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Green bond vs conventional bond: Outline the rationale behind issuance choices in China

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ABSTRACT

Increasingly serious ecological problems have generated considerable focus on environmental-friendly green bonds. Although it has been experiencing rapid development, the rationales behind its issuance remained largely unexplored. This paper makes an initial discussion based on China. We analyze the roles of potential factors that might affect issuers to choose between green or conventional bonds, as well as identify the confrontational combinations of the statistically significant determinants. A sample of green and matching conventional corporate bond issuance records since 2016 is studied through the binary choice regressions (Probit and Logit) and fuzzy set qualitative comparative analysis (fs-QCA). The results demonstrate different motives and premises drive firms to choose green or conventional bonds when using debt financing. This choice can be eventually attributed to the financing demand and the preference of issuers. The factors related to bonds' specific characteristics, issuers' financial features, and external ambience conditions might play significant roles in this decision process. Additionally, we summarized three causal paths affecting the green bond issuance choice. Overall, this paper provides a knowledge basis for targeted encouraging green bond issuance, some corresponding implications are also concluded.

1. Introduction

The rising severity of climate warming is gaining global consensus (Dunne, Stouffer, & John, 2013), many countries have proposed ambitious carbon-neutral[1] targets and schedules (Jia & Lin, 2020; Williams et al., 2021). This brought opportunities for new green financial instruments that have always been committed to promoting environmentally friendly or low-carbon projects (Jin, Han, Wu, & Zeng, 2020). While they could compress the financing space of high-carbon emission industries by guiding capital preference. In particular, green bonds have been keenly promoted due to their relatively lower environmental risks and good effectiveness (Karpf & Mandel, 2018; Zerbib, 2019). The definition of a green bond is a kind of fixed-income asset that limits the use of proceeds to fund green projects that meet the prescribed conditions. Thus, green bonds allow features and mechanisms similar to conventional bonds but have stricter "use of proceeds" criteria.

With the preferential policies and official encouragement, green bonds have received extensive attention from the fund demanders and investors, especially within the sustainability-oriented financial community. According to the Climate Bond Initiative statistics, the total amount of global green bond issuance reached 170.9 billion dollars in 2018, and such a scale is expected to expand to 350 billion dollars after 2020. The rapid development proposes higher requirements for related theoretical knowledge. It is, therefore, imperative to understand green bonds from different aspects, such as its unique features, cross-market links, risk transmissions, etc. This would provide investors with the necessary guidelines and help policymakers apply this new asset in the carbon-neutrality process. This realistic background has made green bonds become a crucial research topic among financial scholars.

Despite the rising interest in green bond offers and investments, the issuance volume is still far fewer than the conventional bonds. The need to develop a low-carbon economy makes expanding the scale of green bonds an important proposition. In other words, a long-existed task of the era of stepping on carbon neutrality is how to promote green bonds. Consequently, there exist a specific principal problem behind this task that requires an urgent solution: what motivates the green bond issuance

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[1] The carbon neutrality refers only to carbon dioxide emissions and is a state of balance between the CO2 emitted into the atmosphere and the CO2 removed from the atmosphere. (IPCC, 2018)

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behavior? The corresponding policy incentives designed to promote green bonds supply could be directly effective only when this problem has been understood in-depth. However, the research to appraise firms' rationales to issue green bonds remains limited, as a few research directly investigate the related issues. Baulkaran (2019) examined the stock market reaction to the announcement of green bond issuance, and concluded that shareholders might issue the green bonds to mitigate the risk; Nanayakkara and Colombage (2019) demonstrated that the issuer would be more likely to choose green bonds for their lower cost; Löffler, Petreski, and Stephan (2021) further confirmed the existence of "green premium" and reveal its crucial effect on driving the green bond issuance; Russo, Mariani, and Caragnano (2021) linked financed project and bond performance, and indicated that project-specific characteristics would be the causes of green bond issuance. These studies contribute to the motivations behind the issuance of green bonds but do not systematically investigate determinants of the issuer's choice for different types of financing instruments. This gap motivates us to question the factors that determine an issuer's choice between the greens bond and conventional bonds, as well as how these factors jointly play out.

After reviewing the other existing studies on green bonds, we failed to obtain a specific answer. The related published papers mainly concentrated on the two aspects, (1) the unique financial properties of green bonds, especially through comparison with conventional bonds (see, Pham, 2016; Zerbib, 2019; Barua & Chiesa, 2019; Hyun, Park, & Tian, 2020; Tolliver, Keeley, & Managi, 2020; Jakubik & Uguz, 2021; Sangiorgi & Schopohl, 2021, 2) the complex market correlation characteristics between this asset and other financial assets or macro factors (see, Reboredo, 2018; Broadstock & Cheng, 2019; Reboredo & Ugolini, 2020; Pham & Huynh, 2020; Pham, 2021;). The issuance rationales have not been fully summarized yet. This further points out to the research blankness in this area. Though most papers do not directly discuss the rationales behind the green bond issuance or choice behavior, their implications still provide a broad perspective on this issue. For instance, Barua and Chiesa (2019) finds that financing size of green bonds could be influenced by various factors related to issuer-selves, bond characteristics, and market factors, though their effects do not always persist and are heterogeneous. Thus, when detecting the determinants of green bond issuance, potential factors should be considered widely. Tolliver et al. (2020) indicate that the drivers of green bond market growth do not play the role individually but in an aggregated manner. In other words, the issuance of green bonds results from a combination of factors from a national perspective, while similar characteristics may also exist in the decision-making of issuers. Given this, the configurational causal modes of determinants would be crucial to be found.

To obtain comprehensive findings on green bond issuance rationales, we theoretically consider the factors that may affect the issuance choices and their underlying pathways. According to the theoretical analysis, this article eventually selects 14 potential issuance determinants of three aspects (issued bond characteristics, issuer-specific characteristics, and external conditions of market or policy) that are based on two theoretical channel perspectives (financing demand and green preference). The selected potential factors are shown in Figure 1. Employing the binary choices models (Probit and Logit), we examine the direct influence of each potential factor. Then, the significant factors are further used to detect the complex multi-causal modes of issuance behavior, applying the fuzzy-set qualitative comparative analysis (fs-QCA) method.

In this paper, we analyze a sample of Chinese green corporate bonds and their matching conventional bonds. The simulation putting interest in China are as follows. Firstly, it could summarize some general insights for the case of developing economies by investigating China (Lin and Su, 2021b), since it is the largest developing country and have a relatively long history in cultivating green finance. Secondly, the intensification of

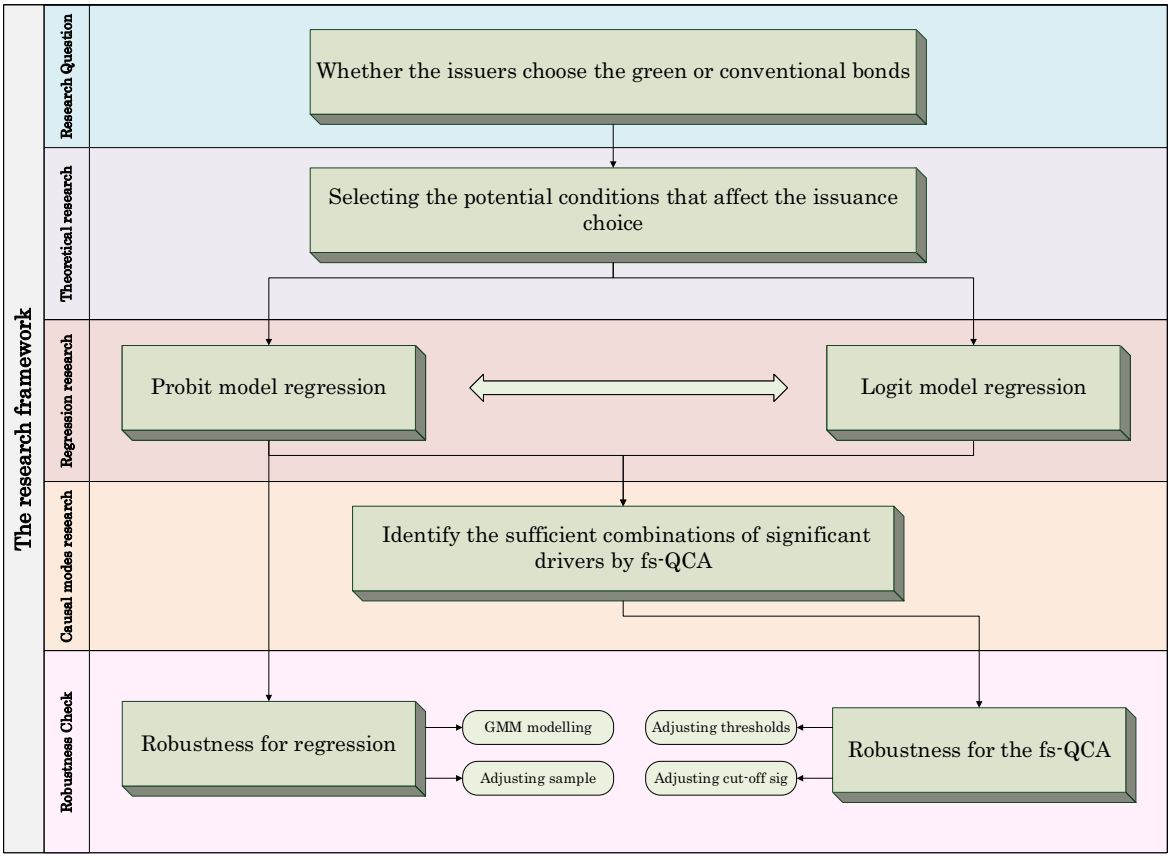

Fig. 1. The potential factors determining the issuance choices between green and conventional bonds. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

climate change promotes global carbon neutrality actions. China has set a goal to peak carbon emissions by 2030 and achieves carbon neutrality by 2060. The realization of this goal will inevitably require the application of financial instruments. It provides sufficient practical motivations for analyzing from the perspective of China. Moreover, China's green bond market has been developing rapidly and has achieved "From Zero To Hero" status since 2016, it is the second-largest green bonds issuance nation up to now. Such conditions make it necessary to investigate the issues of green bond issuance based on the specific background of China.

As a preview of our empirical results, we acknowledge that either three angles of factors would affect the issuance choices between green and conventional bonds. In specific, issue cost, issue size, issuer profitability, issuer current ratio, issuer environmental responsibility initiative, and macro monetary policy are the six significant variables in regression analysis. Thus, the two theoretical channel perspectives are also supported. Based on the fs-QCA results, there is no necessary condition for corporate bond selection behavior, indicating that each of the significant factors cannot affect a company's green bond issuance choice in isolation. We find three essential configurations concerning the firm's issuance decision, as these pathways revealed that the combined effect of poor financing conditions and high green preference are the sufficient condition of green bond issuance choice. To sum, owing to the unique design requirements and complex certification procedure, the green bond is more likely a less desirable choice for issuers. This partially explains why there has not been a breakthrough in the issuance volume of green bonds, even after several years of strong cultivation.

This paper has marginal contributions to the literature in several ways. First, we partly fill the research blank in the field of rationales for green bond issuance behaviors, which is a fundamental prerequisite to target promote the development of green bonds. Second, this paper considers the roles of determinants from the bond, issuer, and external conditions, thereby providing effective understandings of the rationale behind the green bond issuance. These factors transmit effects are attributed to the financing demand and the preference of issuers. Thirdly, in addition to multiple Probit and Logit regression analysis, we apply a qualitative comparative analysis, namely fs-QCA. Thus, not only the significant variables that drive the issuance choice could be obtained, but we have also outlined some vital pathways in which firms make green bond issuance decisions. Lastly, according to the main findings, this paper provides targeted implications for policymakers to promote green bond development and some managerial recommendations.

The remaining parts of this paper have been organized as follows. Section 2 introduces the theoretical background. Section 3 is concerned with the research framework, data set, and methodologies used in this study. Section 4 describes and discusses the results from regression and fs-QCA. The fifth section summarizes the main conclusions of this paper and puts forward some implications. In the last section, we close this paper by indicating some limitations and future research perspectives.

2. Theoretical deduction

The green bond is a nascent developed instrument that has unique characteristics that distinguishes it from traditional bonds. Their proceeds are committed to financing environmental and climate-friendly projects. To guide more enterprises devoted to environmental affairs, green bonds are always designed to lower issuance costs (Gianfrate & Peri, 2019). Looking at the coupon rate, on average, green bonds have a lower yield at issuance than similar conventional bonds (Fatica, Panzica, & Rancan, 2021). Thus, the superiority in financing cost of green bonds successfully attracts the attention of corporate issuers. However, there still are some potential issuance or transaction costs of labeled green bonds due to the low flexibility of capital usage, credit rating and industry restrictions, additional green certification requirements, and the uncertainty of relevant policies. In other words, there are unobserved opportunity costs for capital demanders to issue green bonds. Thus, a company will prefer green bonds when its perceived opportunity cost is lower than the expected financing cost allowance. From this perspective, the specific characteristics of corporate financing needs and financial conditions may affect their final issuance choice between green bonds and conventional bonds.

Another channel that may influence corporate green bond issuance decisions is the green preference mechanism. Green bonds requires that all the (or a large proportion of) financing proceeds must be invested in green and low carbon projects (Flammer, 2021). Thus, using green bond financing is accompanied by a tendency to take the initiative to assume social responsibilities or promote the green transformation of enterprises (Sinha, Mishra, Sharif, & Yarovaya, 2021; Zhou & Cui, 2019); Companies with a good sense of green or environmental social responsibility may be more actively involved in the application of green bonds. Meanwhile, the issuance of green bonds can contribute to a positive spillover effect on firms' reputations by enhancing their green images (Bachelet, Becchetti, & Manfredonia, 2019; Tang & Zhang, 2020). It is rationale to speculate if a company pays more attention to maintaining and enhancing its green image, it is more likely to choose green bonds when financing through fixed-income instruments. Issuers may hold different expectations for the long-term green transformation and low-carbon development of the macroeconomy, so their understanding of green bonds is somewhat differentiated. For issuers with a positive attitude on green development, the green bond is likely to be identified as a developing financing instrument with a foreseeable growth trend and financing advantages. To obtain relevant experience as soon as possible, such companies can raise funds through green bonds than other firms. In summary, companies' preference for green and environmental responsibility may affect the marginal choice of green bond issuance.

As a result, the potential factors that might determine the green bond issuance choices should be selected based on the above two theoretical perspectives. Reviewing the previous research, there are always multifaceted factors influencing corporate financing choices. Three classifications always are considered to choose the potential determinants, they are the issue characteristics, the issuers' characteristics, and the macro factors like policy adjustment or financial ambiance. Although targeted studies on green bond issuance rationales are lacking, a great deal of previous research focused on the financing choices conduct investigation based on these three classifications of variables, which supports the necessity of selecting the potential factors from such three angles (Arena & Howe, 2009; Azmat, Skully, & Brown, 2014; Grassa & Miniaoui, 2018; Mohamed, Masih, & Bacha, 2015). As the main objective of this paper is to analyze the rationales behind the issuance of green bonds, we also follow this idea by selecting the potential factors from the issue characteristics, issuers' characteristics, and macro factors.

According to the above analysis, this article selects 14 potential issuance determinants, as shown in Table 1. It describes the proxy of variables and analyzes the possible paths in which each factor could affect the issuance of green bonds. The considered variables are based on two theoretical perspectives and could be classified into three aspects. Figure 1 also provides a clear map of the potential factors determining the issuance choices. It should be noted that there are two classical theories in the financing decision of corporate, namely the pecking order theory and trade-off theory. The two theories indicate the firms would have a priority judgment on different financing instruments, and there is an optimal (well-defined) target debt ratio for each firm, respectively. Since green bond issuance is one small part of corporate financing decisions, this paper only treats green bond issuance as a unique financing event but not try to fit into them.

Table 1
Variables or conditions for the issuer's choice.

Determinants	Determinants	Theoretical Perspective	Description	Theoretical deduction	Related References	Expected effects
Issue conditions						
COST	Bond issue cost	Financing Demand	% rate of coupon interest per annum, representing the cost of financing.	Due to the additional opportunity cost, green bonds attract issuers by lower direct issuance costs; when the issuance cost becomes higher, green bonds will become unpopular.	Gianfrate and Peri (2019)	Negative
SIZE	Bond issuance size	Financing Demand	The total amount issued.	Green bond has the requirements for the use of financing proceeds, more extensive financing needs are often more challenging to meet such requirements; thus, higher financing demand would discourage issuing green bonds.	Cao, Jin, and Ma (2021)	Negative
TENOR	Bond term structure	Financing Demand	Number of years for bond maturity	Longer maturity would encourage issue size and affect the financing cost, thereby the conventional bond is preferred.	Esho, Lam, and Sharpe (2002); Cao et al. (2021)	Negative
Issuer conditions						
TASSET	Issuer size (total assets)	Financing Demand	Value of total assets in billion RMB, representing the firm size of the issuer.	Larger firms face lower information costs and can raise capital through the conventional ways more easily, so smaller companies might tend to take advantage of emerging green bonds to solve the financing difficulties.	Mohamed et al. (2015); Klein and Weill (2016)	Negative
PROFIT	Growth or profitability	Financing Demand	The EBIT to total assets (%), representing the profitability of the issuer.	Firms with relatively high growth will tend to issue debt that is less subject to information asymmetries to avoid debt overhang problems (Myers, 1977), thus firms with higher profitability would more likely issue mature conventional bonds.	Azmat et al. (2014); Mohamed et al. (2015)	Negative
CURRENT	Current ratio	Financing Demand	The current ratio, representing the ability of issuers to pay off their debts	Current ratio indicates the short-term solvency of a firm. There are two potential opposite effects. Firstly, since solvency could positively affect the company's financing convenience, companies with better solvency (larger current ratio) are more willing to issue conventional bonds that has less information asymmetry; Secondly, the conventional bonds are more flexible for the firms with a lower current ratio that do not limit the use of financing proceeds, the green bonds might also be unpopular.	Pessarossi and Weill (2013); Klein and Weill (2016)	Depends on which effect is stronger
COLLATERAL	Collateral level	Financing Demand	A ratio proxy: fixed assets scaled by the total assets	Firms with more collateralized assets may face lower bankruptcy costs, which increase the availability of conventional bonds for issuers; Considering the conventional bonds have better flexibility in the use of financing proceeds, the firms with better collateral might tap on the conventional bonds.	Mohamed et al. (2015)	Negative
SOE	State-owned or not	Green Preference	Whether the issuer is a state-owned company (1 = SOE; 0, otherwise).	The development of green bonds has obvious characteristics of policy promotion; The state-owned company would be more likely to issue green bonds due to their close links with the government.	Pessarossi and Weill (2013)	Positive
EREMPHASIS	Green and environmental responsibility emphasis level	Green Preference	Following the Hou, Chan, Dong, and Yao (2022), we use an index of 0–8 may not fully capture a firm's green and environmental responsibility emphasis level, representing the initiative of issuers participating in the social-environmental responsibility-friendly actions[a].	Companies that actively participate in environmental affairs might have a more positive attitude on long-term green economic development and care more about their green reputation; Thus, they are more likely to accept and recognize the concept of green bonds, thereby have larger probability to issue green bonds.	Deschryver and De Mariz (2020); Li, Tang, Wu, Zhang, and Lv (2020)	Positive

(*continued on next page*)

Table 1 (*continued*)

Determinants	Determinants	Theoretical Perspective	Description	Theoretical deduction	Related References	Expected effects
AGE	Issuer age	Green Preference	The number of years since the issuer was founded.	The older companies might often less willing to accept new things and more likely to lack of sufficient green projects to meet the restrictions of green bonds.	Grassa and Miniaoui (2018)	Negative
Outside conditions						
MP	Macro monetary policy condition	Green Preference	% annual growth rate of money supply M2, representing the conditions of monetary policy	Monetary policy could affect the firm's financing constraints; When monetary policy is loose, it is easier for companies to financing in conventional ways, thereby reducing their enthusiasm for emerging green bonds	Foley-Fisher, Ramcharan, and Yu (2016)	Negative
LFD	Local financial development level	Green Preference	The financial development level of the region where the issuer is located, represented by *Local deposit and loan balance/Total GDP*.	In regions with a higher level of financial development, it is easier for companies to use conventional bonds for financing, but the environment for issuing green bonds is also better. The strength of the two mechanisms may determine the final effect.	Blackburn, Bose, and Capasso (2005)	Depends on which effect is stronger
LGFP	Local targeted green finance policy level	Green Preference	Whether the regional government the issuer's location has announced the "Green Finance Implementation Opinions" related policies, representing the regional green finance development policy (1 = yes, 0 = no).	Regions with local green financial system development policies might provide more favorable financing costs for green bonds, and policy propaganda can guide companies to agree with the concept and potential prospects of green bond and make use of it.	Tolliver, Keeley, and Managi (2019)	Positive
COVID-19	Issuance behavior occurs during the COVID-19 or not	Green Preference	Dummy variable that takes the value 1 for bonds issued during the COVID-19 period (Citing the Lin and Su (2021a, 2021b) and taking account of the lagged effects of the pandemic, we set this period as of March 2020–July 2020).	The protection and immunization policies during COVID-19 and the economic recession have increased the financing needs of companies, thereby conventional bond financing measures may become more inaccessible. It might bring green bonds more popular than usual as a new financing instrument.	Grassa and Miniaoui (2018); Didier, Huneeus, Larrain, and Schmukler (2021)	Positive

[a] This proxy is calculated by the number of environmental responsibility disclosure items. Specifically, we examined whether the company disclose: the company's environmental protection philosophy; the company's past environmental protection goals and future environmental goals; the company's related environmental management systems, systems, regulations, and other related management systems; environmental protection education and training condition; the company's particularly environmental protection activities and other social welfare activities; the emergency measures for major environmental incidents, and treatment of key pollutions; the honors or awards in the area of green development and environmental protection; the implementation situation of the "Three simultaneous system" (All pollution prevention facilities shall be designed, constructed, and put into operation simultaneously with the process of the main project.). For every "yes" answer to the standard, the company gets one point. Therefore, the value range of EREMPHASIS is 0–8. Naturally, the high value of EREMPHASIS indicates that the company has a strong emphasis on green and environmental responsibility

3. Research design

3.1. Research framework

This paper aims at answering how issuers choose between green bonds and conventional bonds. To achieve this target, the significant determinants and their causal modes should be obtained. After selecting the potential determinants based on the above theoretical analysis, we applied a two-step procedure as the empirical analysis. First, the multiple regressions on the binary choice variable (Probit and Logit model) are employed to confirm the influence of variables. In identifying the causal configurations of the significant elements leading to a consequence of green bond issuance choice the fuzzy set qualitative comparative analysis was adopted. At last, we respectively introduced a set of robustness check procedures for the above two steps to confirm our empirical results. The main research framework is summarized in Figure 2.

3.2. Data collection and preview

There is a complex problem in constructing the full sample, including the green and conventional bonds, since the green bonds are limited to financing for the green projects. That is, we better ensured that the corresponding conventional bonds could theoretically fit such limitations, otherwise, we could not have treated the issuance behavior as a choice. To do this, we conducted the four following steps to develop an empirical sample. (1) We firstly collected 9255 corporate-typed bond issuance records in China from the CSMAR database from Jan 1, 2016, to June 30, 2021, as the initial sample. Since China's green bond market was formally established in 2016, this sample period could maintain there is a possibility to choose between two types of bonds for issuers. (2) This paper focused on the corporate bond issuers' behavior, as the use of debt is different for financial and non-financial firms. Hence, we excluded bonds issued by banks, financial companies, or governmental platforms. (3) We selected bonds issued by listed companies, since only a listed issuer announced financial-related information necessary to construct the issuer's characteristic variables. (4) We manually filtered the remaining conventional bonds based on the purpose of the bond's raised funds, the issuer's industry, and the main business. A bond is excluded if it does not meet any of the four mainstream green bond

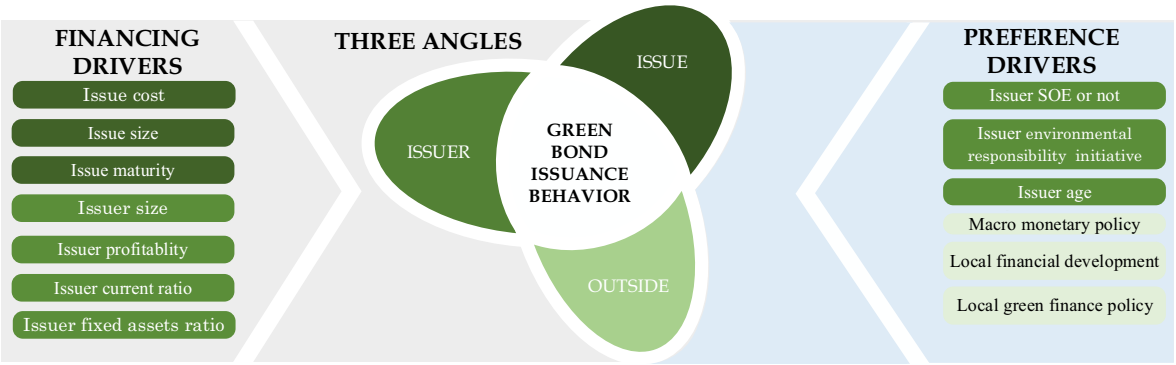

Fig. 2. The research framework.

standards.[2] Accordingly, the sample consists of formally labeled green bonds and conventional bonds that could have been issued in the form of green bonds.

Some issuance records were also removed from the study for two main reasons. Firstly, the perpetual debt was excluded since its characteristics and issuance rules are substantially different from the other bonds. Secondly, all issuance records with missing data were excluded. As summarized in the last section, this paper introduces a set of 14 potential determinants classified in three key categories: (a) bond characteristics, (b) issuer characteristics, and (c) macro policy and market characteristics. All the related data of bond and issuer characteristics were sourced from the CSMAR database, while the data of the macro determinants were collected from the Wind database. The proxy constructed procedure is described in Table 1. Citing the Altunbaş, Kara, and Marques-Ibanez (2010) and Klein and Weill (2016), the variables of the issuer and macro conditions are set as the year preceding the issuance, except the "COVID-19". We conducted this procedure since the issuance choice are fundamentally based on the accounts in the last year and could prevent a probably endogenous issue.

Table 2 display the descriptive summary of all the variables considered in this paper. The mean cost of green bonds is 4.44, lower than the conventional bonds with 4.97, and its mean value of issuance size (8.24), bond maturity (4.4), is also smaller than the conventional bonds (11.53 and 4.72, respectively). The descriptive statistics of issuer conditions for green bonds and conventional bonds seem no significant difference and similar to the full sample, except for CURRENT. The current ratio of green bond issuers means at 0.88, while conventional bond issuers have the mean value of 1.12; the standard deviation of the former is 0.33, far less than the conventional bond issuers' 0.91. It can be inferred that green bond issuers appear to be concentrated on companies with relatively weaker debt servicing capabilities. A comparison between green and conventional bonds also reveals similar average values across external determinant variables.

The preliminary correlation analysis results are listed in Appendix, there is a mix of positive and negative correlations between 14 variables. The overall low correlation coefficients indicate the harmless of possible multi-collinearity.

3.3. Methodology

Based on the research framework, two empirical steps are estimated in this paper. Probit and Logit models are used to link the discrete variable and its determinants, while the fuzzy set qualitative comparative analysis is subsequently used to support the association of the significant determinants.

3.3.1. Regression model

We apply the Probit and Logit model with a dummy variable *Green*, distinguishing the issuance type as the dependent variable as shown in Eq. (1).

$$Green = \alpha + \beta_1 COST + \beta_2 SIZE + \beta_3 TENOR + \beta_4 TASSET + \beta_5 PROFIT + \beta_6 CURRENT + + \beta_7 COLLATERAL + \beta_8 SOE + \beta_9 SREMPHASIS + \beta_{10} AGE + \beta_{11} MP + \beta_{12} FD + \beta_{13} LGFD + \beta_{14} COVID - 19 + \varepsilon \quad (1)$$

Eq. (1) is a linear probability model, where Green is a dummy variable that if the issuance record is for a green bond, it is 1, otherwise 0, the terms of independent variables are the same as the Table 1. We mainly applied two models to capture the significant factors by avoiding the model selection biases and confirming the result's robustness. In both Probit and Logit models, the probability distribution of dependent variable *Green* has the same settings, as follows,

$$\begin{cases} P(Green = 1|x) = F(x, \beta) \\ P(Green = 0|x) = 1 - P(x, \beta) \end{cases} \quad (2)$$

Where $F(x, \beta)$ is the connection function. For the Probit model, the $F(x, \beta)$ is the standard normal cumulative distribution function; While in the Logit model, $F(x, \beta)$ is the cumulative distribution function that obeys the logistic distribution. Accordingly, the Probit and Logit model both aim at analyzing the issue of the binary choice, and based on similar connection functions, they can often be interchanged and compared in specific research.

3.3.2. Fuzzy-set qualitative comparative analysis

The fuzzy-set qualitative comparative analysis (fsQCA) was proposed by Rihoux et al. (2009), as the development of normal qualitative comparative analysis (Ragin, 2006). This method attempts to identify general patterns of associations between sets of variables and allows the

[2] These standards are "List of projects supported by green bonds (2015, 2021 edition)", "Guidelines for Issuing Green Bonds" issued by the General Office of the National Development and Reform Commission, "Green Bond Principles" issued by the International Capital Market Association, 2015, and internationally accepted "Climate Bond Standards".

Table 2
Descriptive statistics.

	Full Sample				Green bonds				Conventional bonds			
	Mean	Std.Dev.	Min	Max	Mean	Std.Dev.	Min	Max	Mean	Std.Dev.	Min	Max
COST	4.69	1.27	1.69	7.50	4.44	1.17	1.69	7.50	4.97	1.33	2.95	7.50
SIZE	9.81	6.73	0.50	30.00	8.24	4.92	1.00	25.00	11.53	7.95	0.50	30.00
TENOR	4.55	1.86	0.26	10.00	4.40	2.03	0.26	10.00	4.72	1.65	2.00	10.00
TASSET	24.44	1.30	21.99	26.81	24.51	1.24	22.10	26.81	24.36	1.37	21.99	26.81
PROFIT	0.06	0.03	−0.02	0.15	0.05	0.02	0.02	0.15	0.06	0.03	−0.02	0.11
CURRENT	0.99	0.68	0.17	6.13	0.88	0.33	0.19	1.80	1.12	0.91	0.17	6.13
COLLATERAL	0.36	0.24	0.00	0.83	0.38	0.21	0.00	0.83	0.34	0.27	0.01	0.83
SOE	0.60	0.49	0.00	1.00	0.70	0.46	0.00	1.00	0.50	0.50	0.00	1.00
EREMPHASIS	3.49	2.40	0.00	8.00	3.87	2.30	0.00	8.00	3.08	2.46	0.00	8.00
AGE	19.54	5.33	8.00	32.00	20.53	5.12	10.00	32.00	18.45	5.40	8.00	32.00
MP	0.10	0.02	0.08	0.13	0.09	0.02	0.08	0.13	0.10	0.02	0.08	0.13
LFD	4.18	1.85	1.44	8.32	3.98	1.69	1.44	8.32	4.41	2.00	1.88	8.32
LGFP	0.57	0.50	0.00	1.00	0.59	0.50	0.00	1.00	0.55	0.50	0.00	1.00
COVID-19	0.09	0.29	0.00	1.00	0.11	0.32	0.00	1.00	0.06	0.24	0.00	1.00

study of a limited number of cases to obtain the complex causal modes. As indicated by the previous research (Azmat et al., 2014; Mohamed et al., 2015;), a broad set of factors jointly determine the final decisions for firms issuing bonds. With the employment of fsQCA, we could find the comprehensive multi-causal modes since such a qualitative method covers all possible interactions between the causal conditions. Meanwhile, this method offers the capability to explore the causality based on the limited numbers of cases (Glaesser & Cooper, 2011), this advantage makes it possible to obtain in-depth combinations of significant determinants from a small number of bond issuance records. This method explains the relationship based on asymmetry (Hervas-Oliver, Sempere-Ripoll, & Arribas, 2015), thereby making it possible to make up for the shortcomings of regression analysis in neglecting the asymmetric causal relations.

Given the study's second objective—to examine how the factors that have been found as the significant determinants jointly play effects, the fsQCA method is highly appropriate to explore the logically possible combinations of causal conditions. There are two main steps of fs-QCA.

At first, the fuzzy-set approach needs to transform the original scaled variables into fuzzy set values for the antecedent conditions and the target. To achieve this, three qualitative anchors, namely full membership, a cross-over point, and full non-membership, must be specified for all variables, should be set. The closer the transformed variable value is to 1, the higher the degree of membership, and vice versa.

Second, a truth table is generated with all possible combinations that can be made with the critical conditions after calibration. The truth table algorithm should simplify the combinations of the conditions and minimize the table using Boolean algebra (Ragin, 2009). Based on Ragin and Davey (2014), a factor could be treated as a necessary condition when it is present in all combinations to lead to the target, while it would be a sufficient condition if the outcome emerges whenever the condition is present.

The fs-QCA calculates the consistency and coverage to measure condition effects, which should be analogous to the influence and the coefficient of explanatory capability (R^2) measure in the regression analysis, respectively. The formula for the consistency and the coverage is as follows:

$$Consistency\left((X_i \le Y_i) = \sum\{min(X_i, Y_i)\} \Big/ \sum(X_i)\right) \quad (3)$$

$$Coverage\left((X_i \le Y_i) = \sum\{min(X_i, Y_i)\} \Big/ \sum(Y_i)\right) \quad (4)$$

where for the case X_i is the membership score in the set X, and Y_i is the membership score in the outcome condition. In this paper, the fs-QCA method was implemented using fs-QCA official software, version 2.5.

Table 3
Main regression by Probit and Logit model.

	Probit Modeling			Logit Modeling		
	Coef.	Std. Err.	Z-Stat	Coef.	Std. Err.	Z-Stat
COST	−0.47***	0.16	−3.03	−0.84***	0.30	−2.82
SIZE	−0.09***	0.03	−3.24	−0.16***	0.06	−2.68
TENOR	0.00	0.07	0.02	0.00	0.12	0.02
TASSET	−0.15	0.16	−0.91	−0.22	0.29	−0.73
PROFIT	−9.90*	5.56	−1.78	−16.72*	10.11	−1.65
CURRENT	−0.69**	0.31	−2.27	−1.17**	0.55	−2.11
COLLATERAL	−0.03	0.72	−0.04	−0.17	1.21	−0.14
SOE	−0.65	0.42	−1.53	−1.18	0.77	−1.53
EREMPHASIS	0.12**	0.06	1.96	0.19*	0.11	1.77
AGE	0.05	0.03	1.49	0.08	0.06	1.36
MP	−25.24***	9.24	−2.73	−41.09**	16.15	−2.54
LFD	−0.08	0.07	−1.15	−0.16	0.13	−1.22
LGFP	−0.59	0.33	−1.80	−0.89	0.57	−1.55
COVID-19	0.34	0.45	0.75	0.59	0.77	0.77
Constant	10.24**	4.55	2.25	16.79**	8.26	2.03

Note: The dependent variable is Green in Eq. (1); * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

4. Results and discussion

This section first presents the main regression results based on the Probit and Logit model, then the results of the fs-QCA. At last, we conduct some robustness checks for the above results.

4.1. Multiple regression results

Table 3 summarizes the results of the regression models included in this study. There are two panels in this table, the left panel displays the regression results of the Probit modeling procedure while the right panel is for the Logit modeling simulation. Overall, the results based on two modeling techniques indicate similar results. The target debt security issuance determinants show a mixed but significant relationship between some of the factors in all three aspects.

For bond characteristic variables, the COST and SIZE shows a negatively significant effect on the dummy variable of Green. It demonstrates that firms seem more likely to issue green bonds for seeking a lower coupon payment commitment, and they prefer to issue conventional bonds to satisfy a greater debt demand. This finding is most consistent with Barua and Chiesa (2019) that lower costs often drive companies' issuance of green bonds. While the coefficient of SIZE indicates that green bonds are the choices when companies' financing needs are relatively small. It is reasonable since green bonds have more certification procedures than traditional debt financing approaches, such as green third-party certification and process supervision. These

affairs create some efficiency obstacles for issuing a large size of debts under the green bond system. Another potential cause for the negative effect of SIZE, is that, companies might use the green bond to enhance their environment-friendly reputation, thereby regarding it as a prestige tool (Zhou & Cui, 2019) rather than the main options of financing.

PROFIT, CURRENT, and EREMPHASIS are the three variables of firms' characteristics that significantly affect issuance choices between green and conventional bonds. According to the sign of the coefficient, companies with poor profitability are more likely to seek financing through green bonds. The current ratio also shows similar effects, in line with the theoretical deduction and descriptive analysis, while the EREMPHASIS has a positive link with the probability of green bond issuance.

Based on the previous research on financing decisions, firms with larger profits would be less likely to rely on debt financing due to their better-retained earnings (Mohamed et al., 2015). In other words, for companies with better profitability, there is often less demand for debt financing. If it is consistent with the impact of the issuance scale, companies with better profitability, thereby the less debt financing need, theoretically prefer the green bonds that always have a smaller issuance size. However, the results show the opposite situation. It does not violate this theoretical analysis while indicating the conventional bonds always have the priority status in the financing instruments. Based on Akerlof (1978), issuers with a relatively high growth opportunity are inclined to issue debt that is less subject to information asymmetries to avoid debt overhang problems. As green bonds have a more cumbersome approval and issuance regime, companies naturally prefer conventional bonds on the premise that other conditions are consistent. So, the issuers with good profitability are more likely to treat the green bond as a sub-optimal choice than other issuers. Moreover, the low level of significance of PROFIT further shows that companies with higher profits may still be inclined to issue green bonds due to a lower financing need, this opposite impact offsets the effect of the pecking order of conventional and green bonds.

The current ratio also appears to be significantly negative. As the introduction in Table 1, the current ratio reflects the short-term solvency of a company. A higher current ratio indicates a higher corporate short-term debt repayment capability. Thus, the lower current ratio reveals that the firm can hardly repay the future debt, thereby reducing the probability of obtaining funds from conventional financing channels. From another perspective, when a company has a relatively worse debt repayment capability, the current debt may be higher than its target debt level. Since the green bonds are stipulated that no more than 50% of raised funds could be used to optimize the debt structure,[3] the conventional bonds are more flexible for the firms with a higher current ratio. Recalling Table 1, the negative sign of the parameters for CURRENT indicates that declining the external financing capacity is stronger than the effect of seeking a more flexible financing instrument. Although the poor solvency firms are inclined to use conventional bonds that can meet various capital utilization needs, they are more likely to switch to green bonds due to the rising difficulty of traditional bond financing.

The environmental responsibility emphasis level scores (EREMPHASIS) that reflect the corporate green preference positively correlate with green bond issuance behavior. This result supports our theoretical insights that companies who accept and recognize the concept of green bonds would issue more green bonds, while active participation in environmental affairs provides them with the willingness to be exposed to green bonds. Meanwhile, for companies that are more concerned about their green prestige, the green bond is a means of combining financing with a better establishment of a "green image" (Barua & Chiesa, 2019). Since the firm's commitment or activities to environmental development are statistically supported to be the positive drivers of green bond performance (Russo et al., 2021), another reason for some corporates preferring green bonds may be seeking a better bond performance through a good public perception on their environmental protection.

It is worth noting that in the variables of issuer characteristics, whether it is a state-owned enterprise (SOE) does not significantly impact the preference of green bond issuance. However, whether it is an SOE may still affect the company's issuance decision. In reality, most of the issuers of green corporate bonds are state-owned enterprises, proving this point. As state-owned enterprises are more concerned about political correctness and have many social obligations, state-owned enterprises promoted by the government often try green bonds before private enterprises. The potential reason why this variable is not significant in that the empirical results might be of a smaller sample size, as non-financial listed companies' issuance behaviors were only selected.

Among four considered macro factors that might determine the bond issuance choices, only the MP displayed a significant role. MP proxy the monetary policy of the central bank. As shown in Table 3, changes in macro-monetary policy will negatively affect corporate bond selection decisions. This indicates that the looser monetary policy would bring green bonds less popular. This finding also appears to be consistent with the related findings in previous studies, when there is a looser monetary policy, corporate financing becomes easier and has fewer costs (Kashyap & Stein, 2000); thus, the green bonds with lower priority will be more unpopular. The LFD and LGFP both show insignificantly negative effects on the probability of choosing the green bonds. What stands out in this result is that the current supporting policies and financial systems introduced by various areas are still lacking, which cannot effectively promote the popularity of green bonds. Meanwhile, the COVID-19 also does not show a significant influence, which shows that the exogenous emergencies did not change the company's financing preferences.

Overall, our findings based on the regression analysis support the financing demand and green preference two theoretical channels. In the determinants of issuer choice between green and conventional bonds, the bond, issuer characteristics, and external factors are all possibly significant, indicating the issuance choice would be a complex decision-making process. There are six determinants' effects supported by the regression, COST, SIZE, PROFIT, CURRENT, EREMPHASIS, and MP. Since the determinants are classified into different types, a natural question would be proposed, how do these factors with different sources combine to determine the choices of the issuer, or what are the pathways of firms choosing between the two bond financing instruments. To provide a more in-depth understanding of this question, we further employ the fs-QCA on these significant determinants. The results are shown in the following sub-section.

4.2. *fs-QCA results*

Following Ragin (2009) recommendation, we transformed the raw data into fuzzy-set data. This study used the direct calibration method that uses the percentiles of each variable (García-Castro, Aguilera, & Ariño, 2013; Greckhamer, Misangyi, Elms, & Lacey, 2008). According to the related literature (Ho, Plewa, & Lu, 2016), our calibration process

Table 4
Calibration for outcome and conditions.

	Thresholds		
	Full membership	Cross-over point	Full non-membership
Green	1 = issued bond is green bond, 0 = conventional bond		
COST	7.0000	4.2550	3.3325
SIZE	25.0000	8.7000	2.0000
PROFIT	0.1093	0.0533	0.0222
CURRENT	1.7571	0.9817	0.1972
EREMPHASIS	5.0000	3.5000	2.0000
MP	0.1334	0.0904	0.0808

[3] The Chinese Development and Reform Commission clearly stated in the "Green Bond Issuance Guidelines"

Table 5
Necessary conditions for presence (absence) of issuing green bonds.

	Presence of issuing green bonds		Absence of issuing green bonds	
	Consistency	Coverage	Consistency	Coverage
COST	0.46	0.47	**0.56**	**0.53**
SIZE	0.47	0.48	**0.57**	**0.52**
PROFIT	0.47	0.49	**0.54**	**0.51**
CURRENT	0.42	0.45	**0.55**	**0.55**
EREMPHASIS	**0.54**	**0.57**	0.45	0.43
MP	0.46	0.47	**0.58**	**0.53**
~COST	**0.54**	**0.57**	0.44	0.43
~SIZE	**0.53**	**0.57**	0.43	0.43
~PROFIT	**0.53**	**0.56**	0.46	0.44
~CURRENT	**0.58**	**0.59**	0.45	0.41
~EREMPHASIS	0.46	0.47	**0.56**	**0.53**
~MP	**0.54**	**0.58**	0.42	0.42

Note: "~" denotes the absence of a condition, and *in bold = highest conditions but not necessary (less than 0.90).

was based on the thresholds for full membership (0.75), full non-membership (0.25), and the cross-over point (0.5). The values assigned for calibration are displayed in Table 4.

Before constructing the truth table for examining the sufficient combinations of conditions on a specific outcome, the necessity of every single condition should be tested (Schneider & Wagemann, 2010). The necessity in fs-QCA is supported if a condition is always present (absent) in all cases where the outcome is present or absent. As Ragin (2008) recommended, the threshold of necessities is equal to 0.9 for both the consistent and coverage value. Table 5 below illustrates that none of the condition variables exceeded the threshold value necessary, no matter how we considered the presence or absence of the outcome. Namely, any solitary determinant could not lead to the firms' choice for issuing green bonds or not.

Consequently, configurational analyses for multi-causal modes was required. We also bolded the conditions with higher consistency and coverage values, the present situation of these conditions is strongly consistent with the regression results in the last sub-section. This mirrors our previous finding.

In analyzing the sufficient configurations for the conditions, we consider two models in detecting the causal modes for issuing or not issuing green bonds. After obtaining the truth value table, we set 1 as the minimum for cut-off frequency and 0.75 as the cut-off consistency. Based on this procedure, three sufficiency solutions could be eventually obtained. The results have been listed in Table 6. Among the three solutions, the only causal paths led to the presence of the outcome. It indicates the causal impact of determinants on choosing the green bond is asymmetric, the combinations of conditions can only drive the firms issuing the green bonds, while it does not lead to negligence in issuing green bonds if such a combination does not exist for a company. In a word, the three causal paths are sufficient and unnecessary conditions for companies to issue green bonds.

Table 6
Sufficient conditions (configurations) for issuing green bonds.

Frequency Cut-off: 1	Issuing Green Bonds or Not		
	[Consistency Cut-off: 0.755939]		
	1	2	3
COST	○		○
SIZE	○	○	○
PROFIT		○	
CURRENT	○	○	
EREMPHASIS	●	●	○
MP		●	○
Consistency	0.849	0.815	0.875
Raw coverage	0.145	0.149	0.081
Unique coverage	0.036	0.046	0.055
Overall solution consistency:	0.855		
Overall solution coverage:	0.246		

Note: Filled circles indicate above threshold levels of full membership, thereby the presence of the condition, whereas unfilled circles indicate negative conditions. Blank cells represent "do not care" conditions.

The results of the sufficient conditions present a total solution consistency of 0.855; the consistency value for the three causal paths is 0.849, 0.815, and 0.875, respectively, above the given benchmark value of 0.8; and the total coverage is 0.246. Thus, the results are accepted, and more than 24% of the total variance in green bond issuance choice can be explained by these patterns. The relatively low coverage suggests there might be some omitted unobserved factors still driving the issuer decisions. The coverage is roughly equivalent to R2 in regression estimation, so the small value does not reject the configurational results but highlights that corporate green bond issuance rationales would have individual characteristics. Overall, the results support our previous speculation, the significant determinants exert influence through different causal models but do not work in isolation.

In specific, Configuration 1 represents the most common decision-making mode for choosing green bonds as the debt financing tool, covering about 14.5% of the total issuance records. This mode demonstrates that firms would issue green bonds when they seek a low financing cost with a small amount of financing demand, and these issuers might have better solvency and a strong sense of environmental responsibility. In this causal configuration, the profitability of the firm and the external monetary policy are not crucial for determining the issuance choices. This mode represents the decision-making process of companies that are not sensitive to monetary policy, thereby more common than the others. The financing needs and financial characteristics of enterprises that have a better "environmental image" determine green bond issuance choices for themselves.

In contrast, configurations 2 and 3 represent firms' decision paths considering two kinds of monetary policy. Configuration 2 suggests that under a loose monetary policy environment, the issuers would prefer the green bonds only when their financing demand is small and have poor profitability but good solvency. This only holds for issuers with higher environmental initiatives. In this mode, the financing cost seems to be insignificant. A possible explanation for this might be that a looser monetary policy may decrease the overall cost of the financing process for both the green and conventional bonds. In this case, the inherent low-cost advantages of green bonds are less attractive or getting irrelevant.

Regarding configuration 3, it could explain about 8.7% of the cases. This pathway reflects the selections of green bonds under the tight monetary policy condition, the issuers mainly concentrate on the firms with bad environmental responsibility scores. Moreover, these firms have a small target financing scale, and they are keen to take the strength of low financing costs in issuing green bonds. In other words, the financing dilemma sourced by the tightening monetary policy lead companies to gradually use green bonds to meet their small-scale financing needs, especially for those not enthusiastic about the concept of green and environmental protection. Under this situation, the lower financing cost is the root cause of attracting issuers to choose green bonds instead of conventional bonds (Flammer, 2021; Tang & Zhang, 2020).

The different roles of MP playing in three causal modes reflect the nature of external factors affecting the business decisions. Monetary policy is an environmental variable. Although it will negatively affect companies' green bonds, companies would not directly decide their financing instruments for a certain monetary policy. Whether monetary policy is loose or tight, companies' issuance decisions are always based more on their financing characteristics and needs. Correspondingly, different causal paths form.

Table 7
Robustness test for regression analysis.

	GMM Model			Adjust sample Probit		
	Coef.	Std. Err.	Z-Stat	Coef.	Std. Err.	Z-Stat
COST	−0.15***	0.04	−3.61	−0.40**	0.19	−2.16
SIZE	−0.03***	0.01	−3.91	−0.64**	0.26	−2.42
TENOR	0.01	0.02	0.32	0.14	0.09	1.62
TASSET	−0.03	0.04	−0.78	−0.22	0.17	−1.26
PROFIT	−2.71*	1.52	−1.78	−7.59	6.16	−1.23
CURRENT	−0.17**	0.04	−4.27	−0.91*	0.51	−1.77
COLLATERAL	−0.02	0.22	−0.10	−0.71	0.84	−0.85
SOE	−0.19	0.13	−1.54	−0.46	0.42	−1.11
EREMPHASIS	0.04*	0.02	1.92	0.11*	0.07	1.69
AGE	0.01	0.01	1.53	0.02	0.03	0.48
MP	−7.65**	2.82	−2.72	−27.29***	10.18	−2.68
LFD	−0.03	0.02	−1.52	−0.12	0.07	−1.57
LGFP	−0.16*	0.09	−1.79	−0.56	0.38	−1.47
COVID-19	−0.10	0.14	−0.73	−0.31	0.54	−0.58
Constant	3.29**	1.14	2.87	12.41**	5.05	2.46

Note: * Significant on 10%; ** Significant on 5%; *** Significant on 1%.

4.3. Robustness check

To confirm the empirical results are robust, we conducted some checks for the regression analysis and the fs-QCA simulation as displayed in the research framework.

Table 7 display the robustness test for the results of Probit and Logit regression. There are two tests included. In the left panel, we display the results based on the generalized moments (GMM) estimation method. The GMM estimator holds the assumption of no serial correlation and exploits all the linear restrictions. Therefore, it is appropriate to introduce a robustness test to avoid potentially misleading evidence caused by many instrumental variables (Grassa & Miniaoui, 2018). As shown in Table 7, all the significant variables in Probit or Logit estimation are still significant using the GMM estimator, which indicates that the regression results are generally robust considering the model bias.

In China, there are two main green bond types for corporate issuers: green corporate (enterprise) bonds and green debt financing instruments. However, only companies in the green finance reform and innovation pilot zone can issue the green debt financing instrument. Thus, some biased effect will exist in the regression results if some endogenous relations exist between the reforming zone and green bond issuance choice. To test the validity of our sample selection, we further delete all the issuance records for the green debt financing instrument, thereby obtaining a subsample, and conduct a similar Probit regression on this subsample. The result demonstrates that most of the verified determinants remain at a significant level but the PROFIT. It supports the robustness of our main empirical regression. Different significances of the PROFIT adapt the limited effects of profitability itself and may have been influenced by the decrease in the observations for the subsample.

To confirm the robustness of the fs-QCA, we follow the procedure of Xie and Wang (2020), testing the variation of consistency and calibration threshold. Firstly, we reset the cut-off consistency value from 0.75 to 0.77 (see Panel A of Table 8); Then, changing the calibration process of condition variables, we use the 80th, 50th, 20th percentile values to represent the full membership, cross-over, and full non-membership, respectively (see Panel B of Table 8). The test presents an overall consistent result with Table 6, though the presence of CURRENT getting significant in configuration 3. This slight change does not destroy our original findings that green bonds would be a more popular financing tool when facing a worse financing environment. Instead, the presence of the current ratio mirrors firms' solvency and has multiple influences on the issuance choices, as assumed in Table 1.

5. Concluding remarks

The intensification of climate change promotes global carbon-neutral actions (Hao, Dai, Wang, Xu, & Liu, 2021; Tan & Wang, 2021). Since green bond is recognized as an effective financial instrument for promoting the process, it has been rapidly cultivated and gained considerable expectancy (Wang, Chen, Li, Yu, & Zhong, 2020). There has been significant development of green bonds worldwide, but whose strength is still weak compared to conventional bonds. Though many studies have indeed focused on green bonds, the rationales behind their issuance remained largely unexplored. This paper makes an initial discussion based on China.

This paper aims to provide insights into the rationale behind the corporate choice between green and conventional bonds. Based on theoretical analysis, 14 potential factors that might determine the green bond issuance choice were selected. To understand the roles of potential factors and identify how the statistically significant determinants combinedly guide the issuers' decisions, we employed a two-step empirical analysis. At first, the multiple regressions (Probit and Logit) was used to obtain the significant factors. Secondly, we chose the fs-QCA as a configurational methodology to detect the causal modes for them determining the green bond issuance.

Based on regression analysis, COST, SIZE, PROFIT, CURRENT, EREMPHASIS, and MP are the six significant variables that could drive the issuers to choose between the green or conventional bonds. The signs of the coefficients indicate that the corporations tend to prefer green bonds only when they face relatively poor financing conditions, such as a tight monetary policy. Meanwhile, the corporate issuers would choose the green bond to gain a lower financing cost, but large-scale financing demanders still seem to favor traditional debt financing tools. The significant effects of EREMPHASIS raise the possibility that firms with high environmental responsibility will have a strong preference for green bonds. Based on the fs-QCA, we summarized three causal paths affecting

Table 8
Robustness test for fs-QCA sufficient conditions analysis.

Solution	Causal conditions						*Frequency Cut-off: 1*		
	COST	SIZE	PROFIT	CURRENT	EREMPHASIS	MP	Raw coverage	Unique coverage	Consistency
Panel A: Adjusting consistency cut-off value							*[Consistency Cut-off: 0.775372]*		
1	○	○		○	●		0.145	0.067	0.849
2		○	○	○	●	●	0.092	0.029	0.854
3	○	○		●	○	○	0.081	0.055	0.875
Overall Solution coverage: 0.228							Solution consistency: 0.850		
Panel B: Adjusting membership thresholds (80th, 50th, 20th)							*[Consistency Cut-off: 0.75039]*		
1	○	○		○	●		0.180	0.073	0.827
2		○	○	○	●	●	0.115	0.029	0.815
3	○	○		●	○	○	0.100	0.051	0.827
Overall Solution coverage: 0.261 Solution consistency: 0.822									

Note: Filled circles indicate above threshold levels of full membership, thereby the presence of the condition, whereas unfilled circles indicate negative conditions. Blank cells represent "do not care" conditions.

the green bond issuance choice. The configurations indicate the determinants cannot work on the issuance choices in isolation. The three causal modes generally clarify why a firm would choose the green bond as the debt financing tool. The issuance decision is the rational outcome after issuers evaluate their characteristics and capital needs and coordinate with the macro monetary policy.

The findings suggest several targeted policy implications and managerial contributions. For policy designers, there are four recommendations. 1) The significant determinants cover all the three classifications of potential factors, which indicates that a better mechanism design of green bonds and some targeted policy promotion will be able to play a role in improving the popularity of green bonds, such as discount encouragement; 2) As the local financial development and broad green finance policy cannot show apparent effects on green bond issuance, refined policies are required, and the issuers with better "green images" should be paid more attention to; 3) Monetary policy conditions would guide the issuer behavior, thus the tight monetary policy stage happens to be a window period that appeal financing demanders to enter the green bond regime, adequate publicity, short-term discount care, and etc. should be adopted to seize such opportunities; 4) The regression results and three causal modes both indicate the green bonds are more like a sub-optimal alternative for issuers, thus it is an inevitable requirement to promote a more complete green financial system to reduce the potential issuance costs and risks, it might change the issuer's inherent pecking order for different financing instruments.

Regarding corporates, the worldwide development of green bonds will be imperative. Therefore, understanding and gaining experience in issuing green bonds is of positive significance for reducing the financing costs of enterprises in the long run. Moreover, our results imply that companies may enhance the company's "green image" by participating in the green bond market. Considering this supernumerary advantage, green bonds should be more entertained by corporate issuers.

6. Limitations and future research lines

Limited by the research focus and the weakness of the paradigm, this paper can be further extended in several directions.

An obvious extension would be the examination of situations for other countries. Since this paper mainly concentrates on the case of China, some potential universal characteristics in the rationales behind the green bond issuance choice cannot be summarized. In other words, the findings could only explain the Chinese tale, it should be cautious about applying the corresponding recommendation to other economic areas. The subsequent targeted analysis would be crucial to guide the development of green bonds for other countries efficiently.

Exploring the drivers of the issuance choices of unlisted issuers and governmental financial issuers is also a natural subject for future research. In this paper, we exclude the cases of unlisted issuers due to the unavailability of data collection, thus the conclusion cannot be fully promoted to unlisted issuers. Moreover, the neglect of the issuance choice for other kinds of issuers also makes it unclear to acknowledge the full rationales of different types of green bond issuers. As the green bond itself has different classifications, there might be some conclusions from testing the issuance options for different types of green bonds, which would supplement the current research findings.

At last, our multi-causal modes were obtained from the fs-QCA simulation. Since this method still has shortcomings in its weak mathematic foundationxtended by using another methodology to quantify this effect.

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Appendix

	COST	SIZE	TENOR	TASSET	PROFIT	CURRENT	COLLATERAL	SOE	EREMPHASIS	AGE	MP	LFD	LGFP	COVID-19
COST	1.00													
SIZE	−0.30	1.00												
	(0.00)													
TENOR	0.13	0.16	1.00											
	(0.14)	(0.06)												
TASSET	−0.34	0.49	−0.03	1.00										
	(0.00)	(0.00)	(0.76)											
PROFIT	−0.29	0.15	−0.15	0.02	1.00									
	(0.00)	(0.08)	(0.07)	(0.85)										
CURRENT	0.27	−0.21	0.11	−0.47	−0.23	1.00								
	(0.00)	(0.02)	(0.19)	(0.00)	(0.01)									
COLLATERAL	−0.51	0.21	−0.15	0.42	0.37	−0.45	1.00							
	(0.00)	(0.02)	(0.08)	(0.00)	(0.00)	(0.00)								
SOE	−0.56	0.10	−0.03	0.26	0.22	−0.47	0.57	1.00						
	(0.00)	(0.28)	(0.72)	(0.00)	(0.01)	(0.00)	(0.00)							
EREMPHASIS	−0.22	0.21	−0.12	0.40	0.08	−0.15	0.13	0.16	1.00					
	(0.01)	(0.02)	(0.15)	(0.00)	(0.36)	(0.08)	(0.14)	(0.06)						
AGE	−0.28	0.05	0.13	0.19	0.22	−0.24	0.28	0.58	0.01	1.00				
	(0.00)	(0.57)	(0.12)	(0.03)	(0.01)	(0.01)	(0.00)	(0.00)	(0.89)					
MP	0.14	−0.16	0.08	−0.41	−0.02	0.30	−0.20	−0.36	−0.37	−0.33	1.00			
	(0.12)	(0.07)	(0.36)	(0.00)	(0.83)	(0.00)	(0.02)	(0.00)	(0.00)	(0.00)				
LFD	−0.02	0.04	−0.01	0.07	0.07	−0.06	−0.06	−0.05	−0.08	−0.01	−0.06	1.00		
	(0.86)	(0.61)	(0.90)	(0.46)	(0.44)	(0.48)	(0.51)	(0.57)	(0.38)	(0.89)	(0.47)			
LGFP	−0.19	0.23	−0.04	0.39	0.13	−0.25	0.19	0.22	0.25	0.22	−0.64	0.13	1.00	
	(0.03)	(0.01)	(0.63)	(0.00)	(0.12)	(0.00)	(0.03)	(0.01)	(0.00)	(0.01)	(0.00)	(0.15)		
COVID-19	−0.30	−0.02	−0.18	0.07	−0.09	−0.07	0.09	0.15	0.06	0.05	−0.19	0.08	0.06	1.00
	(0.00)	(0.81)	(0.04)	(0.41)	(0.33)	(0.42)	(0.28)	(0.09)	(0.52)	(0.55)	(0.03)	(0.37)	(0.47)	

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