

Research on the Impact of Issuing Green Bonds on the Corporate Value of Listed Companies in China

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Abstract: To study the impact of green bond issuance on the value of issuing entities, this paper uses panel data of green bond issuance by Chinese A-share listed companies from 2015 to 2023, and employs a multi period difference in differences (DID) model to empirically analyze the value changes before and after the issuance of green bonds by enterprises. The research results indicate that firstly, issuing green bonds can significantly improve the TobinQ value of enterprises, that is, green bonds have a positive impact on enterprise value. Secondly, the reduction of debt financing costs has played a partial intermediary role between green bonds and corporate value. Thirdly, in heterogeneity analysis, enterprises in the eastern region and polluting industries are more significantly affected by green bonds.

Keywords: Green bonds, Enterprise value, Green innovation.

1. Introduction

In recent years, China's economy has shown a strong development trend and achieved historic leaps. Since the reform and opening up, especially in the 21st century, China's total economic output has achieved a qualitative leap, with GDP soaring from 1.092 trillion yuan in 1987 to 1.260582 trillion yuan in 2023, firmly ranking as the world's second largest economy. However, with the rapid growth of the economy, the contradiction between environment and development has become increasingly prominent, becoming a major challenge that restricts sustainable development. Ecological and environmental issues, such as air pollution, water pollution, soil degradation, and loss of biodiversity, are increasingly attracting widespread attention from all sectors of society. Green bonds are highly expected to achieve seamless integration of green funds from fundraising to efficient investment in green projects through the transmission mechanism of financial markets, thereby internalizing the ecological value of environmental protection into the actual value of enterprise growth.

Since its first launch in 2007, green bonds have undergone several years of development and exploration. However, it was not until 2013 that this innovative financial tool truly gained widespread recognition and adoption worldwide. Prior to this, the concept of green bonds was still in its infancy, and market participants' understanding of its feasibility and potential impact was still not deep enough. There are significant differences in the development speed of green bond markets among countries (L'EPEZ-CABARCOS et al., 2021), which reflect the influence of multiple factors. So, what factors are driving the rapid growth of the green bond market?

Tolliver et al. (2021) conducted an in-depth study on the green bond markets of 49 countries between 2007 and 2017, emphasizing the key role of policy makers in promoting the development of green bond markets and pointing out the interactive relationship between policies and the economic environment. The study showed that the independent contributions made by countries under the framework of the Paris Agreement are one of the core driving forces for the development of green bond markets. Secondly,

macroeconomic environment and institutional factors also play an undeniable role. The stability of economic growth, the level of development of financial markets, and government regulatory policies will directly affect the issuance and investment of green bonds. Torvanger et al. (2021) compared the absorption of green bonds in Norway and Sweden from 2013 to 2019 and found that Sweden's rapid growth in this field is mainly attributed to its unique business culture, the emphasis on sustainable development by financial institutions, and the diversification of the corporate sector. The business environment in Sweden encourages companies to consider environmental factors in their investment decisions, leading to a thriving green bond market. In contrast, Norway faces more complex challenges. Despite Norway's advantage in the energy sector, competition for high-yield investment projects such as oil and gas has led investors to be more inclined towards these traditional energy sources, thereby suppressing the development of the green bond market [1]. Nanayakkara et al. (2021) studied the demand for green bonds among investors in G20 countries and found that strict adherence to the Green Bond Principles (GBP) can significantly increase investor demand [2]. Agliardi et al. (2019) showed that the tax incentives implemented by the government and the increased awareness of green investment among investors have played a crucial role in the expansion of the green bond market. They not only promote the green financing capabilities of enterprises, but also enhance the overall attention of the market to sustainable development, thereby promoting more investors to participate in this emerging field [3]. Broadstock (2019) pointed out that the volatility of the capital market, uncertainty in economic policies, and energy prices are the main influencing factors for the development of the green bond market. Banga (2019) studied the green bond market in developing countries and concluded that investors' attention to climate change and monetary policy are the main factors driving the development of the green bond market. At the same time, the obstacles at the institutional level mainly stem from the recognition and review techniques of green bonds, as well as the unreasonable design of the system. At the market level, the small issuance scale and high transaction costs of green bonds are key obstacles that constrain market development. Tu et al. (2020) studied the influencing factors

of Vietnam's green bond market through the Analytic Hierarchy Process and found that the effectiveness of the legal system supporting green bonds, the monetary policy of the central bank, and interest rates are the main factors driving market development.

2. Research Hypothesis

2.1. Green Bond Issuance and Enterprise Value Analysis

According to the theory of priority financing, issuing green bonds as a debt financing method has the following advantages that can enhance corporate value: firstly, green bonds often enjoy lower issuance costs and interest rates, allowing companies to obtain financing at lower costs, which directly increases the company's profit margin and thus enhances its financial value. Secondly, as a debt tool, green bonds do not dilute shareholder equity like equity financing, and can optimize a company's capital structure by maintaining a lower weighted average cost of capital (WACC), thereby increasing the company's market value. According to signal transmission theory, on the one hand, companies issuing green bonds send signals to the market that they are committed to environmental protection, social responsibility, and sustainable development [4]. On the other hand, issuing green bonds can help attract ESG (Environmental, Social, and Governance) - oriented investors who typically have longer-term investment preferences and higher expectations for a company's sustainable development potential, thereby increasing its stock price and market value. According to the theory of externalities, on the one hand, funds from issuing green bonds are often used for environmental projects, reducing pollution emissions, improving resource utilization efficiency, etc. This helps to reduce the negative impact of enterprises on the environment, reduce regulatory and social responsibility costs, and in the long run, is beneficial for enterprises to obtain more policy support and social recognition [5]. On the other hand, the environmental protection projects invested by enterprises through green bonds can create positive externalities such as environmental protection and carbon emission reduction for society, thereby enhancing the social value of the enterprise and transforming them into brand value and market competitiveness through external benefits.

The issuance of green bonds can provide more favorable financing conditions for enterprises. On the one hand, green bonds have attracted a large number of institutional investors and funds focused on sustainable investment, who are often willing to accept lower yields because they place greater emphasis on environmental, social, and governance (ESG) standards. In this way, companies can raise funds at lower financing costs by issuing green bonds, reducing overall capital costs and directly enhancing corporate value. On the other hand, it can convey the company's commitment to environmental protection to the market and improve the company's social responsibility image. For companies that actively participate in green projects, issuing green bonds means that the company not only focuses on short-term profits, but also on long-term sustainable development [6]. This image enhancement can increase the trust and support of consumers, investors, and stakeholders. This' reputation effect 'can enhance a company's brand value, which is reflected in its market value. Taking into account these factors, this article proposes hypothesis H1:

H1: Issuing green bonds by enterprises can enhance their value.

2.2. Analysis of Enterprise Heterogeneity

The level of economic development, policy environment, and development of green finance markets in the region where the enterprise is located are important factors that affect the role of green bonds in enhancing the value of the enterprise. There are significant differences in resource allocation efficiency, financial market maturity, and policy implementation among different regions, resulting in regional heterogeneity in the use of green bonds to enhance corporate value. The level of regional economic development directly affects the utilization efficiency of green bonds by enterprises and the acceptance of the capital market [7]. Economically developed regions, such as the eastern region, have stronger market-oriented characteristics and higher levels of capital accumulation, which creates more favorable external conditions for enterprises to issue green bonds. Meanwhile, enterprises in these regions have strong capabilities in technological upgrading and industrial optimization, making it easier for them to utilize green bond funds to enhance their corporate value. Compared to other regions, enterprises in economically underdeveloped areas such as the central and western regions may not be able to fully utilize green bond financing to promote value enhancement due to low efficiency in capital utilization and insufficient technological reserves [8]. The development level of regional green finance markets largely determines the financing cost of green bonds and the acceptance of investors. In regions where the green finance market is more mature [9] (such as the eastern coastal areas), the issuance efficiency of green bonds is higher, the financing cost is lower, and it is easier to attract environmentally friendly investors to participate. Therefore, this article proposes the hypothesis H2b:

H2a: The promotion effect of issuing green bonds on the value of enterprises in different regions is more pronounced in the eastern region.

Industry characteristics are important factors affecting the value enhancement of green bonds for enterprises [10]. The differences in pollution levels, technological requirements, green transformation pressure, and policy support among different industries result in significant industry heterogeneity in the role of green bonds in enterprise value. Enterprises in high polluting industries often face greater environmental pressure and social responsibility requirements. High polluting industries can significantly alleviate their financial pressure caused by environmental compliance and promote green transformation through green bond financing [11]. The funds obtained by these enterprises through green bonds are mostly used for upgrading emission reduction technologies, pollution control, and clean production projects, which can reduce potential environmental risks and policy penalties, thereby indirectly enhancing the value of the enterprise. Therefore, this article proposes hypothesis H2b:

H2b: Compared to non-polluting industries, the issuance of green bonds has a more significant promoting effect on the value of polluting industry enterprises.

2.3. Analysis of Enterprise Heterogeneity

Green bonds are a type of bond specifically designed to fund environmental or sustainable projects. Compared to traditional bonds, green bonds often enjoy lower interest rates. The main sources of this interest rate discount are investor

preferences, policy support and incentives, and strong market demand [13]. Due to the increasing concern of society for sustainable development, more and more investors tend to invest in environmentally friendly financial products. Institutional investors and asset management companies are particularly interested in investing funds in environmental, social, and governance (ESG) investment tools. Green bonds attract these investors due to their environmental attributes, allowing issuers to raise funds at lower costs. Secondly, many governments have provided policy support for green bonds, such as tax breaks, low interest loans, and green finance incentives [14]. These policies have reduced the financing costs of enterprises. The issuance of green bonds indirectly enhances the financial health and market competitiveness of enterprises by reducing financing costs, improving corporate social responsibility image, enhancing risk management, and improving capital utilization efficiency. Based on the above analysis, the study can assume that H3:

H3: Green bond issuance can increase corporate value by reducing financing costs

3. Analysis of the Value Enhancement Effect of Green Bonds Issued by Listed Companies

3.1. Variable Declaration

For the dependent variable enterprise value, TobinQ combines market value with asset replacement cost, reflecting both the capital market's expectations for future earnings and the actual asset situation of the enterprise. This combination enables TobinQ to simultaneously consider the external evaluation of the market and the operational efficiency of internal assets, making it a comprehensive indicator for measuring enterprise value. TobinQ is widely used in empirical research as a reliable indicator to measure enterprise value, especially when studying the impact of enterprise capital structure, investment behavior, merger and acquisition decisions, corporate governance, and innovation capabilities on enterprise value. The widespread application of TobinQ stems from its simplicity, intuitiveness, and ability to comprehensively reflect market and business fundamentals.

In terms of explanatory variables, this article referred to Beck et al.'s (2010) setting and used the policy treatment variable did as the core explanatory variable [15]. If enterprise i issues green bonds in year t , then in the years after year t , the value of did is 1; On the contrary, it is 0. Meanwhile, the interaction term between the policy dummy variable and the time dummy variable is taken as the dependent variable.

In this study, the cost of debt financing is considered as an intermediary channel for the value of enterprises through the issuance of green bonds. Specifically, the issuance of green bonds can usually help enterprises obtain lower financing costs, because green bonds are popular with investors, the market demand is high, and the interest rate is usually lower than ordinary bonds. This article refers to the method proposed by Li Guangzi et al. (2009) and defines the cost of corporate debt financing as financial expenses divided by total liabilities at the end of the period. The measurement of green technology innovation performance is based on the green patent application status of enterprises. The green technology innovation index is used to measure the innovation input and output level of enterprises in environmentally friendly and resource efficient technologies. This indicator is usually based on the performance of

enterprises in green patents, reflecting the technological research and development achievements of enterprises in reducing pollution, energy conservation and environmental protection, clean energy and other aspects. In this empirical study, the logarithm of the sum of the number of green inventions and the number of green utility models of enterprises was used as a measure of green technology innovation in reference to ZHANG (2020) [16]. Specifically, first count the number of green invention and green utility model patents disclosed by each enterprise during the sample period, then add the two and take the logarithm to obtain the green technology innovation index. This method can effectively reflect the R&D investment and innovation output of enterprises in green technology, facilitating further analysis of the impact of green bond issuance on enterprise green technology innovation.

In terms of control variables, in this study, a series of control variables were introduced to ensure the robustness and accuracy of the analysis results, in order to reduce the interference of other factors that may affect enterprise value on the research results. This article selected some control variables that have potential causal relationships with TobinQ, as shown in the table 1 below.

Table 1. Control variable table

Variable	Variable Name	Variable Symbol
Explained Variable	Tobin Q	Tobin Q
Explanatory Variable	Policy Handling Variables	did
Intermediary Variable	Finance Costs	Cost
Control Variable	Enterprise Growth	Growth
	Return on Total Assets	ROA
	Total Asset Turnover	ATO
	Financial Leverage	Lev
	Company Size	Size
	Firm Age	FirmAge
	Cash Flow Ratio	Cashflow
	Ownership Concentration	Top1
	Board Size	Board
	Proportion of Independent Directors	Indep

3.2. Variable Declaration

The multi period double difference model is a commonly used empirical analysis method for evaluating the impact of policy interventions or specific events on sample and control groups. Unlike traditional two-stage DID models, multi-stage DID models can handle situations where events occur at different times within multiple time spans. To analyze the impact mechanism of green bond issuance events on corporate value and avoid endogeneity issues, this paper refers to the multi period double difference model proposed by Beck et al. (2010) and constructs the following equation [15]:

$$Y_{it} = \alpha_0 + \theta did_{it} + X_{it}\beta + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

In the model, TobinQ represents enterprise value, constant

term, policy treatment variable for green bonds, control variable, and individual fixed effects, which are used to control for the heterogeneity of enterprises that do not change over time. Represents the fixed time effect, used to control the time effect of all enterprises in different years. Represents the error term.

In terms of testing enterprise heterogeneity, this article uses group regression to test the hypothesis testing part of enterprise heterogeneity, examining the moderating effect of different enterprise characteristics on the relationship between green bond issuance and enterprise value, including the moderating effect of pollution industry attributes, industry regions, and enterprise property rights on the impact of green bonds on enterprise value.

In terms of the mediation effect model, this article refers to the method proposed by Baron (1986) [17] to test whether financing costs and green technology innovation performance play a mediating role between green bond issuance and corporate value.

$$Y_{it} = \alpha_1 + \omega did_{it} + X_{it}\beta + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

$$median_{it} = \alpha_2 + \gamma did_{it} + X_{it}\beta_2 + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

$$Y_{it} = \alpha_3 + \omega_1 did_{it} + \varepsilon median + X_{it}\beta_3 + \mu_i + \lambda_t + \varepsilon_{it} \quad (4)$$

Equation (2) is used to test the direct impact of green bond issuance events on enterprise value, where enterprise value is taken as variables such as Tobin Q or enterprise market value. Equation (3) is used to test the impact of green bond issuance on the mediating variables, which are financing costs and green technology innovation performance. Among them, financing costs are represented by the ratio of corporate financial expenses to total liabilities at the end of the period, while green technology innovation performance is represented by the logarithm of the sum of the number of green invention patents and the number of green utility model patents. Finally, equation (4) incorporates green bond issuance and intermediary variable financing costs into the regression equation as explanatory variables into the model to determine the significance of the intermediary effect.

3.3. Model Analysis Results

3.3.1. Benchmark Regression

In order to investigate the impact of issuing green bonds (DID) by enterprises on their enterprise value (TobinQ), this paper gradually introduces fixed effects to verify whether there is a difference in the impact of issuing green bonds on enterprise value before and after adding fixed effects, and whether the results are robust.

From the regression results in Table 2, it can be seen that the regression coefficients of the core explanatory variable did and the dependent variable TobinQ are 0.255, 0.232, and 0.094, respectively, and are significantly positive at the 1% level. This indicates that issuing green bonds by enterprises can promote the increase of enterprise value, and hypothesis H1 is verified.

Table 2. Benchmark regression results

VARIABLES	(1) TobinQ	(2) TobinQ	(3) TobinQ
did	0.255*** (9.495)	0.232*** (7.694)	0.094*** (2.936)
Size	-0.306*** (-59.341)	-0.466*** (-17.728)	-0.357*** (-14.486)
Lev	-0.170*** (-4.812)	0.419*** (4.958)	0.198** (2.527)
ROA	2.177*** (18.577)	1.584*** (12.552)	1.401*** (12.323)
ATO	0.012 (1.119)	0.117*** (3.547)	0.181*** (5.691)
Cashflow	0.479*** (5.218)	0.357*** (4.067)	0.398*** (4.897)
Growth	0.048*** (3.467)	-0.001 (-0.079)	-0.024** (-1.983)
Board	0.130*** (4.083)	0.104 (1.569)	0.075 (1.278)
Indep	0.007*** (6.658)	0.004* (1.752)	0.003* (1.808)
Top1	-0.028 (-0.787)	-0.342** (-2.320)	-0.326** (-2.326)
FirmAge	-0.382*** (-19.314)	-1.179*** (-18.320)	-0.135 (-0.679)
Constant	9.275*** (69.458)	15.324*** (27.556)	10.344*** (12.927)
Observation Value	14,354	14,354	14,354
R2	0.335	0.256	0.431
Individual Fixed Effects	NO	YES	YES
Fixed Year Effect	NO	NO	YES

Note: The values in parentheses are t, and *, **, *** indicate significance at the 10%, 5%, and 1% levels.

3.3.2. Robust Test

(1) Parallel Trend Test

From the parallel trend test chart, it can be seen that before the implementation of the policy, the coefficients of the dummy variables in the previous years all contained 0 in the 95% confidence interval, so they did not pass the significance test. This indicates that there is no systematic difference between the treatment group and the control group before the implementation of the policy, which satisfies the parallel trend test. After the implementation of the policy, it is evident that the dynamic effects of the policy have a significant upward trend and can all pass the significance test.

From the perspective of the dynamic effects of policies, the issuance of green bonds by enterprises has a positive promoting effect on enterprise value, further verifying the robustness of the benchmark regression results.



Figure 1. Parallel Trend Test

(2) Placebo test

On the basis of passing the parallel trend test, this article further examines to what extent the benchmark regression results are affected by random factors and omitted variables through placebo testing. Specifically, this study randomly selected experimental group samples and policy implementation time, reconstructed policy dummy variables, and then substituted the reconstructed false policy dummy variable x into the benchmark regression model (1) for regression. The above process was repeated 500 times, and finally a regression coefficient distribution map of x was

drawn for the 500 regression processes. From the distribution chart of the estimated coefficients drawn in Figure 2, it can be seen that the regression coefficients of the "pseudo policy dummy variable" are concentrated around 0 and far from the benchmark regression coefficients in this article. The distribution of the estimated coefficients is close to a normal distribution, with P-values mostly greater than 0.10 and not significant at the 10% level. This indicates that the impact of issuing green bonds on corporate value is not caused by other random factors, and the conclusion obtained in the previous text is reliable.

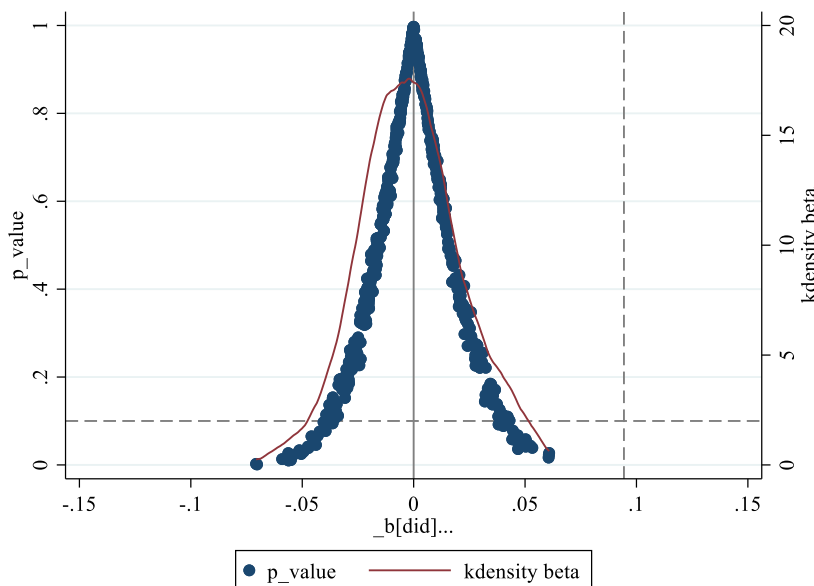


Figure 2. Placebo test

(3) Replace the explained variable

This article replaces the calculation method of the original dependent variable enterprise value in the benchmark model with market value $A/(\text{total assets} - \text{net intangible assets})$, and conducts model regression again. From the regression results in Table 3, it can be seen that the impact of issuing green

bonds on corporate value remains positive and significant, indicating that the conclusion that issuing green bonds promotes corporate value is robust and reliable, supporting the previous conclusion.

Table 3. Regression Results of Replaced Variables

VARIABLES	(1) TobinQ	(2) TobinQ	(3) TobinQ
did	0.286*** (9.774)	0.257*** (8.223)	0.111*** (3.228)
Size	-0.317*** (-52.458)	-0.411*** (-13.904)	-0.295*** (-10.078)
Lev	-0.408*** (-9.517)	0.290*** (2.832)	0.055 (0.559)
ROA	2.072*** (14.977)	2.171*** (14.465)	1.972*** (14.680)
ATO	-0.054*** (-4.171)	-0.003 (-0.071)	0.067* (1.659)
Cashflow	0.673*** (6.390)	0.378*** (3.843)	0.421*** (4.563)
Growth	0.179*** (9.822)	0.056*** (3.462)	0.032** (2.034)
Board	0.118*** (3.146)	0.159** (2.084)	0.130* (1.837)
Indep	0.008*** (6.055)	0.005** (2.156)	0.005** (2.254)
Top1	-0.272*** (-6.442)	-0.320* (-1.922)	-0.299* (-1.861)
FirmAge	-0.521*** (-21.646)	-1.613*** (-21.786)	-0.454* (-1.927)
Constant	10.348*** (66.879)	15.516*** (25.267)	10.064*** (10.716)
Observation Value	14,354	14,354	14,354
R2	0.327	0.267	0.422
Individual Fixed Effects	NO	YES	YES
Fixed Year Effect	NO	NO	YES

Note: The values in parentheses are t, and *, **, *** indicate significance at the 10%, 5%, and 1% levels.

3.4. Variable Declaration

3.4.1. Heterogeneity analysis

To verify whether there is regional heterogeneity in the impact of issuing green bonds on corporate value, this study divided the sample into eastern, central, and western regions for heterogeneity analysis.

From the regression results in Table 4, it can be seen that in the eastern region, the regression coefficient of the explanatory variable did is 0.123, and it is significantly positive at the 1% level. In the central and western regions, the regression coefficient between issuing green bonds and corporate value is not significant, indicating that the impact is not significant. From the size and significance of the regression coefficients, it indicates that there is regional heterogeneity in the impact of issuing green bonds on corporate value, and in the eastern region, the promotion effect of issuing green bonds on corporate value is stronger. Assuming H3a is proven, the promotion effect of issuing green bonds on the value of enterprises in different regions is more pronounced in the eastern region.

Table 4. Regional Heterogeneity Results

VARIABLES	(1) East	(2) West	(3) Central
did	0.123*** (3.116)	0.003 (0.041)	0.023 (0.350)
Size	-0.383*** (-13.540)	-0.313*** (-5.794)	-0.258*** (-3.388)
Lev	0.167* (1.868)	0.563*** (3.161)	-0.048 (-0.182)
ROA	1.281*** (9.799)	1.569*** (6.141)	1.898*** (4.866)
ATO	0.188*** (5.436)	0.232** (2.391)	0.010 (0.108)
Cashflow	0.256*** (2.638)	0.743*** (3.767)	0.792*** (3.806)
Growth	-0.022 (-1.536)	-0.050* (-1.795)	-0.021 (-0.639)
Board	0.096 (1.401)	0.159 (1.181)	-0.290 (-1.583)
Indep	0.004* (1.902)	0.007 (1.598)	-0.008* (-1.698)
Top1	-0.450*** (-2.697)	-0.192 (-0.638)	-0.161 (-0.453)
FirmAge	0.049 (0.219)	-0.696 (-1.209)	-0.639 (-1.094)
Constant	10.456*** (11.386)	10.270*** (5.098)	10.755*** (4.509)
Observation Value	10,251	2,475	1,628
R2	0.448	0.424	0.384
Individual Fixed Effects	YES	YES	YES
Fixed Year Effect	YES	YES	YES

Note: The values in parentheses are t, and *, **, *** indicate significance at the 10%, 5%, and 1% levels.

3.4.2. Heterogeneity of industries

In order to verify whether there is industry heterogeneity in the impact of issuing green bonds on corporate value, this paper divides the sample into two categories: heavily polluting industries and non-heavily polluting industries for heterogeneity analysis.

From the regression results in Table 5, it can be seen that in heavily polluted industries, the regression coefficient of the explanatory variable did is 0.142, and it is significantly positive at the 1% level. In non-heavily polluting industries, the regression coefficient between issuing green bonds and corporate value is 0.064, but it did not pass the significance test. From the size, significance, and inter group difference tests of the regression coefficients, it can be seen that the impact of issuing green bonds on corporate value is heterogeneous across industries, and in heavily polluting industries, the promotion effect of issuing green bonds on corporate value is stronger. Assuming H3b is proven, the promotion effect of issuing green bonds on the value of enterprises in different industries is more pronounced in heavily polluting industries.

Table 5. Industry Heterogeneity Results

VARIABLES	(1) Heavy Polluting Industries	(2) Non-Heavy Polluting Industries
did	0.142*** (2.959)	0.064 (1.536)
Size	-0.307*** (-5.592)	-0.362*** (-12.964)
Lev	0.139 (0.748)	0.224** (2.575)
ROA	1.839*** (7.165)	1.245*** (10.040)
ATO	0.178*** (3.068)	0.175*** (4.463)
Cashflow	0.308* (1.909)	0.384*** (4.131)
Growth	-0.008 (-0.282)	-0.032** (-2.295)
Board	0.099 (0.699)	0.072 (1.103)
Indep	0.008* (1.855)	0.002 (1.216)
Top1	-0.434 (-1.442)	-0.313** (-1.988)
FirmAge	-0.303 (-0.653)	-0.145 (-0.661)
Constant	9.326*** (5.435)	10.596*** (11.669)
Observation Value	3,326	11,028
R2	0.405	0.439
Individual Fixed Effects	YES	YES
Fixed Year Effect	YES	YES

Note: The values in parentheses are t, and *, **, *** indicate significance at the 10%, 5%, and 1% levels.

3.5. Testing the Intermediary Effect Mechanism of Financing Debt Cost

In order to verify whether there is a mediating effect of financing debt cost on the impact path of issuing green bonds on corporate value, this paper adopts a stepwise approach to verify the mediating effect. The first step is to verify the relationship between the independent variable did and the dependent variable TobinQ. As demonstrated in the previous benchmark regression, did is positively correlated with TobinQ at a significance level of 1%. The second step is to replace the dependent variable with the mediator volume and investigate whether there is a significant correlation between the independent variable and the mediator variable. The results show that at a significance level of 5%, DID is negatively correlated with Cost, indicating that issuing green bonds can reduce the cost of financing debt.

The third step is to add a mediator variable to the first step and perform regression again. If the mediator variable is significant, it indicates the existence of a mediator effect. In the results, Cost is negatively correlated with TobinQ at a significance level of 1%, indicating the existence of a mediator effect, which is a partial mediator effect. The indirect effect value is $-0.017 * -0.154 = 0.2618\%$, and the total effect value is 0.094, so the indirect effect accounts for 2.785% of the total effect, which indicates that the issuance of green

bonds has a positive impact on enterprise value by reducing the cost of financing debt.

Table 6. Intermediary effect of financing debt cost

VARIABLES	(1) TobinQ	(2) Cost	(3) TobinQ
did	0.094*** (2.936)	-0.154** (-2.293)	0.092*** (2.851)
Size			-0.017*** (-2.828)
Lev	-0.357*** (-14.486)	0.050 (1.117)	-0.356*** (-14.473)
ROA	0.198** (2.527)	1.808*** (11.306)	0.229*** (2.919)
ATO	1.401*** (12.323)	-2.458*** (-9.989)	1.358*** (11.980)
Cashflow	0.181*** (5.691)	-0.130* (-1.792)	0.179*** (5.611)
Growth	0.398*** (4.897)	1.785*** (9.281)	0.429*** (5.287)
Board	-0.024** (-1.983)	-0.166*** (-5.612)	-0.027** (-2.223)
Indep	0.075 (1.278)	0.008 (0.065)	0.075 (1.281)
Top1	0.003* (1.808)	0.004 (1.185)	0.003* (1.843)
FirmAge	-0.326** (-2.326)	-0.623** (-2.415)	-0.336** (-2.403)
Constant	-0.135 (-0.679)	0.813** (2.035)	-0.121 (-0.608)
Observation Value	10.344***	-1.906	10.311***
R2	(12.927)	(-1.291)	(12.919)
Individual Fixed Effects	14,354	14,354	14,354
Fixed Year Effect	0.431	0.124	0.432

Note: The values in parentheses are t, and *, **, *** indicate significance at the 10%, 5%, and 1% levels.

4. Conclusion and Suggestions

This study is based on relevant data of listed companies in China, and uses a multi period difference in differences (DID) model to empirically analyze the impact of issuing green bonds on their enterprise value (TobinQ). By using methods such as parallel trend testing, PSM-DID, and mediation effect testing to comprehensively validate the data, the following main conclusions were drawn:

Firstly, from the perspective of the overall sample, there is a significant positive correlation between the issuance of green bonds and enterprise value (TobinQ). Issuing green bonds can significantly increase the market value of enterprises, which verifies the positive role of green financial instruments in promoting enterprise value enhancement.

Secondly, the heterogeneity test of enterprises shows that the issuance of green bonds has different impacts on different types of enterprises in terms of industry categories. Compared with non-polluting industries, the issuance of green bonds has a more significant promoting effect on the enterprise value of polluting industries, indicating that green bonds have a stronger driving effect on environmental protection and pollution control related industries. In terms of regional

differences, the issuance of green bonds has a significant effect on enhancing the value of enterprises in the eastern region, while its impact on enterprises in the central and western regions is relatively small.

Thirdly, the cost of debt financing plays a partial mediating role in the impact of green bond issuance on corporate value. The empirical results indicate that issuing green bonds can significantly reduce the financing costs of enterprises, and the reduction of financing costs to some extent promotes the increase of enterprise value. The intermediary effect of financing costs explains the mechanism of green bonds to improve enterprise value by optimizing the capital structure of enterprises, reducing financial burden.

For the government, firstly, it is necessary to improve the green finance system and promote the development of diversified green finance products. At present, China's green finance system is still dominated by green credit, while the issuance scale and product innovation space of other green finance products such as green bonds are relatively small. In order to achieve the "dual carbon" goal, China should continue to improve the top-level design of green finance and promote the innovation of diversified green financial products in the financial market. For enterprises, actively issuing green bonds and optimizing financing structure. Enterprises should recognize the potential of green bonds in reducing financing costs, enhancing corporate reputation, and promoting green innovation. Especially for high polluting industries and capital-intensive enterprises, issuing green bonds can provide long-term, low-cost financial support for green technology research and equipment upgrades. Therefore, enterprises should clarify their own green bond issuance goals and design the use of funds reasonably based on industry characteristics and development needs. For high polluting industries, green bonds can be used for the renovation of environmental protection facilities and the upgrading of clean production technologies, helping companies alleviate environmental compliance pressures; For green technology-oriented enterprises, green bonds can be invested in new product research and technological innovation to enhance their competitiveness. In addition, companies can replace traditional high-cost debt by issuing green bonds, optimize capital structure, and attract new investors such as social responsibility investment funds (SRI) and green development funds, broaden financing channels, and reduce dependence on a single financing model.

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