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The Impact of Green Bonds on Firm Value and the Role of ESG: Revisiting the Stakeholder Value Maximization Theory

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Abstract: This study evaluates managers' motivations in decision-making and whether they aim to maximize value or meet environmental and social pressures at the expense of value. The authors utilize green bonds as a treatment and measure changes in firm value data using Tobin's Q, controlling for times and individual fixed effects and several company characteristics. This research documents the positive impact of issuing green bonds on a firm's value using the difference-in-differences (DD) method. Our findings are confirmed over the aggregate sample and most of the industry subsample, whereas we observed negative associations between green bonds and firm value only in the industrial subsample (comprising industrial and commercial services, industrial goods, and transportation). These findings align with the hypothesis of the stakeholder value maximizing theory. So, we suggest that, based on the data we analyzed about green bond issuances, companies choose to issue green bonds to increase their overall value.

Keywords: green bonds, corporate finance, firm value, stakeholder value maximization
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Introduction

The conventional discussion in the financial field concerns whether a corporation is obligated only to maximize its shareholder value. The shareholder theory has been widely referenced since Nobel Prize winner Milton Friedman (1970) proposed it in an article entitled "The social responsibility of business is to increase its profit." Corporate managers, acting as agents, are only responsible to a company's owners or its shareholders, who are considered the principals. In the early 2000s, Jensen (2010) introduced the stakeholder theory, which he referred to as "enlightened value maximization," thereby contributing to the ongoing discussion. This theory states that, while environmental, social, and governance (ESG) factors are important, they can undermine value by obscuring the strategic corporate goal; however, they still have legitimate uses within a corporation.

Thus, investors and the government are increasingly demanding that firms engage in ESG-related activities. In recent years, the climate change problem has become increasingly prominent, making environmental issues one of the most pressing challenges in human history. There have been many attempts by researchers, practitioners, and regulators to address the issues, resulting in relevant guidance, ratings, and regulations. In recent years more than ever, there has been significant pressure on the firms to incorporate environmental policies in their long-term strategies to increase firm value; that is to say, paying attention to stakeholder concerns is necessary if the company does not want to harm its value.

A green bond is one of the green finance instruments designed to address environmental, social, and climate conservation issues. The business world has established numerous ideas to promote the cultivation of environmental and social concerns. The evidence regarding the impact of green bonds—as a sustainable finance instrument—on firm value remains mixed (Flammer, 2021; Khurram et al., 2023; Larcker & Watts, 2020; Wang et al., 2020; R. Zhang et al., 2021; Zheng et al., 2023). There is still limited literature that mainly focuses on the empirical study of green bonds and their relation to the intrinsic value of the firm. This study tests the impact of green bonds on the firm value. Surprisingly, to the best of the authors' knowledge, the association between green bonds and firm value using Tobin's Q measure has only been examined by Khurram et al. (2023) and Jiang et al. (2022), and both use data for China. Our study thus expands the dataset to regions and industries all over the world and, following Deng et al. (2013), examines the relationship from the perspective of the stakeholder theory.

From the standpoint of firm value maximization, the questions this research poses are as follows: Do green bonds affect firm value, and if so, how does that change over time? Do green bonds have an impact on the environmental, social, and governance performance of a firm?

This study employs a difference-in-differences (DD) method to assess the impact of green bond issuance on firm value, measured using Tobin's Q. The dataset consists of 99 green bond issuers and 524 non-issuers across six industries from 2013 to 2023, sourced from Refinitiv's Green Bond Guide. Control variables include ROA, ROE, firm size, leverage, long-term debt, and ESG scores to account for firm characteristics. The model incorporates firm and time fixed effects to mitigate selection bias and isolate the causal relationship between green bond issuance and firm value. Two robustness tests are conducted with (1) separating the sample into high- and low-ESG-combined-score firms and (2) testing the industry subsample.

The results reveal that green bond issuance increases firm value by 0.07 (7%) in Tobin's Q, supporting the stakeholder value maximization theory. The effect is more pronounced in high-ESG firms and sectors like technology (0.242) and energy (0.214), while the industrial sector shows a slight decline (-0.066). A dynamic analysis indicates that the positive effect emerges immediately after issuance but fluctuates over time. These results highlight the financial and strategic advantages of green bonds in aligning corporate value creation with sustainability goals.

The findings and discussion of this study contribute to at least two research streams. The first contribution is to the literature on corporate finance, where the value maximization theory is applied to the decision-making process of financial managers (Deng et al., 2013; Humphrey et al., 2012; Zerbib, 2019). The second contribution is to the literature on the association between green bond issuance and firm value (Flammer, 2021; Jiang et al., 2022; Khurram et al., 2023; Tang & Zhang, 2020; Wang et al., 2020; Yeow & Ng, 2021; R. Zhang et al., 2021). This study tests the relationship between the issuance of green bonds as a decision regarding firm financing and the value of the firm, from the perspective of maximizing stakeholder value. The question arises as to whether firms prioritize the interests of their shareholders by maximizing value or the interests of their stakeholders by improving the firm's ESG scores at the expense of value. This research also explores results regarding the association between green bond issuance and firm value in different industries.

The remainder of this study is structured into four sections. Section 2 discusses the theories and previous research concerning green bonds, firm value, and stakeholder value maximization. Section 3 introduces the data and variables used in the study and identifies the model and method of empirical strategy in evaluating the impact of green bond issuance on the firm's value and ESG scores. Section 4 presents the results and discusses their implications. Section 5 summarizes the discussion.

Literature Review

Corporate Green Bonds and Firm Value

Prior research concerning green bonds seems to agree that they can be defined as a debt instrument that is used to finance environmentally friendly and climate change-related activities (Flammer, 2021; Horsch & Richter, 2017; Khurram et al., 2023; Larcker & Watts, 2020; R. Zhang et al., 2021; Zheng et al., 2023). In a more practical way, Tang and Zhang (2020) explain that a green bond is a fixed-income security issued by capital-raising entities (corporations, financial institutions, government agencies, municipal, national, or international organizations, or other entities) to fund their environmentally friendly projects such as renewable energy, sustainable water management, pollution prevention, climate change adaptation, and CO2 emission reduction.

The interesting puzzle surrounding green bonds is the question of what might drive the company to issue them. Compared to the conventional bond, a green bond has more constraints related to the use of the proceeds of these funds, which restrict companies' investment policies. Although it is voluntary, for an instrument to qualify as a green bond (such as being included as a CBI or Climate Bond Initiative-aligned bond), companies have to go through third-party verification, which incurs more administrative and compliance costs. The disclosure requirements for green bonds are more complicated

than for conventional ones. Additionally, if the company fails to fulfill the requirements, it can be exposed to greenwashing and reputational issues. The more reasonable strategy for firms is to just issue conventional bonds and invest the proceeds into green projects if it is evident that they are more financially viable than other projects (Flammer, 2021).

The question being asked in this research to address the puzzle is whether the firms issue green bonds to increase the value or only to improve their reputation by increasing their ESG scores by showing commitment to the issue without increasing the value. According to previous research, there are different angles to assess as to whether green bonds affect firm value, namely in terms of (1) the cost efficiency of its operating process, (2) the market reaction to green bond issuance, and (3) the pricing premium of green bonds. First, green bonds can be issued for energy management projects that are directed toward energy efficiency. Energy management projects can reduce operational costs, have a low-risk ratio, and improve productivity. A green bond is one kind of debt financing available to firms; for instance, in the energy sector, this type of financial arrangement mitigates the constraints on a facility's funding, allowing it to reap the benefits from energy savings (Woodroof, 2009).

Second, green bonds can influence firm value through market reaction from the issuer's signal of environmental and social commitment to the investor. In this stream, Flammer (2021) has documented a positive cumulative abnormal return (CAR) from stocks between the 5-10 event window of green bond issuance. He finds a positive investor reaction of 0.49% to the event, and he states that, consistent with the pecking order theory, the stock market generally shows no significant reaction to bond issues. Instead, the reaction is likely explained by the signaling theory. This indicates that investors appreciate green bonds as a means to increase shareholder value (Baulkaran, 2019; Ekawati, 2025; Tang & Zhang, 2020). From an issuer perspective, a recently published article examines the green bond issuance on corporate value using the Tobin's Q and finds that a company issuing green bonds has a Tobin's Q ratio that is 0.215 higher than a company that does not issue green bonds, considering firms characteristics, control variables of ROA, net asset per share growth rate, and leverage (Khurram et al., 2023). Sustainable financing assists in enhancing long-term firm value (Wang et al., 2020).

Third, from an investor perspective, Larcker and Watts (2020) examine whether firms are willing to trade off wealth for societal benefit from the yield difference between green bonds and comparable conventional bonds. If the yield difference exists, then there is a premium (also called greenium) for green bonds, which means investors are willing to trade off wealth for societal benefit, and the opposite applies if there is no difference. By exploiting municipal green bonds and comparable conventional bond databases in the US, they find that the greenium is essentially zero. In his study, Zerbib (2019), on the other hand, concludes that the greenium exists in the low difference of yield spread between the green and conventional bond, and this low rate of greenium does not have substantial influence on firm value.

Overall, according to previous studies of green bonds at the instrument level (investor perspective) in the US, it seems they have no substantial greenium in the market (Flammer, 2021; Larcker & Watts, 2020; Zerbib, 2019). At the issuer level (firm perspective), Flamer, who also uses US data, suggests that the material effect of green bonds is explained through signaling theory, which applies in the market and is observed from the positive cumulative return of the green bond issuer stock price.

However, in China, both at the issuer and instrument levels, studies on green

bonds suggest that they have a significant economic impact, both in terms of the greenium and firm value. This effect might be partly explained by regulations, policy incentives, and even tax benefits implemented to promote sustainable finance, including green bonds. As the world's leading greenhouse gas emitter, China faces pressure and has committed to reducing its carbon footprint with a net-zero target. Therefore, the evidence of whether green bonds affect firm value at the issuer level remains puzzling.

Stakeholder Value Maximization: The Case of Green Bond

There are at least two general reasons for adopting green bond issuance events to study the stakeholder value maximization theory in this research. First, issuing green bonds is a critical financing decision for managers. Like conventional bonds, this instrument will directly affect the firm's financial structure, especially for a firm that operates with high leverage (Modigliani & Miller, 1958). In this regard, the financing cost and its risks must be measured precisely to provide a promising positive net present value and increase firm value. Wang et al. (2020) have documented a lower yield of 34 basis points for green bonds in China, denoting lower financing costs for the issuer of green bonds compared to when they issue conventional bonds. Hence, the decision to issue green bonds is not a trivial one for finance managers.

Second, the issuance of green bonds requires several stakeholders to acknowledge some technical knowledge of energy efficiency financing (Woodroof, 2009). Unlike conventional bonds, which usually primarily involve only bondholders, green bonds often involve more diverse stakeholders, for instance, environmentally friendly investors and third-party certifiers, including firms' employees and suppliers; furthermore, for reasons of compliance, they involve government and regulations. For example, compliance and internal control for green bonds are costly from the issuer's perspective. Although the process is voluntary, bonds must be included in the Climate Bond Initiative (CBI) green bond database and labeled "CBI-aligned" to enhance investor confidence. The EU green bond standards also require independent third-party reviews, making stakeholder approvals essential for the finance manager to issue green bonds.

Regarding those reasons for compliance, according to previous research (Deng et al., 2013; Wang et al., 2020), there are two opposing perspectives regarding the rationale of green bond issuance by firms: stakeholder value maximization versus stakeholder interest at the expense of the shareholders (depicted in the conceptual framework diagram below). The stakeholder value maximization perspective delineates that maximizing the value for shareholders is congruent with the goals of another stakeholder. Serving broad parties that are related to and affected by the firms is beneficial for the firm's long-term sustainability. Therefore, it will likely preserve the firm's operations and protect its reputation, thus positively affecting shareholders' wealth (Jensen, 2010). This perspective is supported by empirical evidence supporting the signaling theory gathered by Flammer (2021). Employing an event study method, Flammer documents that investors react positively to the issuance of green bonds. He finds a positive cumulative abnormal stock return of 0.49% in between 5-10 event windows of green bond issuance. He further explains that this positive reaction is likely not attributed to the bond issuance itself but rather to the signals of the firm's commitment to the environment (Flammer, 2021).

In contrast, the stakeholder interest at the expense of the shareholders perspective argues that stakeholders such as managers could pursue their interests at the expense of

the shareholders. Managers might do this for several reasons, such as securing a position or exercising short-term gain. This perspective implies that managers have environmental or social responsibility when spending shareholders' money. In line with the shareholder theory, as argued by Friedman (1970), "the social responsibility of business is to increase its profits." Firms are only obligated to use their resources for profit maximization and act as agents responsible only to their shareholders as long as they do not commit fraud. This notion raises an empirical question: Are environmental and social responsibility doing harm or good to the firm? Although the measure of good can be debatable, we measure it in this study by the firm's value. Additionally, if environmental and social responsibility do harm to the firm value, an alternative view to the stakeholder interest at the expense of the shareholders perspective is that these shareholders are willing to accept lower profit to incentivize their values, such as commitment to the environmental and social issues (Starks, 2023).

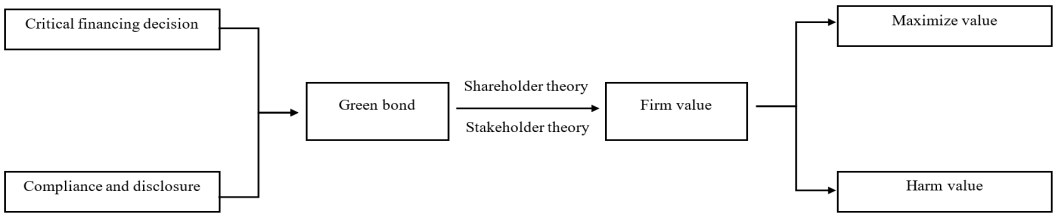

Diagram 1. Conceptual framework of Green bond on Firm value relationship diagram

The main discourse between the stakeholder theory and the shareholder theory in terms of value maximization centers on the fundamental purpose of the corporation. As explained above, shareholder theory suggests that corporations only serve their principals, that is to say, their shareholders; therefore, by maximizing shareholder value, they have fulfilled their social responsibility. The shareholder theory argues that, as businesses, firms should only be concerned with profitability as a measure of value. Environmental and social responsibilities such as eliminating poverty or reducing pollution harm the business and are the responsibility of individuals or the government, not of businesses. This theory can provide a precise measure of performance that is comparable between companies and distinguishes between good and bad companies (Jensen, 2010). This theory also assigns clear roles to corporations, individuals, and the government in a free society.

However, the shareholder theory perspective in maximizing value may only be complete by considering another stakeholder. Considering environmental and social responsibility as part of the stakeholder may not maximize value, yet it is not possible to maximize value when stakeholders are ignored. As a means to maximize value, finance managers should satisfy and obtain support from all corporate stakeholders, customers, employees, managers, suppliers, local communities, and government. That said, businesses cannot be accountable to all stakeholders simultaneously because it would mean that they are accountable to none of them. Jensen (2010) argues that maximizing shareholder value should still be an anchor while the business is responsible to stakeholders. This value acts as a comparable measure to separate between the better and the worse.

A recent article analyzes the effect of green bond issuance on corporate value using Tobin's Q and finds that companies issuing green bonds have a Tobin's Q ratio that is 0.215 higher than those that do not. This comparison considers control variables such as return on assets (ROA), net asset per share growth rate, and leverage (Khurram et al.,

2023), which may cause Tobins's Q values to vary across firms. Flammer (2021) uses an event study methodology that tests the fluctuating and short-term stock price of a firm in a specific event window. Therefore, by expanding the data using universe of green bond issuance, we aim to provide a more comprehensive understanding of the association between green bonds and the value of the firm, as measured by Tobin's Q, which also reflects the growth and long-term expectations in terms of firm value.

From a risk-related perspective, Zhang et al. (2021) explore green bond issuance in the Chinese bond market to understand its influence on the cost of capital in terms of yield spread. They describe three ways in which firms can minimize the cost of capital by issuing green bonds: (1) it reduces information asymmetry, (2) it improves the liquidity of their security, and (3) it lowers perceived risk. Using the difference-in-differences (DD) method, Zhang et al. (2021) can calculate that the corresponding 24.9 basis points of yield for firms issuing green bonds is lower than the control firms that do not issue green bonds, suggesting evidence of the green premium of the green bonds.

Focusing on the same market, J. Wang et al. (2020) have found that the yield spread of Chinese firms that issue green bonds is considerably lower than companies that do not issue green bonds of 34 bps (basis points). This 34 bps is not trivial since considering their yield spread means a dataset that is 213 (15.3% of the average) and a total face value of the bonds of USD 29.6 (USD 100.6 million savings per year) of the company with green debt. The yield spread difference confirms a green bond premium, meaning investors are willing to trade higher prices for environmentally friendly projects.

From the stakeholder theory point of view, shareholders are the leftover residual owners of the firm's assets. They come after employees, suppliers, creditors, and the government (Jensen, 2010; Ross et al., 2019). The goal of financial managers is to maximize the current value per share only and this means that shareholders will gain more if everyone else is also gaining (Ross et al., 2019).

Based on the confounding result of return and the risk-related effect of green bond issuance on the firm value, this study aims to draw a causal relationship between green bond issuance and a firm's value measured by Tobin's Q. We take this measure as it reflects growth value of the firm and is the most widely used proxy for establishing a firm's value. Previous research rigorous methodology motivates this research to use the difference-in-differences (DD) method in estimating the best-educated guess about the true cause of the impact of green bond issuance on the firm value (Flammer, 2021; Khurram et al., 2023; Tang & Zhang, 2020; Wang et al., 2020; R. Zhang et al., 2021; Zheng et al., 2023). If the result is positive, it will reveal that signals perceived by investors are not only that the firm commits to the environment, but also that both investor and issuer being perceived as having a commitment to green practices can actually increase the value of the firm. If the result is negative, then a green bond might reasonably decrease firm value. However, if the result is not significantly different from zero, then green bonds do not really have a material impact on firm value. Therefore, this test might complete the signaling theory hypothesis of Flammer's (2021) research. More importantly, it can be asserted that the issuance of green bonds, as an expression of a firm's commitment to environmental sustainability, bears a causal relationship with the firm's intrinsic value.

H1: Firms that issue green bonds have higher firm value compared to firms that do not issue green bonds. Green bonds can increase firm value.

H2: Firms that issue green bonds have lower firm value compared to firms that do not issue green bonds. Green bonds can decrease firm value.

H3: Firms that issue green bonds have the same value compared to firms that do not issue green bonds. Green bonds are not significantly material to firm value.

Methods

Data

To compile the sample dataset of this research, we extracted green bond issuance data from Refinitiv's green bond guide. These data contain a universe of green bond issuance at the instrument level; the data include the column for the date issued and maturity date, which we will use to create a dummy for the treatment group and for post-treatment in our firm characteristic dataset. The firm characteristics dataset was also acquired from Refinitiv's database; we used six industries over a period from 2013 to 2023 (year to date in December 2023) according to The Refinitiv Business Classification (TRBC) specifically. For the industry, country, and year, firm characteristics are collected for each firm's value, and growth measure (Tobin's Q), firm profitability (ROA and ROE), firm size (total assets), firm structure (total long-term debt), and firm environmental, social, and governance performance measured by E, S, and G scores. From the above dataset, we obtained a sample dataset of six industries of firms that issue green bonds (99 firms) and do not issue green bonds (524 firms) with each firm's characteristics, indexed by firm, year, industry, and country, resulting in a total of 6,853 observations with 372 treated group and 6,481 in the control group.

Definition of Variables

We use Tobin's Q to measure firm value at each financial year-end during the sample period. Tobin's Q, a widely used measure in studies, is the ratio of a company's market value to its replacement cost. In this study, Tobin's Q is calculated by dividing market capitalization by total assets (Hao et al., 2022). The detailed description of all the variable measurements we used in this research is obtained from the Refinitiv database and is disclosed in the appendix.

Research Model

The difference-in-differences (DD) method is the most widely used in the exploration of causal inferences (Autor, 2003; Goodman-Bacon, 2021). The DD method provides robust estimations of causal effect since it compares the average value of the outcome variable while being conditional on a vector of control variables with time and individual fixed effect. In this research, since firms voluntarily issued green bonds in the different time periods from 2013 to 2023, these bonds become a treatment effect, and therefore we exploit the variation across groups of firms that receive treatment at different time periods. Another form of employing the DD method is the two-way fixed effect. This research's specifications use a vector of dummies for individuals and time (staggered or roll-out program) to elicit the treatment effect on the outcome variable. This mechanism allows us to identify the effect of green bond issuance on the firm value measured by Tobin's Q using a staggered DD model. By exploiting the fact that the green bonds are issued in different

firms and years, we assess their causal impact by contrasting Tobin's Q in green bond issuer firms and non-issuer firms. The underlying idea is that there are no other changes in the units that can affect the outcome of interest after controlling for all the correlated variables except for the program by introducing time and individual fixed effects. In other words, the DD estimation method overcome the selection bias and time trends that might affect the outcomes of interest (Karimah & Yudhistira, 2020).

For this staggered DD method, we assign the variable of interest 1 if the company issues a green bond for the treated group and 0 otherwise for the control group. We then assign 1 for the year of issuance and the preceding year, and zero otherwise. Hence the combined dummy of treatment and post (or, more generally, two-way fixed effect) creates the beta of the variable of interest. This beta is the difference of green bond issuance on the firm value between the green bond issuer and non-issuer or the impact of green bond issuance on firm value.

We motivate the effect of green bond issuance on the firm value based on an assumption that the firm that is the first-time issuer of a green bond is comparable to the firm that has issued a green bond in the following period and to the firm that did not issue a green bond over the fixed effects and time-varying control variables. For a firm that did not issue a green bond, the fixed effect and time-varying control alone should explain the change in the value of the firm.

Firms that issue green bonds are not issuing them in the same year; we use the staggered DD method to account for this policy difference. To elicit the causal effect of the green bond issuance on the firm value and address time-varying differences (as long as it has a parallel trend between the treatment and control group), we adopt prior research estimates (Flammer, 2021; Karimah & Yudhistira, 2020; Khurram et al., 2023). With some modifications, our baseline estimate is as follows:

$$Q_{it} = \beta_0 + \beta_1 GB_{it} + \theta X_{it} + \beta_i + \beta_t + \varepsilon_{it} \quad \textbf{(3.1)}$$

Where Q_{it} is Tobin's Q as a direct measure of firm value i in year t. GB_{it} is the green bond issuance as a variable of interest and equal to 1 for the firm *i* that issues bonds in time *t*. β_1 captures the difference in Tobin's Q between the treatment and control group of firms after issuing green bonds. If issuing green bonds is beneficial to the firm value measured by Tobin's Q, we expect that β_1 is positive and statistically different from 0. Since Tobin's Q measure is expressed as a ratio, the effect of green bond issuance on firm value is interpreted as how much in ratio the firm value in terms of Tobin's Q increases or decreases.

X_{it} represents the vector of time-variant control variables that might affect the outcome of estimation. It comprises company characteristics control variables taken from previous research (Flammer, 2021; Khurram et al., 2023): return on assets (ROA), return on equity (ROE), leverage, long-term debt, size of the firm, and environment, social, and government score. ROA and ROE are included to control that the treated firm may be more profitable and therefore easier to issue debt. ROA and ROE may also have an influence on firm value; higher ROA and ROE mean the company is profitable, which is reflected in Tobin's Q. While size, leverage, and long-term debt control for firms with more access to the capital market, while leverage and long-term debt as firm capital structure may also have an impact on the firm value (Ross et al, 2019, pp. 10-12). For size, the bigger the size of a company, the bigger its chance to invest in green buildings. Environmental, social, and governance scores ensure that treated and controlled firms have similar envi-

ronmental performance prior to the green bond issuance. The method of using confounding control variables to decrease bias is also conducted by Khurram et al. (2023).

Certain industries, such as real estate, follow a cyclical trend and are highly influenced by regional characteristics (e.g., regulation, geographical conditions). Some of the industries have faced strong pressure to improve their environmental and social performance in the last decade. We include individual fixed effect β_i which is a vector of dummy variables for each individual that control for mean differences in Tobin's Q values across firms, and yearly time fixed effect β_t which is a vector of dummy variables for each year that control for changes in Tobin's Q values common to all firms. ε_{it} is an error term (Autor, 2003).

Results

Baseline Result: The Impact of Green Bonds on Firm Value

Here we report our baseline model estimation results. Table 1 presents the results of the multiple tests for hypothesis 1. In every column, the dependent variable is Tobin's Q in $t_{t\text{-}1}$ indexed by firm and year. The first model in column (1) is the result of the effect of the green bond on the Tobin's Q value without including individual fixed effect, time fixed effect, and covariates of the control variable. The coefficient is 0.08 positive and significant at a 5% probability value. The results seem to suggest that the difference between treatment and control firms in our data sample is 0.08 compared to the firms that did not issue green bonds. However, this estimate does not include the time-variant effect, idiosyncratic individual effect, and any other relevant control variables that might affect the Tobin's Q value of the firm. Hence, our estimation model in column (1) is likely to be overestimated.

In column (2), given that green bond issuance also depends on unobservable variation across firms (idiosyncratic effect) and years (time effect), we introduce year and firm fixed effect. Thus, we can see from the results that the coefficient drops to 0.071 and is significantly positive with a 5% probability value. Additionally, in column (3), we include the following control variable covariates: environment, social and governance score, a log of the total assets, leverage, ROA, ROE, and a log of the long-term debt to the equation since those variables might affect both Tobin's Q and the green bond issuance of the firm. The results show that the coefficient changes slightly to 0.069, while the coefficient significance remains. In column 4, however, we use the same specification as in column 3 but cluster the standard error in the country of headquarters and find that the coefficient remains the same, while the standard error seems to be higher. Thus, we prefer the model specification in column 3, which suggests that the firms that issue green bonds systematically have a Tobin's Q value that is 0.07 higher than the firms that did not issue green bonds.

The overall result of this model seems in line with previous research that had found a positive effect of green bonds on firm value. According to our findings, the coefficient of green bond issuance is lower than that of Khurram (2023), who uses data from China; he finds that green bonds can, on average, increase the Tobin's Q level in China by 0.19 (Flammer, 2021; Khurram et al., 2023; Wang et al., 2020). The effect of Tobin's Q being 0.07 higher for green bond issuers seems to be quite small considering that Tobin's Q is the replacement cost of firms' market value. This result can be partly explained by the small portion of green bonds over the duration of the total long-term debt of the firm. Therefore, in this regard, Flammer (2021) argues that the improved firm performance is unlike-

ly to be the direct effect of green projects funded by green bonds because its proportion is small compared to the total size of the firms.

Jiang et al. (2022), who also use data from China, find—in their baseline estimation of the effect of green bond issuance on firm value—that the difference in effect between the green bond issuers and non-green bond issuers in firm value is significant at 0.2 points in the Tobin's Q level. In line with this previous research result, our findings are much lower at 0.07. Our lower coefficient result seems more reasonable since we use much broader data on green bond issuers as well as various significant control firms. Flammer (2021) mentions that the green bond market is still in the early development phase. The market of corporate green bonds represents only a tiny share of the overall corporate bond market (USD 95.7 billion over USD 102.8 trillion in 2018). With this in mind, our results need not be generalized to future years. Rather, it is safe to consider for the time being that green projects that are to be funded by green bonds are adequately profitable to sustain competitive returns with conventional bonds.

Prior research has documented that the effect of green bonds on firm value might be explained by country-specific policies and incentives (C. Zhang & Zhou, 2023). For instance, China is one of the top emitters in the world and has a tight policy regarding environmental and social issues (Shen et al., 2017). Meanwhile, the US and Europe have more advanced green bond markets relative to other regions like Asia. The effect is not homogeneous across industries. High-emitter industries such as energy, industrials, and basic materials are likely to be severely affected by the pressure. Technology, on the other hand, might be the industry that can reap the benefit because most of its assets are intangible, and they can easily disclose that they are responsible (Hoepner et al., 2010). In that matter, although indirectly, we are able to capture country-specific and industry effects with the set of dummy variables for each individual firm and time. This is evident in column (4) of our model specification after including country-clustered standard error; after testing the model using a dummy variable for each country (not reported in the table), the coefficient remains as in column (3).

This result has to be interpreted with caution, as our model might still suffer from the limited number of observations. This is especially so in the generalization of the result for all industries. It is worth mentioning that our model does not incorporate macro variables such as interest rate and gross domestic product. However, our model of time-fixed effect should partly reflect the influence of omitted variables or unobserved heterogeneity that are constant or fixed over time in the model[1].

Table 1 also provides the coefficient for the control variables used in the estimation of equation (3.1). Based on column 3 (our preferred specification), the sign of these covariates is as expected and is statistically different from zero except for the E, S, and G scores. The E, S, and G coefficients are close to zero and insignificant to Tobin's Q. The result of another control variable of firm characteristics is consistent with the previous research. Leverage and long-term debt both have negative associations with Tobin's Q. The log of the long-term debt variable in this model's estimation is a control variable, holding this value constant; the green bond as a portion of a firm's total debt is associated with a marginal increase of 0.07 in the Tobin's Q value. This result of control variables is consistent with prior research that used data from China, which found that ROE and leverage have a significant effect on the firm value (Khurram et al., 2023). Although, in terms of magnitude (every one unit increase in return on assets increases firm value by 2.3, and every one unit decrease in leverage by 1.1), in prior research, it is bigger, consistent with the bigger mag-

[1] We tried the estimation by including industry and country dummies alongside time and firm fixed effect and found that the results for both industry and country dummies needed to be omitted because of collinearity.

nitude of the green bond effect on the firm value in that research. This difference might be due to the different data used in the sample; while prior research used data from China, this research has used global data.

Table 1. Impact of Green Bonds on Tobin's Q Values, Baseline Estimate

VARIABLES	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q
Green bond	0.084**	0.071**	0.069**	0.069
	(0.034)	(0.036)	(0.033)	(0.066)
Environmental score			-0.001	-0.001
			(0.001)	(0.001)
Social score			-0.000	-0.000
			(0.001)	(0.001)
Governance score			-0.000	-0.000
			(0.000)	(0.001)
Ln total asset			0.114***	0.114***
			(0.028)	(0.037)
ROA			0.022***	0.022***
			(0.002)	(0.006)
ROE			0.002*	0.002
			(0.001)	(0.004)
Leverage			-0.000**	-0.000
			(0.000)	(0.000)
Ln long-term debt			-0.058***	-0.058***
			(0.010)	(0.018)
Observations	6,230	6,230	6,188	6,188
R-squared		0.037	0.141	0.141
Number of firms	623	623	623	623

Notes: *This table reports estimates of the difference in difference specification in equation (3.1). The dependent variable is lag 1 of Tobin's Q as a measure of firm value (Usman et al., 2020). Standard errors of means are in parentheses. Covariates include E, S, and G scores; a log of total assets; return on assets; return on equity; leverage; and a log of long-term debt. These estimations use firm-level panel data from the period 2013 to 2023. Since we use the lag 1 dependent variable and the difference-in-differences method 2013 and 2014 (for the dummy base) are omitted. The data are retrieved from Refinitiv. *** p<0.01, ** p<0.05, and * p<0.1 indicate statistical significance at 10%, 5%. and 1%. respectively.*

Leverage—calculated as net debt over shareholder equity—and long-term debt indicate a negative trend in terms of Tobin's Q values. This result is consistent with the findings of Khurram et al. (2023), who also document the negative relation between leverage and the value of the firm as measured by Tobin's Q. A higher leverage ratio means that there is more debt than equity in a firm's capital structure. Thus, increasing this ratio would burden firms in fulfilling their obligation and drive market value down. Overall, the result in this estimation result supports hypothesis 1 that managers issue green bonds with the purpose of stakeholder value maximization.

Parallel Trend Assumption Test and the Dynamic Effect of Green Bonds on Firm Value

Complementing the above results—regarding the discrete impact of green bonds on firm value—in the context of answering the first research question, we provide the answer to the second research question with the dynamic effect of the green bond on firm value. For instance, one might ask how quickly the impact of green bonds can be perceived and whether the impact grows or diminishes after the issuance of those green bonds. Our previous specifications do not explain this dynamic impact of the green bond issuance on firm value. To elicit the dynamic impact in our sample study, we applied the specifications suggested by Autor (2003) by modifying equation (1) and introducing variables: 10 years before the first issuance of the green bonds and 10 years after. This effect is the average treatment on the treated firms (isuuing bonds) distributed across time used in the sample study; specifically, the model is as follows:

$$y_{it} = \sum_{\tau=0}^{9} \beta_{-\tau} O_{it-\tau} + \sum_{\tau=1}^{8} \beta_{+\tau} O_{it+\tau} + \theta X_{it} + \beta_i + \beta_t + \varepsilon_{it} \qquad \textbf{(4.3)}$$

Where $\beta_{-\tau}$ and $\beta_{+\tau}$ represent the anticipatory effects and post-treatment, respectively. Notice that we replace β_1 from the baseline estimate to $\beta_{-\tau}$ and $\beta_{+\tau}$ to elicit the dynamic effect and average of the green bonds' effect on the firm value each year. If green bond issuance drives an increase in the Tobin's Q value of the firm, we expect the coefficient of anticipatory effects to be close to zero. At the same time, the post-treatment effects provide the dynamic impacts of the Tobin's Q value of the firms. Figure 4.1 suggests that the Tobin's Q value is already impacted in the issuance year of the green bonds and 1 year preceding the issuance. The coefficient is positive and statistically significant immediately when the green bonds are issued and one year after that, yet the effect in the subsequent year is diminishing and statistically insignificant. However, the effect seems to be negative in the fourth year after the issuance, although it is statistically close to zero. Figure 4.1 depicts the green bond effect starting to bounce back after year 5 and it is likely to need 5 years to provide robust positive effects on the Tobin's Q value. The effect appears to be positive although still insignificant in years 5 and 6, while 7 years forward from the first green bond issuance, the coefficient is positive and significantly different from zero. Year 7 seems like a jump effect since after year 7 (8 to 10) the coefficient is still positive but returns to the level similar to year 6. From Figure 2, we obtain suggestive evidence of the absence of anticipatory responses to the green bond issuance: The coefficients for the lead term are statistically insignificant and are close to zero, showing little evidence of an anticipatory response in firms about to issue green bonds. Thus, Figure 2 also suggests that the parallel trend assumption of our DD model is likely to hold; this means that there is the same (parallel) trend of the average Tobin's Q level before the issuance of green bonds for firms that are both green bond issuers and non-green bond issuers.

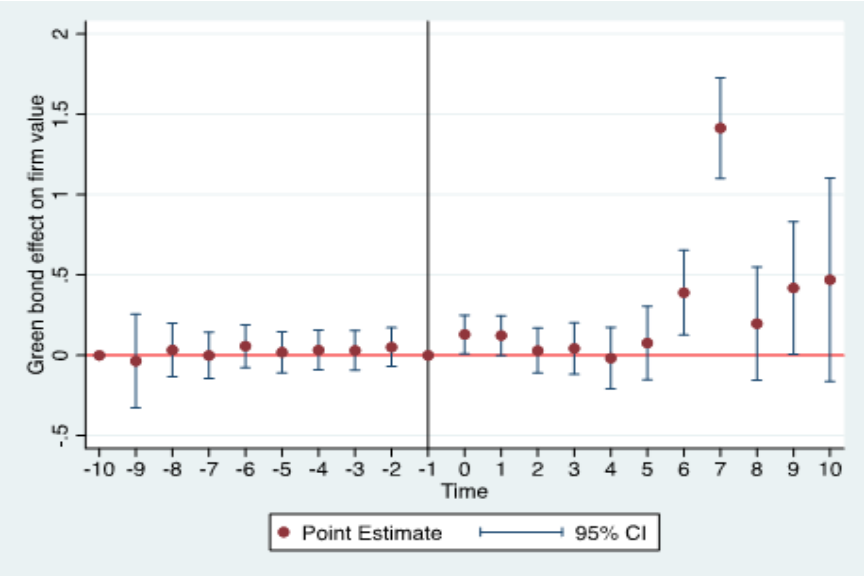

Figure 1. Time passage relative to the year of green bond issuance effect on firm value, the dots indicate the coefficient and the line between dots is the confidence interval

This result is in line with Jiang et al. (2022) who find the dynamic effect of green bonds on the firm value weakens gradually and is unsustainable. A possible reason for this effect is that the green bonds issued by issuer firms have various maturity periods. In his sample, most of the green bonds have a 3- to 5-year maturity period, and they find that in year 3 the effect is declining. In our sample study, many of the green bonds mature in years 5, 10, and 8, respectively, while the least amount of green bonds are those that mature in year 8. The maturity periods and graphic seem to have a common pattern; the effect of the green bonds on the Tobin's Q value is more pronounced in the year after the firm repays the principal to the bondholders due to the freed-up space in the firm's balance sheets. Subsequently, in the year of the repayment when the bond matures, the Tobin's Q value seems to decline due to the repayment burden. This result, indicating a heterogeneous average effect each year, is also evident from the previous research on parallel trend tests and dynamic effects (Khurram et al., 2023; Larcker & Watts, 2020).

Robustness Test

High (Low) ESG Combined Score Subsample

To distinguish between the two competing views, stakeholder value maximization and shareholder expense, we employ a firm-level measure of aggregate ESG performance. We obtain data on firms' ESG performance from Refinitiv's ESG combined score database. This database contains extensive information about firms' ESG combined scores and is widely used for evaluating ESG activity. These scores measure the ESG performance of the firm adjusted due to adverse news or media coverage of greenwashing practices; therefore, if there is news reporting about greenwashing, the score is reduced.

Using the same model specification as in the baseline model, as per the high (low) subsample depicted in Table 2, the results are consistent with the stakeholder value maximization hypothesis. In the high ESG combined score subsample, the association between green bonds and firm value is positive. In contrast, in the low ESG combined score sub-

sample, there is a negative correlation between green bonds and firm value. Our result in the baseline estimation of all samples seems to be driven largely by the high ESG combined score firms. This can be seen because the number of treatment groups (green bond issuers) is higher in the high ESG combined score subsample (218) than in the low one.

Table 2. High ESG Combined Score Subsample

VARIABLES	(1) Tobin's Q	(2) Tobin's Q	(3) Tobin's Q	(4) Tobin's Q
Panel A upper, ESG combined score				
Green bond	0.054	0.089	0.083	0.083
	(0.055)	(0.058)	(0.055)	(0.124)
Time fixed effect	No	Yes	Yes	Yes
Individual effect		Yes	Yes	Yes
Control variables		No	Yes	Yes
Observations	5,664	5,664	5,622	5,622
R-squared		0.034	0.151	0.151
Number of firms	596	596	596	596
Panel B under, ESG combined score				
Green bond	-0.012	-0.014	-0.009	-0.009
	(0.055)	(0.057)	(0.053)	(0.043)
Time fixed effect	No	Yes	Yes	Yes
Individual effect	No	Yes	Yes	Yes
Control variables	No	No	Yes	Yes
Observations	5,657	5,657	5,615	5,615
R-squared		0.033	0.150	0.150
Number of firms	597	597	597	597

Notes: *We form the high (low) ESG combined score subsample by sorting the data by ESG combined score from largest to smallest. The value of the ESG combined score is 0 -100. After sorting, we divide the sample into half, forming the upper and lower of ESG combined scores. This is an unbalanced panel data since we split the high and low for each year and each firm. The table reports estimates of the difference in difference specification in equation (3.1). The dependent variable is lag 1 of Tobin's Q as a measure of firm value. Standard errors of means are in parentheses. Covariates include E, S, and G scores; a log of total assets; return on assets;return on equity; leverage; and a log of long-term debt. These estimations use firm-level panel data from the period 2013 to 2023. The data is retrieved from Refinitiv. *** p<0.01, ** p<0.05, and * p<0.1 indicate statistical significance at 10%, 5%, and 1%, respectively.*

The results support the stakeholder value maximization perspective and are consistent with prior research that has studied the stakeholder value maximization theory by dividing the high (low) subsample and using a merger case study (Deng et al., 2013). It is also in line with prior research, which has shown that, compared to the low ESG score firms, the higher ESG score firms have a lower cost of debt (Apergis et al., 2022). The higher ESG score firms tend to have better transparency, which would allow stakeholders to share the benefits in terms of value and goals (Wandebori, 2018). Additionally, lower ESG management firms may have difficulties in obtaining funding either from banks or investors. In financing firms with lower ESG practices, banks are becoming increasingly cautious of the associated reputational and credit risks as well as the risk of finding the firms liable to environmental obligations (Kroszner & Strahan, 2001).

The Effect in Different Industries: Green Bonds' Impact on Firm Value

The results displayed in Table 3 signal that the effect of green bond issuance on firm value is heterogeneous across industries. A significant effect is observed in the technology industry, resulting in a 0.242 increase in the Tobin's Q value for green bond issuers. We only observed a negative coefficient in the industrial sector of -0.06. The strongest positive effect is in the energy and technology industry, with a positive 0.2 value of Tobin's Q. Energy is the sector where public and government attention has been the highest in recent years following the pressure to incorporate ESG, especially in terms of the environment, into their financing decisions. Technology is under high pressure in terms of social issues. Thus, all the results showing green bonds' positive impact on the firm value in our sample, as presented in Table 1, seem to be driven by these two industries.

Table 3. Effect of Green Bonds on Tobin's Q Values in Different Industries

VARIABLES	(1) Energy	(2) Technology	(3) Utilities	(4) Industrials	(5) Basic materials	(6) Real estate
Green bond	0.214	0.242**	0.054	-0.066	0.071	0.004
	(0.132)	(0.101)	(0.056)	(0.062)	(0.064)	(0.042)
Environmental score	-0.003	-0.004**	0.001	0.000	0.001	0.000
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Social score	-0.000	0.002	0.001	-0.001	-0.003**	-0.001
	(0.003)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Government score	-0.003	0.001	0.001	0.000	-0.000	0.001
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log total asset	0.030	0.288***	-0.052	-0.168***	0.187***	0.364***
	(0.109)	(0.077)	(0.067)	(0.062)	(0.050)	(0.047)
ROA	0.035***	0.014***	0.021***	0.054***	0.022***	0.039***
	(0.008)	(0.005)	(0.007)	(0.006)	(0.005)	(0.007)
ROE	-0.014***	0.007	0.005	-0.002	0.002	-0.003
	(0.003)	(0.005)	(0.003)	(0.002)	(0.002)	(0.003)
Leverage	-0.001*	-0.000	-0.001	0.000	0.000	-0.001*
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)

Log long-term debt	0.048	-0.042*	-0.163***	-0.045**	-0.088***	-0.247***
	(0.055)	(0.022)	(0.043)	(0.023)	(0.014)	(0.033)
Observations	627	1,249	489	1,646	1,487	690
R-squared	0.094	0.178	0.195	0.223	0.211	0.323
Number of firms	63	127	49	165	150	69

Notes: *This table reports estimates of the difference in difference specification in equation (3.1) in column (3). In each column, the dependent variable is lag 1 of Tobin's Q as a measure of firm value. We include a two-way fixed effect, a first-time fixed effect a vector of dummy variables representing year and individual fixed effect, and a vector of dummy variables representing each firm. Standard errors of means are in parentheses. Covariates include E, S, and G scores; a log of total assets, return on assets; return on equity; leverage; and a log of long-term debt. These estimations use firm-level panel data from the period 2013 to 2023., Since we use the lag 1 dependent variable and the difference-in-difference method, 2013 and 2014 (for the dummy base) are omitted. The data are retrieved from Refinitiv. *** p<0.01, ** p<0.05, and * p<0.1 indicate statistical significance at 10%, 5%, and 1%, respectively.*

As a robustness check, the results in Table 3, which use the industry subsample, indicate the same overall findings as in Table 1, which shows the results of the baseline estimates using all samples. Aside from the coefficients of the green bonds as explained above, this can also be seen from the firm characteristics control variables and time trends. The firm characteristics control variables exhibit a similar pattern in most industries. The log of total assets, the return on assets, and the log of long-term debt have a significant impact on the firm value. As for the time trends, the results are significant in the years 2018 to 2023, although not uniformly in all industries, and they are also similar to the results in Table 1, which presents all samples in which significant time trends were observed in the years 2018, 2020, 2022, and 2023.

Conclusion

The primary purpose of firms and their responsibilities to stakeholders remains an ongoing debate. Green bonds are still in the development phase, and they can serve as a potential financing tool for managers to implement green projects within their firms. The results of this research seem to suggest that green bonds have the drive to improve intrinsic firm value, represented by a higher Tobin's Q value. Green bonds can be used to fund energy management projects, which will cut costs and boost productivity. This positive effect of green bonds on firm value is heterogeneous across industries and is more prevalent in firms with high ESG performance, supporting the stakeholder value maximization theory. The results are consistent with the stakeholder theory, which posits that focusing on shareholder value while considering the other stakeholders can benefit the firm's value in the long term.

The use of a green bond issuance event to study the financing decisions of managers that favor stakeholder value is the center of this research. In other words, this study focuses on green bonds as a mechanism to align environmental, social, and governance (ESG) goals with shareholder interests, particularly in the context of global firms across multiple industries. The study's findings show that green bonds positively impact firm value, especially in high-ESG firms, and add to the growing body of literature on sustainable finance.

The empirical evidence indicating an 0.069 increase in the Tobin's Q value following green bond issuance has several implications for corporate managers and policymakers. This study proves that aligning financing decisions with environmental preservation can actually increase firm value. This is related to the empirical findings of research on the inclination of pro-environmental investors to engage in environmentally responsible investment (Hartzmark & Sussman, 2019); hence, managers can opt to satisfy both shareholders and stakeholders, particularly environmental activists and altruistic investors, in generating long-term and stable value for the firm (Brodback et al., 2019). Based on this result, policymakers could support the issuance of green bonds by enhancing ESG disclosure requirements or incentivizing the issuance through tax benefits. Additionally, this research highlights societal implications of green bonds. A 7% firm value boost from green bonds could subsequently drive positive societal change by mobilizing funding for projects that reduce carbon emissions, promote clean energy, and support climate resilience. These kinds of projects direct capital toward sustainable development, benefiting communities through improved environmental quality and long-term economic stability.

To reiterate, the goal of this study is to revisit the theory of stakeholder value maximization using the case of green bonds and evaluating the motivation of managers in issuing green bonds. This study employs the firm's green bond issuance data, Tobin's Q as a firm value metric, and Refinitiv's ESG combined score to gauge the ESG performance of firms. The recommendation from this study is for future research to incorporate a measure of policy regarding green bonds in each country. Future research could utilize various measures of ESG performance from different rating institutions, such as Bloomberg and Sustainalytics, to achieve a more comprehensive and reliable assessment of ESG performance, given that prior research has examined the weak association between ratings from different institutions (Cornell & Damodaran, 2020).

Limitation

Data limitation is the issue in this study; there are many missing values in the ESG scores from Refinitiv's database. Thus, we have to remove all firms and observations containing missing values. This leads to a notable decrease in the number of firms and observations. Our estimation results in the baseline model might still be affected by other factors that influence the firm's green bond issuance and value. Therefore, the generalization of the results must be interpreted with caution, as the study's sample includes only a small portion of green bond issuers. The measure of E, S, and G scores is solely based on Refinitiv's database. These ESG scores are taken from public information and companies' voluntary disclosures.

This research uses the difference-in-differences method to elicit the effect of green bond issuance on firm value. We must meet two assumptions to provide robust estimation results and establish a causal relationship. First, the parallel trend assumption states that the outcome variable must behave similarly before the treatment is implemented. Second, the treatment effect has to be constant over time. This research uses green bond issuance as a treatment effect toward firm value. We assign a value of 1 to firms that issue green bonds and a value of 0 to those that do not in order to indicate the treatment effect. We assign 1 for the year green bonds are issued by firms and the year preceding the issuance and assign 0 otherwise in all years for post-treatment. However, firms issue different numbers

of green bonds at particular times. For example, in 2019, Apple issued one green bond and then issued another in 2021, while Microsoft issued only one green bond in 2019. For this case, we would assign 1 to Microsoft from 2019 to 2023 and assign Apple 1 for 2019 to 2023 throughout our sample period. Therefore, the effect of green bonds on firm value in these settings should be interpreted with that in mind.

This study only provides minimal evidence of the correct direction of causality between the outcome and the interest variables. Since there are firms that have a high Tobin's Q value, this might affect the firm to issue green bonds (with credibility from the debtor perspective). We address a little of the endogeneity problem or the reverse causality problem along with the dynamic effect analysis above. Therefore, future research should focus on addressing the reverse causality problem between green bonds and firm value.

References

Apergis, N., Poufinas, T., & Antonopoulos, A. (2022). ESG scores and cost of debt. *Energy Economics, 112*, 106186. https://doi.org/10.1016/j.eneco.2022.106186

Autor, D. H. (2003). Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing. *Journal of Labor Economics, 21*(1), 1–42. https://doi.org/10.1086/344122

Baulkaran, V. (2019). Stock market reaction to green bond issuance. *Journal of Asset Management, 20*(5), 331–340. https://doi.org/10.1057/s41260-018-00105-1

Brodback, D., Guenster, N., & Mezger, D. (2019). Altruism and egoism in investment decisions. *Review of Financial Economics, 37*(1), 118–148. https://doi.org/10.1002/rfe.1053

Cornell, B., & Damodaran, A. (2020). Valuing ESG: Doing Good or Sounding Good? *The Journal of Impact and ESG Investing, 1*(1), 76–93. https://doi.org/10.3905/jesg.2020.1.1.076

Deng, X., Kang, J., & Low, B. S. (2013). Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *Journal of Financial Economics, 110*(1), 87–109. https://doi.org/10.1016/j.jfineco.2013.04.014

Ekawati, E. (2025). The Relationships between ESG Responsibility, Earnings Management, and Tax Aggressiveness: Evidence of the Halo Effect from Indonesia. *Journal of Indonesian Economy and Business, 40*(1), 75–107. https://doi.org/10.22146/jieb.v40i1.10099

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

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics, 225*(2), 254–277. https://doi.org/10.1016/j.jeconom.2021.03.014

Hao, X., Chen, F., & Chen, Z. (2022). Does green innovation increase enterprise value? *Business Strategy and the Environment, 31*(3), 1232–1247. https://doi.org/10.1002/bse.2952

Hartzmark, S. M., & Sussman, A. B. (2019). Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows. *The Journal of Finance, 74*(6), 2789–2837. https://doi.org/10.1111/jofi.12841

Hoepner, A. G. F., Yu, P.-S., & Ferguson, J. (2010). *Corporate Social Responsibility Across*

Industries: When Can Who Do Well by Doing Good? SSRN Electronic Journal. https://doi.org/10.2139/ssrn.1284703

Horsch, A., & Richter, S. (2017). Climate Change Driving Financial Innovation: The Case of Green Bonds. *The Journal of Structured Finance, 23*(1), 79–90. https://doi.org/10.3905/jsf.2017.23.1.079

Humphrey, J. E., Lee, D. D., & Shen, Y. (2012). Does it cost to be sustainable? *Journal of Corporate Finance, 18*(3), 626–639. https://doi.org/10.1016/j.jcorpfin.2012.03.002

Jiang, K., Chen, Z., & Chen, F. (2022). Green creates value: Evidence from China. *Journal of Asian Economics, 78*, 101425. https://doi.org/10.1016/j.asieco.2021.101425

Karimah, I. D., & Yudhistira, M. H. (2020). Does small-scale port investment affect local economic activity? Evidence from small-port development in Indonesia. *Economics of Transportation, 23*, 100180. https://doi.org/10.1016/j.ecotra.2020.100180

Khurram, M. U., Xie, W., Mirza, S. S., & Tong, H. (2023). Green bonds issuance, innovation performance, and corporate value: Empirical evidence from China. *Heliyon, 9*(4), e14895. https://doi.org/10.1016/j.heliyon.2023.e14895

Kroszner, R. S., & Strahan, P. E. (2001). Bankers on boards: monitoring, conflicts of interest, and lender liability. *Journal of Financial Economics, 62*(3), 415–452. https://doi.org/10.1016/S0304-405X(01)00082-4

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

Ross, S. A., Westerfield, R. W., Jaffe, J., & Jordan, B. D. (2019). *Corporate Finance*. MacGraw-Hill Education .

Shen, L., Zhang, Z., & Zhang, X. (2017). Key factors affecting green procurement in real estate development: a China study. *Journal of Cleaner Production, 153*, 372–383. https://doi.org/10.1016/j.jclepro.2016.02.021

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

Usman, B., Bernardes, O. T. F., & Kananlua, P. S. (2020). On the Nexus Between CSR Practices, ESG Performance, and Asymmetric information. *Gadjah Mada International Journal of Business, 22*(2), 151. https://doi.org/10.22146/gamaijb.54053

Wandebori, H. (2018). International Equity Placement Strategic Alliance: Exploring Stakeholder Support. *Gadjah Mada International Journal of Business, 20*(2), 205. https://doi.org/10.22146/gamaijb.22291

Wang, J., Chen, X., Li, X., Yu, J., & Zhong, R. (2020). The market reaction to green bond issuance: Evidence from China. *Pacific-Basin Finance Journal, 60*, 101294. https://doi.org/10.1016/j.pacfin.2020.101294

Woodroof, E. A. (2009). Financing Energy Management Projects. In A. Thumann & E. A. Woodroof (Eds.), *Energy Project Financing: Resources and Strategies for Success* (pp. 3–50). The Fairmont Press, Inc.

Yeow, K. E., & Ng, S.-H. (2021). The impact of green bonds on corporate environmental and financial performance. *Managerial Finance, 47*(10), 1486–1510. https://doi.org/10.1108/MF-09-2020-0481

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

Zhang, C., & Zhou, B. (2023). Where should the money go? The green effect of governmental guidance when sustainable finance impacts brown firms. *Pacific-Basin Fi-*

nance Journal, 78, 101961. https://doi.org/10.1016/j.pacfin.2023.101961
Zhang, R., Li, Y., & Liu, Y. (2021). Green bond issuance and corporate cost of capital. *Pacific-Basin Finance Journal, 69*, 101626. https://doi.org/10.1016/j.pacfin.2021.101626
Zheng, J., Jiang, Y., Cui, Y., & Shen, Y. (2023). Green bond issuance and corporate ESG performance: Steps toward green and low-carbon development. *Research in International Business and Finance, 66*, 102007. https://doi.org/10.1016/j.ribaf.2023.102007

Appendix

Method

Variable Definitions

Variable name	Variable definition
Tobin's Q	Company market capitalizations are divided by the total assets of the firms.
Green bond	Variable takes 1 if the firm i is issuing a green bond in time t, and 0 otherwise. The data is extracted from Refinitiv's Green Bond Data Guide dataset.
Environmental score	Taken from the Refinitiv ESG score database. This number measures the environmental performance of the firm and has a value of 0-100, 0 being the company has 0 ESG performance and 100 as the highest score (refinitiv.com/esg).
Social score	Taken from the Refinitiv ESG score database. This number measures the social performance of the firm and has a value of 0-100, 0 being the company has 0 ESG performance and 100 as the highest score (refinitiv.com/esg).
Governmental score	Taken from the Refinitiv ESG score database. This number measures the governance performance of the firm and has a value of 0-100, 0 being the company has 0 ESG performance and 100 as the highest score (refinitiv.com/esg).
Total asset	The sum of total current assets and total non-current assets is reported in the fiscal year-end financial or annual report.
Leverage	The ratio (%) of net debt divided by the total value of shareholders' equity. Shareholder equity includes minority interest, and net debt includes hybrid debt. Net debt is calculated from total debt minus cash and short-term investment total.
Return on assets	Is expressed in percentage terms (%). This value is calculated as the income after taxes for the fiscal period divided by the average total assets. Average total assets are the average of total assets at the beginning and the end of the year.
Return on equity	The company's actual value is normalized to reflect the I/B/E/S default currency and corporate actions (e.g. stock splits). Return on equity is a profitability ratio calculated by dividing a company's net income by the total equity of common shares.

Long-term debt	Represents total non-current debt or interest-bearing financial obligations. It includes both convertible and non-convertible debt. It includes non-current lease obligations, non-current hybrid financial documents, and long-term FHLB advances.