GREEN BOND VS CONVENTIONAL BOND: OUTLINE THE RATIONALE BEHIND ISSUANCE CHOICES

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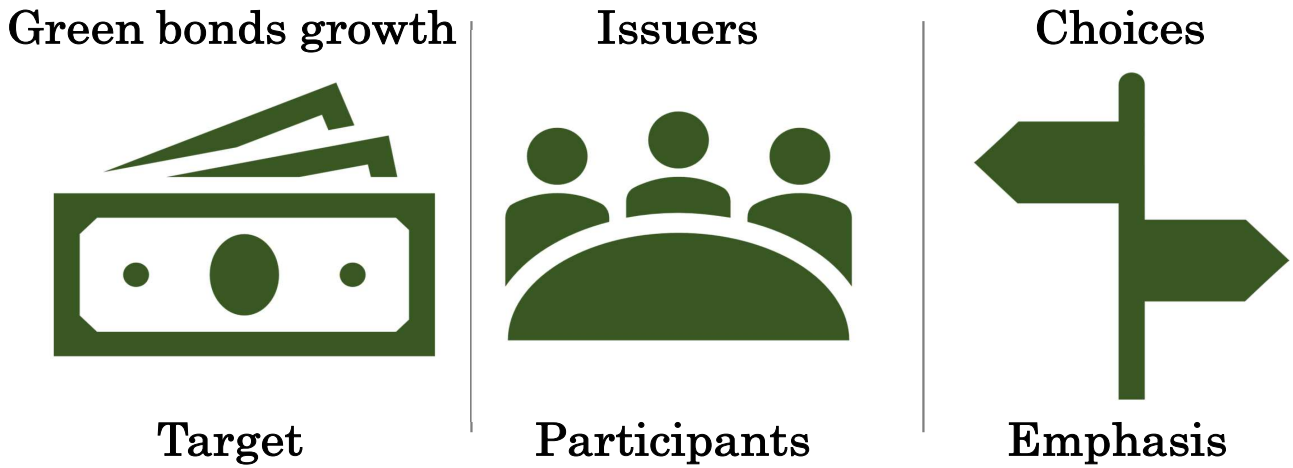
Abstract

Increasingly serious ecological problems have generated a large number of focus on environmental-friendly green bonds. 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 multiple regressions and fuzzy set qualitative comparative analysis. The results demonstrate different motives and premises drive firms to choose green or conventional bonds. 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.

Keywords: Green bonds; China; Issuance; Motivation; fs-QCA

Motivation



- Understanding the rational behind firms' behavior of issuing the green bonds could **help decision makers** introduce more effective incentive policies.
- **Research** to appraise firm motivations to issue specific green type fixed-income assets remains **limited**.
- Only identifying the elements affecting green bond issuance behaviors from a specific perspective would be **insufficient** for capturing the **complex multi-causal modes**.

RESEARCH BACKGROUND FOR REALITY

- **Green bonds:** The use of proceeds are limited to funding the green projects that meet the prescribed conditions.
- As a new financing channel for green projects, green bonds have been keenly promoted. Since 2016, China' s green bond market has been developing rapidly and has achieved *"From Zero To Hero"*. Nowadays, China is the second largest green bonds issuance nation.
- The intensification of climate change promotes global carbon neutral actions. China has set a goal to peak carbon emissions by 2030 and achieve **carbon neutrality** by 2060. The realization of this goal will inevitably require the applications of financial instruments.
- Promoting the development of green bonds has sufficient practical significance for the green economy and the realization of carbon neutrality.
- Discussing the rationale behind green bonds issuance is a key prerequisite to better promote the development of green bonds.

RESEARCH BACKGROUND FOR LITERATURE

- The research on green bonds mainly includes two aspects: the special financial characteristics of green bonds; the investment analysis for green bonds.

- Many studies have shown that green bonds have unique characteristics, which may further affect the issuer's choice. However, little attention has been paid to investigating the conditions where firms are more inclined to issue green bonds.

Aim **Identify the combinations of the issue-related, issuer-related and external factors of enterprises (listed) that may be related to their green bond issuance behavior.**

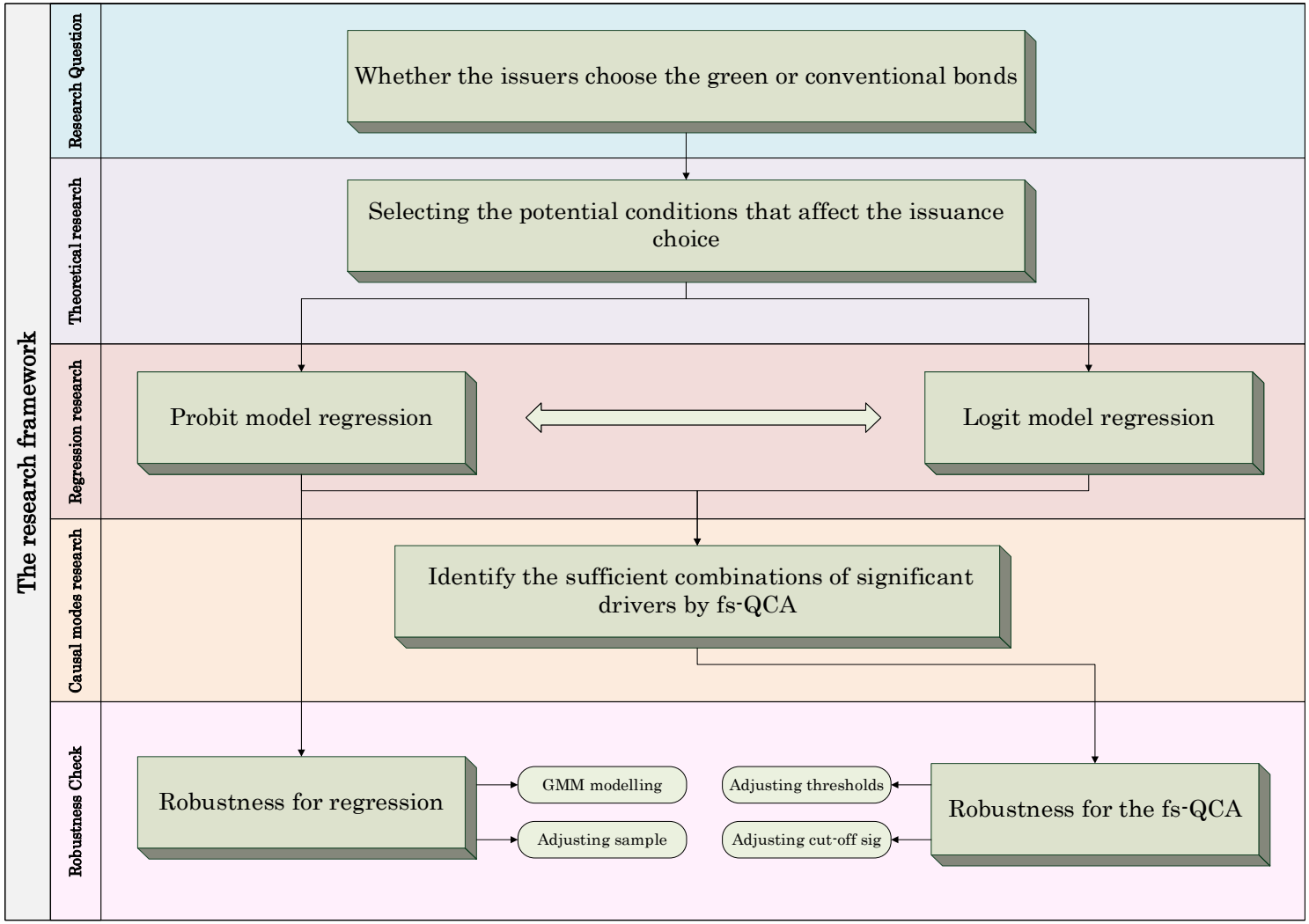
Issue-related What kinds of advantages for green bonds motivates issuance behavior.

Issuer-related What kinds of traits for firms driving green bond issuance behavior.

External What kinds of atmospheric determinants affecting the decisions of green bonds issuance.

Combinations Both indicating the efficient factors and detecting the complex multi-causal modes.

Research steps



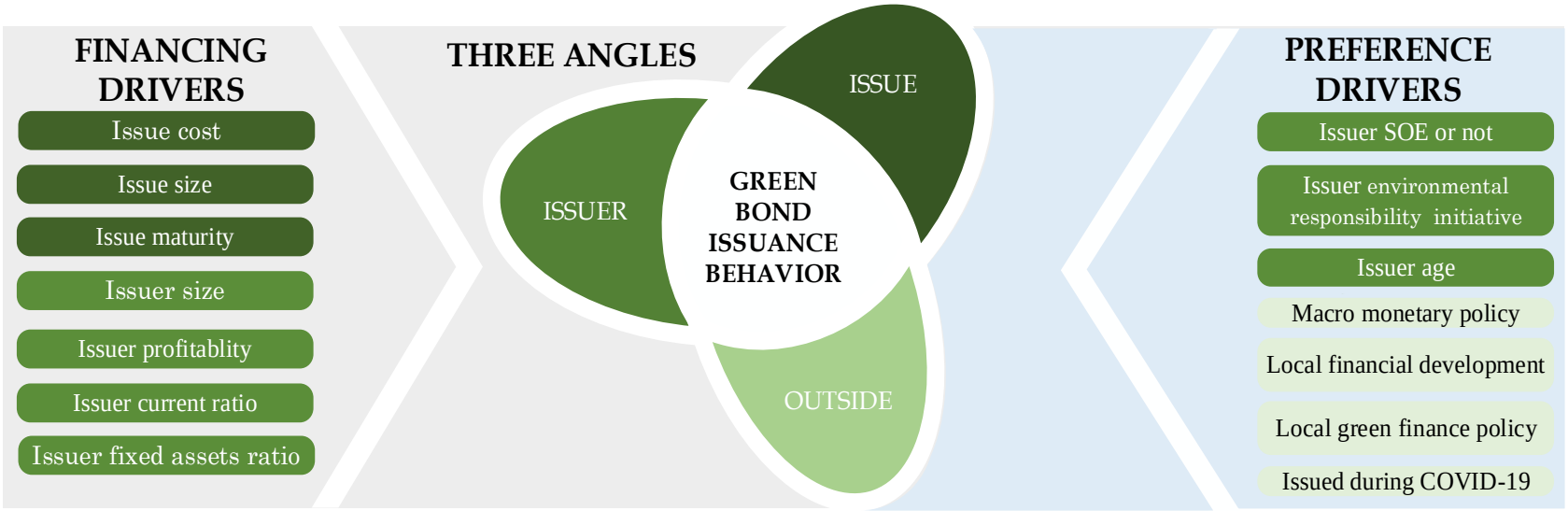
Research steps

1. Collecting and filtering data sets, then constructing the variables that potentially influence the issuers' choices based on the theoretical research .

2. We use the Probit or Logit model to confirm the statistically significant determinants in issuers choosing the types of bonds;

3. Using the fs-QCA model to detect the multi-causality modes so as to capture the pathways for issuers' choices between green and conventional bonds, the robustness check would be added here.

Selecting the underlying determinants



The main objective of this paper is to analyze the rationales behind the issuance of green bonds; thus, as much as possible explanatory variables need to be involved. According to the above theoretical analysis and the variable design in related literature, this article selects 14 potential issuance determinants based on the three aspects.

Determinants	Description	Theoretical deduction
Issue conditions		
COST	% rate of coupon interest per annum, representing the cost of financing.	The higher cost would discourage issue green bonds.
SIZE	The total amount issued.	Higher financing demand would discourage issue green bonds.
TENOR	Number of years for bond maturity	Longer maturity would encourage issue size, thereby the conventional bond is preferred.
Issuer conditions		
TASSET	Value of total assets in billion RMB, representing the firm size of the issuer.	Smaller companies are more difficult to finance through conventional ways and tend to take advantage of emerging green bonds
PROFIT	The EBIT to total assets (%), representing the profitability of the issuer.	Firms with higher profitability would more likely issue green bonds
CURRENT	The current ratio, representing the ability of issuers to pay off their debts	Companies with better solvency (smaller current ratio) are more willing to issue conventional bonds
COLLATERAL	A ratio proxy: fixed assets scaled by the total assets	Lower collateral implies a higher risk for issuers, thus the firms with less collateral tap on the green bonds.

SOE	Whether the issuer is a state-owned company (1 = SOE; 0, otherwise).	The state-owned company would more likely to issue green bonds due to government promotion
EREMP HASIS	Environmental responsibility emphasis level scores (1-8), calculated by authors, representing the initiative of issuers participating in the social-environmental responsibility-friendly actions[1].	Companies that actively participate in environmental affairs are more likely to accept and recognize the concept of green bonds, thereby issue more green bonds
AGE	The number of years since the issuer was founded.	The older companies might Often less willing to accept new things, like green bonds
Outside conditions		
MP	% annual growth rate of money supply M2, representing the conditions of monetary policy	When monetary policy is loose, it is easier for companies to financing in conventional ways, thereby reducing their enthusiasm for emerging green bonds
LFD	The financial development level of the region where the issuer is located, represented by *Local deposit and loan balance/*	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.

LGFP	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 can guide companies to make more use of green financing tools
COVID-19	Dummy variable that takes the value 1 for bonds issued during the COVID-19 period (Citing the Lin and Su (2021) 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 made it difficult for companies to maintain a great cash flow, which may make green bonds more popular than usual as a new financing instrument

Data

- Collect green bonds data from the CSMAR database
- Delete bonds issued by banks or governments
- Filter perpetual debt
- Filter bonds with missing information
- Screen out bonds issued by listed companies
- Matching 1-2 conventional bonds for each green bond based on traits of issuers (same industry type, the main business meets the green bond project directory, bonds issued after 2016, also the listed issuer. We try our best to ensure that the financing through conventional bonds can also be achieved through green bonds)
- Collect information of all the selected bonds

Data

	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

LOGIT AND PROBIT MODEL

	Probit Modelling			Logit Modelling		
	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

Findings from regression

- Companies with lower financing costs tend to issue green bond They financing through GB for a lower cost;
- Firm size often negatively affects corporate green bond issuance behavior;
- Companies with lower profits are more likely to seek financing through green bonds;
- The environmental information disclosure scores that reflects the corporate green preference, have the positive relationship with green bond issuance behavior;
- Changes in macro-monetary policy will also affect corporate bond selection decisions. Loose monetary policy has made green bonds less popular.

There is still a question: how these factors combined determine the choices of issuers, or what are the pathways of firm choosing between the two bond financing instruments

THE FOLLOWING REASONS FOR USING THIS METHOD

1. This method could summary the potential correlations between multiple case combinations.
2. This method make it possible to explain causal asymmetry problem.

(1) Calibration
(2) Evaluating the combination of conditions

$$Consistency((X_i \leq Y_i) = \sum\{min(X_i, X_i)\}/\sum(X_i))$$

$$Coverage((X_i \leq Y_i) = \sum\{min(X_i, X_i)\}/\sum(Y_i))$$

(3) Using Boolean algebra to represent feasible combinations of causes
(4) Summary the results

Calibration

	Thresholds		
	Full membership	Cross-over point	Full non-membership
Green	1 = issued bond is green bond, 0 = conventional bond		
COST	5.95	4.79	3.72
TASSET	85.07	32.74	15.27
PROFIT	0.07	0.06	0.04
ED	5.00	3.00	2.00
MP	10.45	8.80	8.40

To transform the raw data into fuzzy-set data, the calibration process was based on the thresholds for full membership (≥ 0.75), full non-membership (≤ 0.25), and the crossover point (0.5).

Necessary conditions

	Presence of issuing green bonds		Absence of of issuing green bonds	
	Consistency	Coverage	Consistency	Coverage
COST	0.38	0.38	0.57	0.62
TASSET	0.54	0.56	0.40	0.44
PROFIT	0.43	0.41	0.59	0.59
ED	0.59	0.60	0.37	0.40
MP	0.42	0.43	0.51	0.57
~COST	0.62	0.57	0.43	0.43
~TASSET	0.46	0.42	0.60	0.58
~PROFIT	0.57	0.56	0.41	0.44
~ED	0.41	0.37	0.63	0.63
~MP	0.58	0.52	0.49	0.48

图: Detecting necessary conditions for firms issuing green bond

Based on Ragin (2008), none of considered conditions is the necessary condition (Consistency ≥ 0.9) for issuers choose green bond.

Sufficient conditions

Frequency Cutoff: 1	Issuing Green Bonds or Not *[Consistency Cutoff: 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		

Findings from fs-QCA

- No one factor is the necessary condition for financing through green bonds, indicating the good adaptability of green bonds;
- There are three configurations related to bond choice decision, which could be treated as three most common issuance decision process;
- Factors from three aspects do not affect the issuance choices in isolation, they will work together to influence the use of green bonds by companies;
- In general, the coverage rate is not high enough, reflecting that there might be some omitted factors. It may be important to explore the rationale of companies when they choose green bonds from other theoretical perspective in the future;

Conclusions

1. Both three kinds of factors from two theoretical perspectives are important for companies to choose green bonds and conventional bonds.

2. 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
3. There is no necessary condition for corporate bond selection behavior, reflecting each factor cannot affect a company' s bond issuance selection in isolation;

4. There are three important configurations affecting the firm's issuance decision, these pathways reveal the combined effect of internal and external factors is the sufficient condition of green bond issuance choice.

Implications

1. 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 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.

Contributions

1. We fill the research blank in the field of rationales for green bond issuance behaviors and partly confirm pecking order and trade-off theory in the issuers' choice on green and conventional bonds.
2. This paper considers the roles of determinants from the bond, issuer, and outside 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.
3. We apply, in addition to multiple Probit and Logit regression analysis, 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.
4. According to the main findings, this paper provides targeted implications for policy-makers to promote green bond development and some managerial recommendations.