

Research on the Market Effect of Corporate Green Bond Issuance——Taking SF Taisen as an Example

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Abstract. Against the backdrop of sustained economic growth and the proposal of China's "dual carbon" goals, the green financial market has expanded rapidly. As a core component of green finance, green bonds have become a key driver of the green economy. Currently, green bonds are predominantly issued by large central and state-owned enterprises with high credit ratings, while private enterprises account for a very small share of issuers. Nevertheless, the market-oriented development of the green bond market is an inevitable trend that requires broader participation from private firms. As the first private enterprise in China to issue carbon-neutral green bonds, SF Taisen is selected as the research object to analyze its green bond issuance and corresponding market effects from a micro perspective. The empirical results indicate that SF Taisen's green bond issuance triggered a short-term positive stock price rebound, but the overall cumulative market effect was significantly negative. The firm should further improve its green bond information disclosure and broaden the application scope of green bond financing.

Keywords: Green bonds, Event study method, Green finance.

1. Introduction

Green development constitutes a core feature of high-quality economic growth. The robust development of green finance is critical to advancing the green transformation of the economy and society and realizing the carbon peaking and carbon neutrality targets. On the one hand, by guiding capital to flow into green industries to increase investment in clean energy, environmental protection, green transportation and green buildings, it promotes the low-carbon and green transformation of the economy and facilitates the sustainable development of economy and society. On the other hand, by investing in green energy projects, it promotes the R&D and application of green low-carbon technologies and products, thereby reducing dependence on fossil fuels and accelerating the achievement of the carbon peaking and carbon neutrality goals.

It can be said that ecological construction and the development of green economy are important parts of the construction of a modern economic system in the new era. Driven by the new development philosophy, policy and market forces have directed growing financial resources to support green development. China's green financial system has been accelerated, and green finance has become an important bridge to turn "lucid waters and lush mountains" into "invaluable assets". As the main force of green financial products, green bonds play a crucial role in this process. Given the huge demand for liquid capital in the express delivery industry, SF Taisen itself can no longer provide internal financing channels for its high liabilities. The booming development of green bonds provides new financing ideas for enterprises in the logistics and express delivery industry and helps ease their capital pressure.

2. Literature Review

Wang (2003) examined the correlations among debt financing, corporate governance and the market value of listed firms, and found that debt financing accounted for a small share of total assets among Chinese listed companies. Overall, debt financing helped strengthen corporate governance and lift firm market value. Chen (2018) studied a sample of 34 listed firms and found that green bond issuance generated significantly positive stock price responses for listed issuers on average. Hu (2022) integrated event study methodology with regression analysis and found that equity markets held

optimistic expectations for firms following green bond issuances, and such positive sentiment generated positive cumulative abnormal stock returns.

Xu (2023) conducted a case study on Shenzhen Energy and concluded that green bond issuance exerted a significant positive effect on the firm's stock price, yet the effect was short-lived. Wu (2022) selected Shandong Gold as the research sample and found that green bond issuances drove moderate stock price appreciation and boosted corporate value. Chen (2023) explored the internal mechanism through which green bonds affect corporate performance and found that issuers can boost operational performance by optimizing their debt maturity structure via green bond issuances. Huai et al. (2024) compared the risk-return profiles of portfolios with green bonds and those with conventional bonds, and found that green bonds not only fund eco-friendly projects, but also optimize the risk-return performance of investment portfolios.

3. Research Methods

This study examines the case of SF Taisen's issuance of green bonds and employs the event study method to analyze the resulting market effects. By providing a detailed analysis of how the issuance of green bonds impacts the market performance of specific enterprises, it enriches the relevant case studies and plays a positive role in both corporate sustainable development and the implementation of the national high-quality development strategy.

4. Overview of Green Bonds and 21 SF G1

4.1. Overview of Green Bonds

4.1.1. Definition of Green Bonds

Green bonds refer to bond instruments whose proceeds are exclusively used to finance eligible green projects or refinance such projects, including green enterprise bonds, green corporate bonds, and green debt financing instruments. Compared with ordinary bonds, green bonds have special features in four aspects: the deployment of issuance proceeds, the evaluation and selection procedures for green projects, the tracking and management of raised funds, and the requirement for annual reports.

Green bonds have both economic and social benefits. From the perspective of economic benefits, green bonds have at least the following two advantages:

- (1) Obvious financing cost advantage. Many Chinese regional governments have rolled out supportive policies including fiscal subsidies for green bond issuers to lower their financing costs. For example, Shenzhen offers a maximum subsidy of RMB 500,000 per project per issuer, equivalent to 2% of the issuance size. Jiangsu provides interest subsidies covering 30% of actual annual interest payments over two years, capped at RMB 2 million per bond annually. In addition, green bonds have an obvious issuance premium of about 20bp.
- (2) Higher issuance and approval efficiency. Unlike conventional enterprise bonds, green enterprise bonds are not subject to issuance quota limits and permit private placements. The Shanghai Stock Exchange and the National Association of Financial Market Institutional Investors have set up green channels to improve the efficiency of issuance registration.

From the perspective of social benefits, the funds raised by green bonds are mainly invested in energy conservation and environmental protection, clean production, clean energy, ecological environment, green upgrading of infrastructure, green services and other fields, which helps to reduce energy consumption and emissions, protect the environment, and promote the transformation of society toward sustainable development.

The investment projects of labelled green bonds issued publicly in 2023 and 2024 are mainly concentrated in clean energy industry, green upgrading of infrastructure, energy conservation and environmental protection industry. Assuming that the average environmental benefit per unit of capital of bonds with undisclosed environmental benefit information among labelled green bonds is

consistent with that of bonds with disclosed information, it is estimated that the funds of publicly issued labelled green bonds in 2023 are expected to support the reduction of about 39.4 million tons of carbon dioxide per year, playing a favorable role in supporting China's green and low-carbon development.

4.1.2. Current Situation of Green Bonds in China

As an important financing tool, green bonds are growing at an increasingly rapid pace and on an ever-larger scale. Between 2016 and 2023, China's share of global green bond issuance stood at 15%. In the past two years, China has maintained the world's largest green bond issuance volume, demonstrating its substantial contribution to global green finance development.

According to statistics from the China Green and Low-Carbon Transition Bond Database maintained by the Central Depository & Clearing Co., Ltd., between 2016 and 2023, the issuance volume of green bonds in China quadrupled from RMB 201.8 billion to RMB 844.8 billion, representing an average annual growth rate of 22.7%. Over the same period, green bonds expanded financing access to a broader set of market participants; the number of issuers grew from 35 to 299, and bond issuances surged ten times. The annual growth trends are shown in Figure 1. At the same time, the outstanding volume of green bonds has also increased rapidly. By the end of 2023, there were 1,815 outstanding green bonds in China, with a total bond balance of RMB 2.1 trillion. When including unlabeled bonds whose proceeds fund green sectors, the total scale of green-invested bonds exceeds RMB 5 trillion. The annual growth trends are shown in Figure 2.

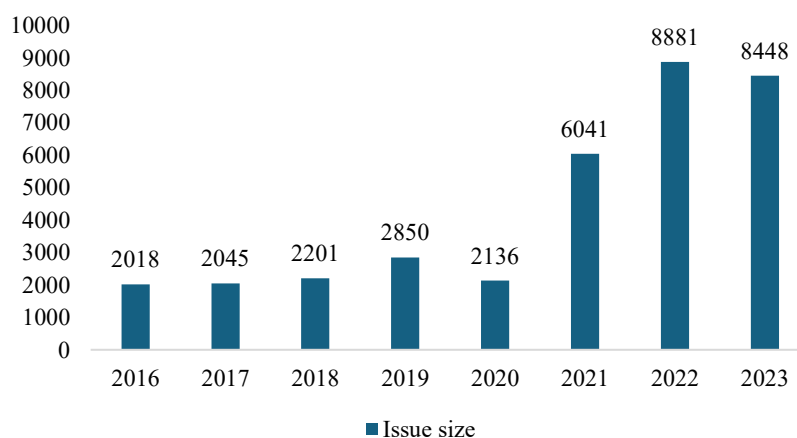


Figure 1. Annual Green Bond Issuance Volume in China, 2016–2023 (Unit: RMB 100 Million)

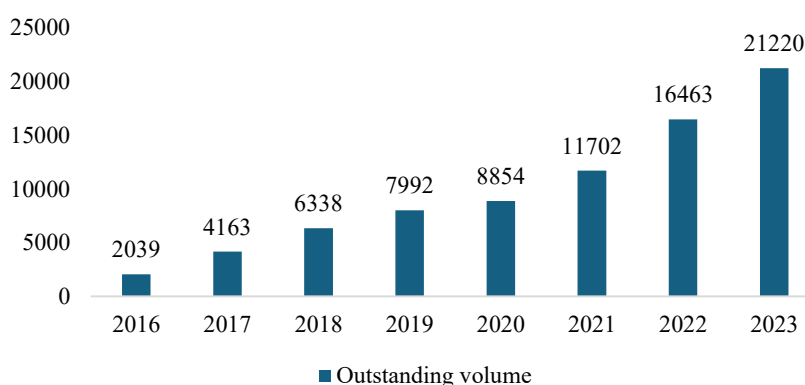


Figure 2. Outstanding Green Bond Volumes in China, 2016–2023 (Unit: RMB 100 Million)

China's green bond market covers all major product segments and strongly supports China's green and low-carbon economic development. Green corporate credit bonds and green financial bonds represent the two dominant issuance categories. Between 2016 and 2023, 1,450 green corporate credit bonds were issued, making up 40.36% of total issuance volume, alongside 303 green financial bonds accounting for 40.21% of the total. The cumulative issuance volume of green asset-backed securities

and international institutional green bonds reached RMB 666.5 billion and RMB 6 billion, respectively. The total cumulative issuance volume across all green bond categories is presented in Figure 3.

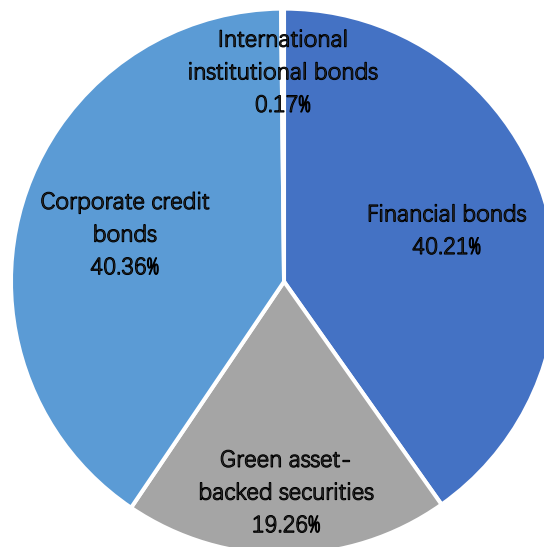


Figure 3. Total cumulative issuance volume of different types of green bonds, 2016–2023

4.2. Overview of 21 SF G1

4.2.1. 21 SF G1

Shenzhen SF Taisen Holdings (Group) Co., Ltd. (hereafter SF Taisen) is the first private enterprise in China to issue carbon-neutral bonds. On April 21, 2021, it issued the first carbon-neutral green bond for private enterprises, “21 SF G1”. Thus, SF Taisen serves as a representative and pioneering case for research on private-sector carbon-neutral bond issuances, and can provide a benchmark for more logistics and transportation firms entering the green bond market.

Proceeds raised from the green bond “21 SF G1” were primarily allocated to the under-construction Qianhai SF Headquarters Building, a green building with energy-saving and eco-friendly features. The bond code is “149466”, with an issuance scale of RMB 500 million and a term of 3 years. The coupon rate is determined to be 3.79% based on the results of offline bookbuilding inquiry. According to the comprehensive assessment by China Chengxin International Credit Rating Co., Ltd., the issuer’s main credit rating was AAA, and the issue credit rating was AAA. The terms and information of the bond are shown in Table 1.

Table 1. Information on the “21 SF G1” Terms and Conditions

Bond Terms	Specific Information
Bond Type	Green Corporate Bond
Bond Term	3 years
Issuance Rate	3.79%
Issuance Scale	RMB 500 million
Par Value	RMB 100
Issuance Price	At par
Interest Calculation Method	Fixed interest rate
Issue/Issuer Credit Rating	AAA / AAA
Issuance Method	Offline inquiry and placement
Rating Agency	China Chengxin
Value Date	April 26, 2021
Maturity Date	April 26, 2024
Interest Payment Method	Annual interest payment and principal repayment at maturity

4.2.2. Use of Raised Funds

Proceeds from green corporate bonds shall be primarily used for the construction, operation, and acquisition of green industrial projects, or to repay loans issued for such green projects. The amount determined to be used for green industry projects shall not be less than 70% of the total raised funds, and the rest can be used to replenish the company's working capital or repay loans.

According to the prospectus of 21 SF G1, the investment project of this green corporate bond is the Shenzhen Qianhai SF Headquarters Building project, which belongs to the green building category of green low-carbon industry projects with significant environmental benefits such as carbon emission reduction, and meets the issuance requirements. SF Taisen promises that after deducting issuance expenses, no less than 70% of the funds raised from this bond will be used to repay the principal and interest of the construction loan for the green building Qianhai SF Headquarters Building. Specifically, RMB 407 million of the RMB 500 million raised funds will be used in advance to repay all remaining 10-year syndicated loans as shown in Table 2, and the remaining raised funds of less than RMB 100 million will be used to supplement the enterprise's working capital.

Table 2. Main Uses of Proceeds from “21 SF G1” (Unit:RMB 10K)

Financial Institution / Debt Item	Loan Amount	Outstanding Loan Balance	Start-End Date	Planned Repayment Amount	Prepayment Allowed
Syndicated loan by Development Bank ICBC Agricultural Bank	100000.00	40700.00	2016/4/20 to 2026/4/20	40700.00	Yes
Total	100000.00	40700.00		40700.00	

Source: Prospectus of 21 SF G1

5. Research on the Market Effect of Green Bond Issuance by SF Taisen

5.1. Definition of Key Parameters

This paper uses the Event Study Methodology (ESM) to explore the impact of green bond issuance by SF Taisen on the market. The Event Study Methodology is an econometric method used to study the short-term impact of major events on firm-level variables. In previous studies, this method has been mainly applied in the financial field to measure the impact of a specific event on the stock price of a company.

Event Date Definition: The green bond issuance announcement date (April 21, 2021) is defined as the event day T_0 . Trading days before T_0 are marked with negative values, and post-event days with positive values..

Selection of event window: As a research method focusing on short-term behavior, the event study method is suitable for analyzing the short-term impact of bond issuance activities on the enterprise market. Therefore, the window period of the event day should be moderate to avoid excessive length affecting the analysis accuracy. No other material corporate events occurred during SF Taisen's bond issuance window, so this study adopts a symmetric 5-day pre- and post-event window. The window period for the event of SF Taisen issuing the “21 SF G1” green bond in 2021 is from April 14 to April 28, 2021($t=-5$ to 5).

Selection of estimation period: After setting the window period, it is necessary to select an appropriate estimation period to accurately evaluate the expected return rate of the enterprise under normal operation. When selecting the estimation period, the stable period before the event is usually preferred, so as to more truly reflect the normal return performance of the enterprise. However, since the main focus is on the short-term impact of the event, the length of the estimation period needs to be appropriate. An excessively long estimation period may introduce too many external variables, such as economic fluctuations or market changes, which would interfere with the analysis, while an excessively short estimation period may fail to fully reflect the normal return of the enterprise due to

insufficient data. After comprehensively considering various factors, combining the actual situation and referring to relevant literature, this paper decides to set the estimation period as [-150,-10].

5.2. Selecting the Market Model and Establishing the Regression Equation

This paper uses the market model method to calculate the expected return, constructs a regression model of the expected return rate, and carries out subsequent return analysis. As SF Taisen is listed on the Shenzhen Stock Exchange, the Shenzhen A-share Index (Code: 399107) is adopted as the market return benchmark. The daily individual stock return $R_{i,t}$ of SF Holding (002352) and the index return $R_{m,t}$ are downloaded and sorted from the CSMAR Database, and the data are substituted into Formula 1:

$$ER_{i,t} = \alpha + \beta R_{m,t} + \varepsilon_t \quad (1)$$

Where $ER_{i,t}$ is the expected return rate of SF Taisen on day t ; α is the intercept term of the regression model; β is the sensitivity of the stock to the market index; ε is the random error term. Regressions are run via Stata 17 based on the estimation window [-150, -10], yielding the fitted equation below:

$$ER_{i,t} = .0001968 + 1.074443R_{m,t} + \varepsilon_t$$

Calculate the Abnormal Return (AR) and Cumulative Abnormal Return (CAR):

$$AR_{i,t} = R_{i,t} - ER_{i,t} \quad (2)$$

Where $AR_{i,t}$ is the abnormal return rate on day t .

Within the window period, the daily abnormal returns are accumulated to obtain the cumulative abnormal return (CAR). The specific calculation formula is:

$$CAR_{i,t} = \sum AR_{i,t} \quad (3)$$

The specific calculation results of Abnormal Return (AR) and Cumulative Abnormal Return (CAR) are shown in Table 3. The trends of AR and CAR during the window period are shown in Figure 4.

Table 3. AR and CAR during the Window Period of 21 SF G1

Time (t)	AR	CAR
-5	-0.021	-0.021
-4	0.008	-0.013
-3	-0.020	-0.033
-2	-0.010	-0.044
-1	-0.004	-0.048
0	-0.009	-0.057
1	-0.013	-0.070
2	0.032	-0.038
3	0.016	-0.022
4	-0.019	-0.040
5	0.000	-0.040

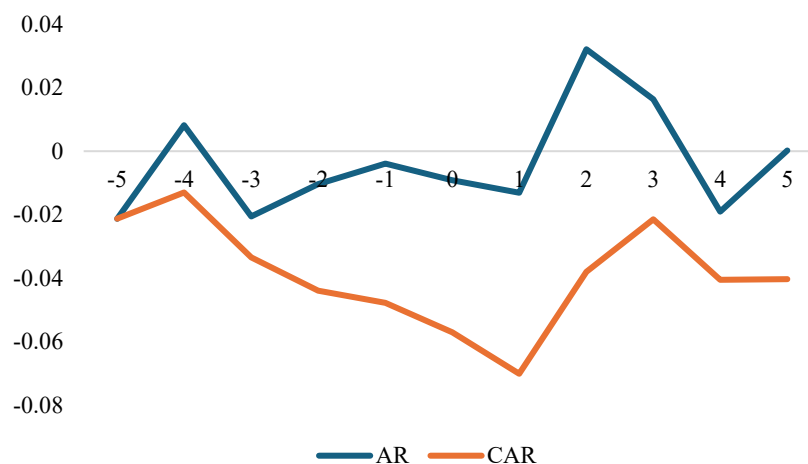


Figure 4. Trend Chart of AR and CAR during the Window Period of 21 SF G1

5.3. Result Analysis

According to the above results, before the event day (before SF issued the green bond “21 SF G1”), the highest AR was 0.008 ($t=-4$), and the lowest was -0.021 ($t=-5$); only one abnormal return was positive. After the event day, AR increased significantly and reached the highest point of 0.032 ($t=2$) during the event period. On the whole, although AR fluctuates up and down during the event period, it still increases to a certain extent overall.

According to the CAR values analysis, the CAR values remained negative throughout the event period. However, after the announcement date, the CAR value experienced a significant increase, but then fell back to a certain extent. On the whole, although the CAR value increased to a certain extent after the announcement date, it did not reach the normal level before the announcement date, showing an overall downward trend.

On the whole, the market had a short-term positive feedback and positive attitude toward SF Taisen’s issuance of green bonds, but more investors hold a wait-and-see attitude. A short-term positive price rebound emerged after the announcement, yet the overall cumulative market effect was significantly negative. The reason may be that bond issuance means that the company needs to bear more debts, which may trigger some investors’ concerns about the company’s financial pressure. Coupled with the impact of the COVID-19 pandemic in 2021, the market as a whole was in a cautious mood and was sensitive to the debt risk of the express delivery industry, which may lead some investors to choose conservative investment strategies and tend to sell, resulting in a short-term decline in stock prices. This negative sentiment will be more obvious especially when the market expects that the company’s future cash flow may not well cover the cost of new debt.

5.4. Significance Test

The t-test is used to test the significant difference between the cumulative abnormal return CAR and 0, so as to judge whether the abnormal return is caused by the company’s issuance of green bonds. The null hypothesis is specified as:

$$H_0: \text{CAR}=0 \quad \text{Green bond issuance has no impact on stock price changes}$$

Table 4. Results of t-test

CAR	Coefficient	Robust	t	P> t	[95% conf. interval]	
_cons	-.0387974	.0049717	-7.80	0.000	-.049875	-.0277197

The p-value is less than the significance level of 0.1, so the null hypothesis H_0 is rejected, indicating that the issuance of carbon-neutral green bonds has a significant impact on SF’s stock price changes.

6. Conclusion

To address environmental and climate change issues, China will need to invest RMB 2 to 4 trillion annually. Yet public fiscal funds can only cover roughly 15% of total capital demand, highlighting the pivotal role of green finance in advancing green development. At present, China's green financing structure is unbalanced: indirect financing dominated by green credit accounts for about 90% of green financing. However, to achieve the carbon neutrality goal, the investment demand for green bonds and equities is expected to reach 40% in the next 40 years, and the development of the green bond market can effectively make up for the green investment and financing gap.

Against this background, research on green bonds is very important and urgent. By studying the relationship between green bond issuance and its short-term stock market effect, this paper finds that the issuance of green bonds led to a certain degree of rise in stock prices, but many investors still adopt a wait-and-see attitude. Overall, SF Taisen's green bond issuance triggered a short-lived positive price rebound, but the overall cumulative market effect over the event window was significantly negative. For enterprises, they should seize the opportunity of favorable policies to promote their own green transformation and achieve sustainable green growth.

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