Green Bond, Institutional Investors and Corporate Value

Ke Chen [1], and Zixuan Ma [2*]

[1]Beijing Technology and Business University, Business School, Professor, Beijing 100048, China

[2]Beijing Technology and Business University, Business School, Master graduate student, Beijing 100048, China

Abstract. Based on the data of China 's green bond market, this paper selects companies that issue green bonds in China 's A-share listed companies from 2015 to 2021 and other listed companies in the industry as research objects to explore the impact and mechanism of green bond issuance on corporate value. Through empirical analysis, it is verified that green bond issuance can enhance the corporate value of issuing enterprises, and further tests the mediating effect of institutional investors ' shareholding between green bond issuance and corporate value.

1.Introduction

In 2007, the European Investment Bank issued the world's first green bond, which began to attract the attention of the investor market and showed a good development trend. Although China's green bond market started late, with the publication of the *Green Bond Issuance Guidelines* by the National Development and Reform Commission in 2015, China's green bond market has officially started and showed explosive growth since 2016. In 2017, China's green bond issuance reached $ 37.1 billion, second only to the United States, becoming the world's second largest green bond issuer.

With the vigorous development of China's green bond market and the continuous expansion of the issuance scale, the research on the economic consequences of green bond issuance on issuing enterprises has gradually emerged. Based on this, this paper first studies the correlation between green bond issuance and corporate value, and further studies the mechanism of green bond issuance affecting corporate value. Different from the previous literature, this paper focuses on the mediating effect of institutional investors in the relationship between green bond issuance and corporate value. Based on green bond issuance events, it provides more support for corporate internal governance from the perspective of investor market.

2. Literature review

2.1. Theoretical and empirical research on the relationship between green bond issuance and corporate value

Regarding the relationship between green bonds and corporate value, most scholars have conducted empirical demonstrations from the perspectives of stock price valuation, and financial performance.

2.1.1 The relationship between green bond issuance and corporate stock value.

There are two main views on the relationship between green bond issuance and corporate stock value at home and abroad. First, it is believed that green bond issuance can enhance the stock value of enterprises. Flammer (2018) found that investors responded positively to the announcement of green bond issuance, especially for initial issuance and third-party certified green bonds[1] .Yaming Ma et al. (2018) found that the issuance of green bonds has a continuous dynamic effect on the stock price of enterprises[4] .Second, it is believed that the stock market's reaction to the issuance of green bonds by enterprises is negative or not obvious. Roslen et al. (2017) found that the stock price was significantly positive on the first day after the issuance of green bonds, but had significant or insignificant negative effects during other event periods[2]. Based on the research of China's green bond data, Zhihui Liang (2018) also found that except for the announcement day and the following three days, the market's response to green bond events in other event windows was significantly negative or insignificant, and believed that the market 's response to the environmental preference information released by the green bond issuance announcement was not persistent and lagging. Through a comparative study of green bonds and traditional bonds in the same period[9].

2.1.2 The relationship between green bond issuance and corporate financial performance.

Most of the current research shows that green bond issuance can significantly improve corporate financial performance. Flammer (2018) used the difference-in-difference method to find that green bonds

*Corresponding author Email: mzx78101527@163.com

can improve business performance and create long-term value[1]. Kanamura (2020) found that green bond investment performance is better than traditional bond investment performance, but this advantage gradually decreases over time[3].Yaming Ma et al. (2020) found that green bonds can promote the improvement of enterprise value, and verified that investor sentiment and financing cost have obvious mediating effects between green bond issuance and enterprise value improvement[4].Buyun Ma (2020) found that the impact of green bond issuance on corporate performance has long-term and short-term differences. In the short term, green bond issuance has a significant positive effect on corporate performance, but in the long run, if green projects cannot be quickly converted into actual assets, it will lead to the rapid depreciation of the green reputation brought by the issuance of green bonds, and may even have a negative impact on corporate performance[5].

2.2. Green bond issuance, institutional investors ’shareholding and enterprise value

In addition to the consideration of economic performance, corporate social responsibility investment and social performance are also important monitoring indicators for institutional investors to choose investment enterprises (Neubaum D O, Zahra S A, 2006)[6]. Enterprises issue green bonds and use the funds raised to develop green projects. The behavior of issuing green bonds shows that the issuing enterprises fully internalize social responsibility issues such as environment, climate issues and industrial structure transformation into their own investment and financing decisions, which is the embodiment of corporate social responsibility. Therefore, it is conducive to the issuing enterprises to establish a good reputation, form a good image in the minds of investors, and bring positive reputation advantages.

At present, there are two completely opposite views on institutional investors and socially responsible investment in the theoretical circle: the myopic investor hypothesis and the super investor hypothesis. The former thinks that the internal and external pressure faced by institutional investors makes them pay more attention to the short-term returns of investment objects, which leads to their insufficient attention to the social responsibility investment of investment enterprises (Graves S B, Waddock S A, 1994)[8]. While the latter holds that institutional investors pay full attention to the social performance of investment enterprises when making decisions. The potential loss of value and the difficulty of discovering new investment make institutional investors must become long-term investors who pay attention to the social performance of investment enterprises （Mahoney L，Roberts R W，2007）[7].Therefore, investors will have higher preferences for enterprises with better corporate social responsibility. Based on the large scale of funds and shareholding advantages, institutional investors can participate in the internal decision-making of the company by hand voting. On the other hand, based on the cost-benefit principle, institutional investors are more motivated to participate in corporate governance and turn to long-term investment to protect investment rights. Based on the above analysis, institutional investors can play an active role in corporate governance and promote the improvement of corporate value.

3. Theoretical analysis and research hypothesis

3.1. Green bond issuance and enterprise value

Green bonds are essentially the creditor’s rights and debt certificates of the issuing enterprises. Green bonds have the dual attributes of bond and green. From the perspective of bond attribute, enterprises increase the proportion of debt in their capital structure by issuing green bond financing. MM capital structure theory shows that in the case of corporate income tax, the higher proportion of debt in the capital structure, the more significant the effect of tax shields on the reduction of capital costs, thereby increasing corporate value. The pecking order financing theory points out that compared with equity financing, bond financing can reduce the degree of information asymmetry between issuers and investors, reduce financing costs, and cause relatively positive market reactions. Therefore, the issuance of green bonds by companies may reduce their own financing costs and thus increase corporate value (Yaming Ma et al, 2020)[4]. At the same time, the issuance of green bonds for debt financing can constrain the free cash flow available to management, reduce the agency costs. And green bonds are based on relatively long bond maturities, which can effectively alleviate the mismatch of financing maturities, reduce corporate financing constraints (Jinhui Ning and Min Wang,2021)[9], effectively improve internal corporate governance, enhance new liquidity, and promote corporate value. At the same time, it meets the investment needs of specific investors and has a positive impact on environmental protection and social sustainable development. The issuance of green bonds helps companies establish a good reputation. Based on the above theoretical analysis, the issuance of green bonds can improve corporate reputation, gain investor trust and reduce the financing cost of issuing enterprises, effectively alleviate financing constraints, thereby improving the internal governance level of enterprises and promoting the improvement of corporate value. Therefore, this paper proposes hypothesis 1.

H1：There is a significant positive correlation between green bond issuance and corporate value.

3.2. Green bond issuance, institutional investors ’shareholding and enterprise value

The issuance of green bonds indicates corporate social responsibility, thus attracting the attention of institutional investors. At the same time, institutional investors have the motivation and ability to participate in the company's internal governance, which has an impact on corporate value.

First of all, based on the theory of shareholder activism, institutional investors have stronger motivation and more active supervision of management behavior because of the high proportion of investment scale. Institutional investors form an investment relationship with the invested enterprise by holding the shares of the enterprise, so the financial status of the invested enterprise will affect the investment income of institutional investors. Compared with the investment loss caused by selling stocks and the opportunity cost of idle funds, institutional investors supervise the management by hand voting. Based on the consideration of obtaining long-term returns of enterprise value, institutional investors can play an active role in governance and supervision, create a high-quality governance environment, and have a positive impact on corporate value. Therefore, institutional investors have an incentive to actively play the role of internal governance of enterprises, so as to maintain their own investment income.

On the other hand, based on the integration and interpretation of information with professional advantages and channel advantages, institutional investors can improve the efficiency of information, promote the optimization of decision-making scheme, reduce investment decision-making errors and reduce the potential loss of the invested enterprise. At the same time, institutional investors can transfer internal information to the outside of the company through changes in shareholding, increase the exposure of managers moral hazard, improve the quality of information disclosure of enterprises, alleviate the degree of information asymmetry between enterprises and investors, increase the stock market’s demand for enterprises, and enhance corporate value. Based on the above analysis, this paper proposes hypothesis 2.

H2: Institutional investors’ shareholding has a mediating effect between green bond issuance and corporate value.

4.Research design

4.1. Sample selection and data sources

China’s green bond market started late and the issuance time span is short. Therefore, this paper selects A-share listed companies in Shanghai and Shenzhen from 2015 to 2021 as research samples. This paper data of the green bond are from the CSMAR database. Considering the industry characteristics of green bond issuing enterprises, the paper， according to the CSRC’s 2012 industry classification standard, selected the data of A-share listed companies in seven industries as the research objects, including manufacturing, mining, production and supply of electricity, heat, gas and water, wholesale and retail, water conservancy, environment and public facilities management, construction, transportation, warehousing and postal services. To a certain extent, it alleviates the endogenous problems caused by sample selection errors and realizes the accurate matching of the experimental group and the control group within the sample. At the same time, the sample data is processed as follows :(1) eliminate ST or ST * enterprises; (2) Excluding enterprises listed after 2015; (3) Eliminate missing values and abnormal data samples. Finally, 11630 data observations are obtained.

4.2. Variable setting and model construction

The definition of the main variables in this paper is shown in the following table (Table1).

Table 1. Variable description and definition

Type	Variable name	Description
Dependent Variable	tobinqA	Enterprise market value / total assets
	tobinqB	Enterprise market value / total assets-net intangible assets-net goodwill
Independent Variable	green*time	It represents the cross term of green bonds and issuance time. If enterprise i issues green bonds in year t, then enterprise i does take 1 in year t and the following years, otherwise 0.
Mediator variable	totalholdinv	Number of institutional investors holding; Ln (institutional investors holding number)
Control Variable	leverage	Debt ratio (Total liabilities / total assets)
	size	Size of enterprise; Ln (total assets)
	roa	Return on total assets (Net profit / total assets)
	liquid	Asset liquidity (Monetary assets / current liabilities)
	rotate	Turnover of total assets (Operating income/total assets)
	growth	Net profit growth rate
	sharehold	Ownership concentration (Shareholding ratio of top ten shareholders)
	director	Board size (The total number of board of directors)

ind	Proportion of independent directors (Number of independent directors / total number of directors)
Year	Year

4.2.1 Model construction

In order to study the impact of green bond issuance on corporate value, a regression model (1) was constructed to test hypothesis 1.

$tobinq_{it}=\beta_0+\beta_1 did_{it}+\gamma X_{it}+corporate_i+Time_t+ {}_{it}$ (1)

In order to verify the mediating role of institutional investors' shareholding between green bond issuance and corporate value, constructed this model（2）and （3）.

$totalholdinv_{it}=\alpha_0+\alpha_1 green_i*time_t + \gamma X_{it} + corporate_i +Time_t+ {}_{it}$ （2）

$tobinq_{it}=\eta_0+\eta_1 totalholdinv_{it}+\eta_2 green_i*time_t +\gamma X_{it} +corporate_i+ Time_t+ {}_{it}$ （3）

5. Authentic proof analysis

5.1. Descriptive statistic

This table (Table2) is the descriptive statistical results of the whole sample. It can be seen that the mean value of tobinqA is 2.03, the median is 1.60, the standard deviation is 1.32, the minimum value is 0.83, and the maximum value is 8.33. The median is lower than the mean, the gap between the most values is large, and the data distribution is not concentrated. tobinqB also presents the same data distribution characteristics. From the descriptive statistics, it can also be seen that there are great differences in the growth of enterprises, the size of the board of directors, the proportion of independent directors and the concentration of ownership.

In order to analyze the influencing factors and economic consequences of green bond issuance on enterprise value, this paper further subdivides green bond issuing enterprises into two categories: first-time green bond issuing enterprises and non-first-time green bond issuing enterprises.

Table 2. Descriptive statistics of the whole sample

variable	sample	Mean	SD	Med	Max	Min
tobinqA	11630	2.03	1.32	1.60	8.33	0.83
tobinqB	11630	2.24	1.46	1.77	9.06	0.87
totalholdinv	11630	19.48	1.57	19.53	23.38	14.70
size	11630	22.64	1.28	22.47	26.46	20.22
leverage	11630	0.44	0.19	0.43	0.86	0.07
roa	11630	0.03	0.06	0.03	0.19	-0.22
liquid	11630	0.69	0.88	0.39	5.71	0.05
rotate	11630	0.63	0.43	0.54	2.58	0.08
growth	11630	-0.31	3.70	0.06	12.60	-23.10
director	11630	8.58	1.68	9	15	5
ind	11630	37.58	5.48	33.33	57.14	33.33
sharehold	11630	56.19	14.75	55.96	90.59	24.06

From the following table (Table3), it can be seen that compared with listed companies that issue green bonds for the first time, the average value of tobinqA and tobinqB of non-initially issued listed companies is larger, indicating that non-initially issued green bonds have a greater effect on corporate value. From the comparison of other variables, non-first-time green bond enterprises are significantly different from first-time green bond enterprises in terms of enterprise size, leverage ratio and proportion of independent directors.

Table3. Comparison of first-time and non-first-time

variable	first-time （212）	non-first-time （147）	
	mean	mean	Difference of mean
tobinqA	1.302	1.305	-0.003
tobinqB	1.488	1.503	-0.015
totalholdinv	21.280	21.280	-0.099
size	24.370	24.620	-0.253**
leverage	0.557	0.609	-0.052***
roa	0.034	0.033	0.001
liquid	0.295	0.290	0.005
rotate	0.462	0.414	0.048
growth	0.034	0.134	-0.100
director	9.528	9.388	0.141
ind	36.340	37.420	-1.086*
sharehold	64.110	66.220	-2.106

5.2. Regression analysis of green bond issuance and enterprise value

This table (Table4) is the regression results of green bond issuance and corporate value. Form the table, the coefficient of green*time is 0.188, which is significant at the level of 1 %. After adding control variables, the coefficient of green*time is 0.281, which is also significant at the level of 1 %. At the same time, according to the columns (3) and (4), after replacing the explained variables, the regression coefficient of green bond issuance and enterprise value is still significantly positive. This shows that the behavior of corporate green bond issuance has a significant effect on corporate value, and the regression results support hypothesis 1 of this paper.

Table 4. Model regression results

	(1)	(2)	(3)	(4)
variables	tobinqA	tobinqA	tobinqB	tobinqB
green*time	0.188***	0.281***	0.227***	0.318***
	(2.916)	(4.251)	(3.222)	(4.587)
size		-0.50***		-0.47***
		(-6.733)		(-5.721)
leverage		0.186		0.051
		(0.842)		(0.209)
roa		3.006***		3.606***

		(8.623)		(9.505)
liquid		0.060**		0.011
		(2.045)		(0.334)
rotate		0.251***		0.154*
		(3.263)		(1.827)
growth		-0.01***		-0.01***
		(-3.382)		(-2.924)
director		-0.007		-0.007
		(-0.424)		(-0.369)
ind		-0.000		0.001
		(-0.077)		(0.203)
sharehold		-0.003		0.000
		(-1.132)		(0.047)
Constant	2.023***	13.18***	2.233***	12.84***
	(2,511.8)	(7.842)	(2,544.7)	(6.811)
Observations	11,629	11,627	11,629	11,627
AdjustedR^2	0.652	0.673	0.655	0.674
FE	Yes	Yes	Yes	Yes

Table 4. Model regression results

5.3. Mediating effect test

The regression of the mediating effect of institutional investors is shown in the table (Table5). Based on the sobel test, this paper verifies the mediating effect of institutional investors' holdings between green bond issuance and corporate value. The results of the sobel test show that it is significant at the 5 % level, indicating the existence of the mediating effect of institutional investors. From column (1) and (2) in the table, it can be seen that the coefficients of institutional investors' shareholding and green*time are significantly positive, indicating that institutional investors play an intermediary role between the issuance of green bonds and corporate value. At the same time, the coefficient of green*time (0.279;0.303) in the table 5 corresponding to table 4(0.281;0.318) is smaller, indicating that the shareholding ratio of institutional investors plays a partial intermediary effect between the issuance of green bonds and corporate value.

Table 5. Mediating effect test

	(1)	(2)
variables	tobinqA	tobinqB
totalholdinv	0.232***	0.229***
	(22.951)	(20.211)
green*time	0.279***	0.303***
	(3.118)	(3.019)
size	-0.603***	-0.641***
	(-47.957)	(-45.379)
liquid	0.149***	0.129***
	(12.502)	(.)
roa	5.555***	5.980***
	(27.689)	(26.541)
liquid	0.000	0.000
	(.)	(9.672)
rotate	-0.051**	-0.164***
	(-1.993)	(-5.772)
growth	-0.022***	-0.022***
	(-7.658)	(-6.811)
director	-0.011	-0.020**
	(-1.570)	(-2.510)
ind	0.016***	0.015***
	(7.521)	(6.248)
sharehold	-0.002**	-0.000
	(-2.374)	(-0.216)
Constant	10.304***	11.584***
	(46.795)	(46.847)
Observations	11,630	11,630
Adjusted R^2	0.383	0.363
FE	Yes	Yes

6.Conclusion

This paper takes the data of listed companies in the industry where China's A-shares issue green bonds from 2015 to 2021 as the research sample, and empirically tests the impact of green bond issuance on corporate value and the relationship between institutional investors in green bond issuance and corporate value. The empirical results show that the issuance of green bonds has a positive effect on corporate value, and institutional investors play a partial mediating effect between green bond issuance and corporate value. The empirical results show that institutional investors as shareholders can play an active role in shareholder governance in corporate governance, which provides new ideas for green bond supervision and corporate governance.

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