13.1781***
	(0.8314)	(0.8330)	(0.8327)	(0.8498)	(0.8562)	(0.3504)	(0.3493)	(0.3589)	(0.3538)	(0.9603)
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Num.Obs.	13744	13744	3586	3586	3586	10342	10342	10342	10342	6094
AIC	2383.0	2390.2	522.6	514.7	521.5	1666.3	1679.2	1727.5	1708.6	446.8
McFadden R2	28.21%	27.99%	30.49%	29.67%	26.17%	20.33%	22.87%	26.43%	18.42%	19.09%

Table 8: CAR comparisons by bond type using CAPM market-adjusted model with MSCI index

This table presents the coefficients and standard errors of the regressions on the impact of corporate governance on announcement returns of 257 green issues and 10495 conventional issues. The dependent variable is stock cumulative abnormal returns (CARs) estimated by the CAPM market-adjusted model with the market indexes as MSCI world and Emerging indexes, proxying for respective developed and developing markets, over three types of estimation windows [0,0], [-3,+3] and [-5,+5]. P(Student test) and P(Wilcoxon rank-sum) are p-values for Student and Wilcoxon rank-sum tests for the difference of CARs by issue type with the null hypothesis of equal CARs across green and conventional bonds, in parentheses with ***, **, and * indicating statistical significance at the 1%, 5%, and 10% level, respectively. For the Kruskal-Wallis test, the null hypothesis is that green and conventional bond announcement samples come from identical populations.

Event window	Bond type	All Sample					Matched Sample				
		CAR (%)	P(Signed-rank)	P(Student test)	P(Wilcoxon rank-sum)	P(Kruskal-Wallis)	CAR (%)	P(Signed rank)	P(Student test)	P(Wilcoxon rank-sum)	P(Kruskal-Wallis)
[0,0]	Green	-0.26	0.60	0.5	0.1	0.1	-1.19	0.5	0.5	0.3	0.3
	Conventional	-0.52	0.00***				-0.04	0.5			
[-3, +3]	Green	-1.6	0.3	0.23	0.78	0.78	-1.2	0.5	0.5	0.3	0.5
	Conventional	-0.78	0.009***				-0.4	0.5			
[-5,5]	Green	3.19*	0.00***	0.74	0.80	0.80	4.47**	0.00***	0.48	0.38	0.38
	Conventional	3.38	0.00***				3.34	0.00***			

Table 9: Regression coefficients for all estimated market models over [0,0]

This table examines the impact of the different governance mechanisms on CARs using OLS regressions. For both all sample and matched sample, regression coefficients for six types of market models are summarized. Market model and CAPM market-adjusted model are estimated using two market indexes: 1) MSCI world index and MSCI Emerging Market Index to represent developed and developing markets, respectively (Market-MSCI and CAPM-MSCI); 2) market indexes on which the firm's stock is listed (Market-Multi and CAPM-Multi). Market return data and 10-year Treasury yield as the risk-free rate are collected from Datastream. Fama3 and Fama5 denote Fama-French-3-factor and 5-factor models, respectively. Under each model, regression coefficients for main variables are reported, together with the number of observations and adjusted R-squared in Column 8 and 9. *, ** and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

Event window [0,0]	Green indicator	Internal Governance Index (Qut1)	External Governance Index (WGI)	Internal Governance Index (Qut1) × Environment Score	Environment Score × Green Indicator	Internal Governance Index (Qut1) × Green Indicator	Observations	Adjusted R-squared
				All sample				

							N	R²
CAPM-MSCI	-0.0006	-0.0001	0.0007	0.0000**	0.0001	-0.0028	11462	1.5%
	(0.0022)	(0.0005)	(0.0007)	(0.0000)	(0.0001)	(0.0031)		
CAPM-Multi	0.002	-0.0012**	0.0019**	0.0000**	0.0002*	-0.0037	11462	1.4%
	(0.0027)	(0.0006)	(0.0009)	(0.0000)	(0.0002)	(0.0036)		
Market-MSCI	-0.0004	-0.0003	0.0016**	0.0000**	0.0001**	-0.002	11462	2.9%
	(0.002)	(0.0004)	(0.0004)	(0.0000)	(0.0000)	(0.0028)		
Market-Multi	0.0004	-0.0008**	0.0019**	0.0000	0.0000	0.0038**	11462	0.8%
	(0.0014)	(0.0003)	(0.0006)	(0.0000)	(0.0001)	(0.0018)		
Fama3	-0.0012	-0.0015**	0.0024***	0.0000	0.0001***	-0.0024	12739	1.4%
	(0.0027)	(0.0006)	(0.0009)	(0.0000)	(0.0001)	(0.0033)		
Fama5	-0.0011	-0.0015**	0.0024***	0.0000	0.0001***	-0.0027	12739	1.4%
	(0.0027)	(0.0006)	(0.0009)	(0.0000)	(0.0001)	(0.0033)		
Matched sample								
CAPM-MSCI	-0.0025	-0.0001	-0.0151**	0.0002**	0.0001*	-0.0094	224	4.4%
	(0.0065)	(0.0048)	(0.0074)	(0.0001)	(0.0002)	(0.0073)		
CAPM-Multi	-0.0022	0.0011	-0.0139**	0.0002*	0.0000	-0.0045	207	10.1%
	(0.0058)	(0.0047)	(0.0058)	(0.0001)	(0.0001)	(0.0074)		
Market-MSCI	-0.0082*	0.001	-0.0077	0.0000	0.0000	-0.0132***	217	15.5%
	(0.0049)	(0.0031)	(0.0048)	(0.0001)	(0.0001)	(0.004)		
Market-Multi	-0.0015	-0.0015*	0.0018	0.0000	0.0002**	0.0016	229	6.6%
	(0.0028)	(0.0021)	(0.0035)	(0.0001)	(0.0001)	(0.003)		
Fama3	0.0037	-0.0022	-0.0055	0.0002	0.0002***	-0.0103	229	8.9%
	(0.0083)	(0.0057)	(0.009)	(0.0001)	(0.0002)	(0.0085)		
Fama5	0.0035	-0.0025	-0.0059	0.0002	0.0002***	-0.0108	229	10.4%
	(0.0083)	(0.0056)	(0.009)	(0.0001)	(0.0002)	(0.0085)		

Appendix

Table A1[5]: Summary statistics of all green bonds

Table A1 compares the basic bond information for the whole bond sample (corporate and non-corporate), private, and public and public non-financial corporate samples. *# Green bonds* indicates the number of all green bonds; *# Green bond issuer-dates* indicates the sum of unique green bond issues on unique date for each issuer. *# Green bond issuer-years* indicates the sum of unique green bond issues on unique year for each issuer. *# Green bond issuers* indicates the number of unique green bond issuers. *Amount (in $M)* is the total bond amount issued (in $M). *Maturity* is the bond maturity in years by subtracting the bond issue date from the maturity date. *Fixed-rate bond (1/0)* is a dummy indicator measuring whether the coupons of green bonds are fixed-rate or non-fixed-rate, and *Coupon* is the average coupons for fixed-rate green bonds. Regarding the *Credit Rating*, Table 2 provides medians for three types of ratings: S&P rating, Moody's rating, and Bloomberg Composite Rating.

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[5] We refer to Flammer (2021) for the format of the Table A1.

	All	Private	Public	Public Non-financial Corporate
# Green bonds	3484	2422	1062	457
# Green bond issuer-dates	2524	1648	876	343
# Green bond issuer-years	1746	1061	685	290
# Green bond issuers	1171	711	460	219
Amount (in $M)	244.27	202.67	343.76	323.31
	(350.29)	(272.07)	(474.94)	(356.18)
Maturity (years)	9.05	8.12	10.62	10.83
	(40.85)	(22.36)	(61.85)	(74.33)
Fixed-rate bond (1/0)	0.74	0.75	0.71	0.75
	(0.44)	(0.43)	(0.45)	(0.43)
Coupon (for fixed-rate bonds)	2.00	1.85	2.3	2.05
	(2.22)	(2.1)	(2.45)	(1.71)
Credit Rating				
S&P rating (Median)	A-	A-	BBB	BBB-
Moody's rating (Median)	A3	A3	A2	A2
Bloomberg's composite rating (median)	BBB	BBB	BBB+	BBB

Table A2: The impact of governance characteristics on green bond issuances for the matched sample

Table A2 replicates the Table 5 for the 132 matched green-conventional pairs, constructed via the Propensity Score Matching (PSM) with the control for both bond types exactly in the same SIC-1-digit industry, issue year, country, coupon type and market type, and "Nearest Neighbor Matching" on bond issue price, issue size, years to maturity, coupon, and S&P investment-grade rating (0/1) with the caliper of 0.2, to verify the effect of internal and external governance on the corporate likelihood of green bond issuances.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Internal Governance Index (Qut1)				2.2169***		2.0650***
				(0.3299)		(0.3475)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
External Governance Index (WGI)					3.6261***	2.3278***
					(0.7261)	(0.7230)
Board Size		0.1782**	0.1982***			
		(0.0726)	(0.0759)			
% Indep		8.3824***	8.3216***			
		(2.1551)	(2.1468)			
CEO tenure		-0.2691	-0.2186			
		(0.2543)	(0.2610)			
CEO age		-0.4174	-0.0630			
		(1.8862)	(1.9717)			
Outside CEO		-2.0059***	-2.1159***			
		(0.4283)	(0.4413)			
Founder CEO		1.2342	1.3697			
		(1.0662)	(1.0913)			
top5		-6.2950	-8.6405*			
		(4.5186)	(5.0889)			
Control of Corruption			-2.5874			
			(3.6419)			
Governance Effectiveness			3.1185			
			(4.3896)			
Political stability			-1.2649			
			(4.0502)			
Regulatory Quality			1.5335			
			(3.6674)			
Rule of Law			-5.6856			

Variables	(1)	(2)	(3)	(4)	(5)	(6)
			(5.9524)			
Voice of Accountability			1.1575			
			(5.6228)			
AT	0.0024	0.4885**	0.5079**	0.7209***	0.3251*	0.5576***
	(0.0678)	(0.2021)	(0.2085)	(0.1876)	(0.1849)	(0.2045)
ROA	-6.4671**	-13.2369***	-12.8670***	-14.4969***	-15.9107***	-15.9013***
	(2.8276)	(4.5870)	(4.8174)	(4.6853)	(4.6438)	(5.1625)
TobinQ	-0.4989*	-1.3214***	-1.5001***	-1.4386***	-0.9113*	-1.0677**
	(0.3028)	(0.4668)	(0.5029)	(0.4538)	(0.4655)	(0.4636)
LEV	0.1668	1.4920	1.6300	0.5584	-1.0833	0.2089
	(1.2379)	(1.6832)	(1.7677)	(1.5903)	(1.5777)	(1.6790)
Environment Score	0.0107**	-0.0036	-0.0044	-0.0045	0.0049	-0.0040
	(0.0048)	(0.0076)	(0.0080)	(0.0081)	(0.0073)	(0.0089)
Tangibility	0.7662	2.7011***	2.6004***	3.1814***	2.5945***	2.8733***
	(0.5263)	(0.9071)	(0.9530)	(0.9110)	(0.8813)	(0.9390)
Sale growth	0.9397	1.4761*	1.8465*	0.8686	1.3878*	0.4272
	(0.6405)	(0.8690)	(0.9656)	(0.9304)	(0.7924)	(0.9527)
Debt Maturity	-0.0567	-4.2872**	-4.3927**	-1.0756	-1.1497	-0.2616
	(1.4073)	(2.0627)	(2.0909)	(1.8756)	(1.8050)	(2.0301)
firm age	-0.4007**	-1.5064***	-1.5398***	-1.0830***	-1.0915***	-1.1448***
	(0.1782)	(0.3090)	(0.3125)	(0.2913)	(0.2873)	(0.3146)
stock volatility	1.8971***	3.4695***	3.2665***	2.6913***	2.7610**	2.6227***
	(0.6900)	(1.1794)	(1.1695)	(0.9263)	(1.2172)	(0.9513)
Credit Spread	0.3912	1.2119	-0.1941	-2.3517*	-0.1011	-2.2957
	(1.1379)	(2.9344)	(3.5543)	(1.2674)	(1.1175)	(1.4169)
Term Spread	-0.1038	0.6401	0.7821	-0.2658	1.2365*	-0.2039

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	(0.2614)	(0.9958)	(1.0757)	(0.7495)	(0.6769)	(0.7796)
Constant	0.2473	2.2896	0.6975	-3.0094**	0.3081	-3.2411**
	(1.6717)	(4.0915)	(4.8775)	(1.5057)	(1.3740)	(1.5777)
Num.Obs.	264	264	264	264	264	264
McFadden R2	9.33%	32.15%	33.32%	37.39%	27.99%	41.62%
AIC	357.8	334.3	342.0	303.2	337.6	289.7