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

Boqiang Lin*; Tong Su

China Institute for Studies in Energy Policy

Xiamen University

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 internal and external factors of enterprises (listed) that may be related to their green bond issuance behavior.**

Internal 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

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 Porbit 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

Trade-off theory

Firms should balance the benefits against the cost of debt and thus, have an optimal (well-defined) target debt ratio

Pecking order theory

The financing choices have peaking orders in which internal funds are preferred to external finance and debt is preferred to equity.

Internal conditions (such as bond characteristics and business or financial status) may play a role.
External conditions (such as public regulation or macro-environment) may play a role.

Determinant categories	Name	Description	Theoretical deduction	Expected sign
Outcome	Green	Whether the issued bond is green bonds (1 = green bond; 0 = conventional bond).	None	None
Financing conditions	COST	% rate of coupon interest per annum, representing the cost of financing.	Higher cost would discourage issue green bond	-
	TASSET	Value of total assets in hundred million RMB, representing the firm size of the issuer.	Smaller companies are more difficult to finance through conventional ways, and prefer the "safest" financing based on this asymmetric information effect	-
	PROFIT	The EBIT to total assets (%), representing the profitability of the issuer.	Firms with higher profitability would are less likely to rely on debt financing, corresponding the less interests on green bonds	-
	CURRENT	The current ratio, representing the ability of issuers to pay off their debts	Companies with better solvency are more willing to issue green bonds	+
Preference conditions	SOE	Whether the issuer is a stated-owned company (1 = SOE; 0, otherwise).	SOE would more likely to issue green bonds due to government promotion	+
	ED	Environmental disclosure scores (1-8), calculated by authors, representing the initiative of issuers participating in the environment friendly actions.	Companies that actively participate in environmental affairs are more likely to accept and recognize the concept of green bonds, thereby issue more 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	-
	LGFD	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	+

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

	Mean	Std.Dev.	Min	Max
Green	0.49	0.50	0.00	1.00
COST	4.83	1.28	1.69	7.50
TASSET	78.82	122.38	3.17	782.77
PROFIT	0.06	0.03	0.01	0.15
CURRENT	0.90	0.45	0.15	2.70
SOE	0.58	0.50	0.00	1.00
ED	3.22	2.24	0.00	8.00
MP	9.40	1.44	8.00	14.00
LGFD	0.45	0.50	0.00	1.00

FIGURE: Descriptive statistics

LOGIT AND PROBIT MODEL

Equations

$$Green = \alpha + \beta_1 COST + \beta_2 TASSET + \beta_3 PROFIT + \beta_4 CURRENT + \beta_5 SOE + \beta_6 ED + \beta_7 MP + \beta_7 LGFD + \varepsilon$$

	Logit Modelling			Probit Modelling		
	Coef.	Std. Err.	Z-Stat	Coef.	Std. Err.	Z-Stat
COST	-0.553**	0.265	-2.090	-0.310**	0.143	-2.170
TASSET	-0.003*	0.002	-1.840	-0.002*	0.001	-1.840
PROFIT	-20.079**	10.198	-1.970	-11.307**	5.594	-2.020
CURRENT	0.671	0.535	1.250	0.362	0.311	1.160
SOE	0.163	0.605	0.270	0.136	0.336	0.410
ED	0.251**	0.118	2.120	0.148**	0.066	2.250
MP	-0.306*	0.179	-1.710	-0.172**	0.097	-1.760
LGFD	0.199	0.396	0.500	0.123	0.242	0.510
Constant	5.481*	3.130	1.750	3.078*	1.655	1.860

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

FIGURE: The empirical results based on Logit and Probit model

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

FUZZY SET QUANTITATIVE COMPARATIVE ANALYSIS

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 ($\geq$ 0.75), full non-membership ($\leq$ 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

Figure: 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

	Firm issue green bond			Firm did not issue green bond
Configuration No.	1	2	3	4
COST		○	◯	●
TASSET	●	●	◯	◯
PROFIT	◯	◯	•	
ED	•		●	◯
MP	◯	◯	◯	●
Raw coverage	0.212	0.182	0.114	0.196
Unique coverage	0.073	0.043	0.076	0.196
Consistency	0.751	0.768	0.807	0.782
Solution coverage	0.331			0.196
Solution consistency	0.793			0.782

Findings from fs-QCA

- No one factor is the necessary condition for financing through green bonds ;
- There are four configurations related to bond choice decision, three of them are associated with issuing green bond, one is related to non-issuance;
- Internal and external factors do not work 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 internal and external factors are important for companies to choose green bonds and conventional bonds, which support the two theories.

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

3. There are four 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. Both internal and external factors are important sources that influence companies to choose green bonds. Therefore, the role of the government and the social environment cannot be ignored.
2. Preferential policies such as discounts on green bonds should be refined, focusing more on the small issuers with larger green preference, and policy advocacy is also necessary.
3. Issuers would consider the monetary policy conditions when they choose green or conventional bonds. When monetary policy is in a state of tightening, it happens to be a window period for guiding companies with financing needs to turn to green bonds.
4. The current green bonds are more like a desperate choice for enterprises. It is an inevitable requirement for the development of green bonds to promote the construction of a more complete green financial system to reduce the potential costs and risks of issuing green bonds.

Contributions

1. Filling the knowledge gap in the field of rationales for green bonds issuance behavior of firms, and confirm the trade-off theory and peaking order theory in the choices between green and conventional bonds.

2. Through evaluating the both inside and outside factors through regression and configurational approaches, we provide comprehensive understandings about the rationale behind the green bond issuance.

3. Capturing the pathways for enterprise issuing the green bonds that provide some targeted implications for policy-makers promoting the green bonds.