The Impact Of Green Bond Issuance On Company Stock Prices: Evidence From China

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***Abstract*—**In the context of the development of a green and low-carbon circular economy, this article takes the listed companies in Shanghai and Shenzhen stock markets. that issue green bonds as the research samples to study the impact of green bond issuance on stock price of listed companies. The literature research approach is to introduce signaling theory, Cost of Corporate Social Responsibility (CSR) theory to provide a theoretical basis for explaining the impact of green bond financing on company stock prices. By using event study method, this article examines the stock price of 25 green bonds issued by 18 listed companies over the period of 2018 - 2020. Through the comprehensive analysis of the theories and empirical studies, the results imply that that both the announcement of traditional bonds and the announcement of green bonds has a substantial negative influence on the stock price 5 days following the announcement date. Furthermore, the announcement of traditional bonds shows a more significant downward trend in stock price. Based on the results, suggestions are made to market institutions, corporations, and the government to enhance the monitor and development of green bond markets.

***Index Terms*—**Green Bond, Climate bond, Stock Price

I. Introduction

The ambitious goal of keeping the global temperatures below 1.5°C or 2°C is urging the governments and companies to carry out polices and set up strategies in response to tackle the climate challenges and meet the net-zero targets. With a rapidly rising market size and significant demand in the international capital market in recent years, the green bond market is considered a practical approach to promote the transition to a low-carbon economy to tackle climate challenges. China, the world's largest carbon emitter, aims to carry out a green policy to achieve net-zero emissions by 2060. One of China's most recent environmental protection measures is establishing a green financial system to support environmentally responsible projects. This new policy has led to a novel financial practice—the issuance of green bonds has expanded rapidly in China. As an important part of China's green economic policy system, the green bond policy provides a channel for listed companies in China to directly issue bonds for financing without being restricted by credit products and bond issuance indicators for green projects such as energy conservation emission reduction and circular economy.

In this context, promoting sustainable development that involves green projects such as infrastructure transformation, technological innovation, and industrial chain requires collaborative efforts from multiple parties, including companies in the capital market. From enterprises' perspective, the process of issuing and managing green bonds to raise funds may enhance internal awareness of the company's sustainable development goals and foster collaboration between the company's internal sustainable development and finance experts. In the meantime, companies may also be exposed to financial risk due to the corporate debt generated by green bonds. It can also reflect changes in the company's business management and strategies towards the "green" label, impacting investors' interests in investing in the firm. Stock prices will be affected as a result of the decision. Hence, analyzing the changes of the company's stock price is essential because it can show investors' preference for its sustainable development. However, the green bond market in China is still in an early stage, with fewer relevant regulations and initiatives announced. It raises a crucial question of how will the stock market react if a company announces the issuance of green bonds. The extensive development of the Chinese economy over the past 30 years has been increasingly restricted by resource shortages and environmental degradation. In the context of the current emphasis on environmental protection and green development, topics relating to the potential impact on the initiative of listed companies to issue green bonds and the future development possibilities of the green bond market have an epochal character.

II. Literature review

A. The Impact of Issuing Green Bonds on the Company's Stock Price: Based on the Signaling Theory

China places a high value on environmental preservation and green growth, as seen by the projected 30 carbon peak and 60 carbon-neutral plans. In the context of the current emphasis on environmental protection and green development, the issue of green bonds is considered a positive "signal" that will cause stock prices to increase in the stock market [1]. When a listed company announces green bond issuance in the market, it conveys a positive signal to the market that company proactively seek innovation, adjustment and optimization of capital structure, indicating its strategy of expanding its business lines of green investment projects. As a results, companies with more predicted future cash flow shows a better the investment profitability to the investors.

B. The Impact of Issuing Green Bonds on the Company's Stock Price: Based on the Cost of CSR Theory

Corporate Social Responsibility is a management strategy in which businesses incorporate environmental and social concerns into daily operations and business management as well as interacting with its stakeholders [2]. Some literatures have revealed a negative relationship between CSR and financial performance. CSR involves risk-management features that may also attenuate stakeholder reactions to negative situations. When a corporation implements environmental policies to avoid and lessen its environmental effect, it will inevitably affect the company's financial performance. Based on Sokolovska and Keseljević (2019), renewable energy indices show negative alphas and high betas, making them financially unattractive, which further discourage private investment [3]. Hoang et al. (2020) conducted research on 361 U.S. firms from 2007 to 2016 and concluded that environmental innovation and transparency

negatively influences the return on capital employed [4].

C. The comprehensive impact of green bond issuance on stock prices

Currently, there are increasing numbers of significant studies on green bonds. However, these studies frequently analyze the changes in the global trend of green bonds. There is limited empirical research on the influence of green bond issuance on companies' stock prices in China and examining affecting variables. Xi and Jing (2021) proved that there is a stock price influence on green bond issuance [5]. In the research from Wang et al. (2020), compared to regular bonds, stock market investors respond positively to the announcements of green bonds issued in 2018 in China [6]. Green bonds have a significant price effect when the issuer has a decent social reputation and bond investor shows great investment interest. According to Jakubik and Uguz (2020), investors in the stock market are pricing the issue of green bonds and the establishment of green funds positively in Europe [7].

Whilst, the impact of China's bond issuance is still controversial, issuing green bonds will increase the company's cost and may affect the returns of shareholders who prefer short-term investments, which will hurt the company's long-term financial health [1]. Tang & Zhang (2020) discovered that the stock market's response to the initial issuance of green bonds was more positive than the re-issuance through analyzing 132 listed companies in China that issued green bonds [8]. Issuing green bonds will send a good signal on the stock market, which just caused a short-term increase in its stock price. Similarly, by comparing the green bonds issued by listed companies in China as of the end of 2019 and the traditional bonds issued during the same period, Zhu et al. (2020) found that neither green nor traditional bond issuance has a significant impact on the company's stock yield. There is no significant difference between the two types of effects due to the green nature of the financing [9].

III. RESEARCH HYPOTHESIS AND RESEARCH FRAMEWORK

During the last few years, the rapidly transforming social structure and continuous implementation of new green bond policies have profoundly affected the capital market. This article analyzes 25 green bonds issued by the listed company in China from 2018 to 2020 by using the event study method. This research may also provide decision-making insight for improving green finance policies in the Chinese context and serve as an essential complement to the green finance literature. According to the Signaling Theory, Cost of CSR Theory, and the comprehensive studies, the hypothesis of this study are:

H_0: The announcement of the green bond issuance has positive impact on the company's stock price, causing the stock price rises,

H_1: The announcement of the green bond issuance has a negative impact on the company's stock price, which has the same result as issuing ordinary bonds, will cause the stock price decrease.

The framework of this article is as follows: The first section is an introduction, summarizing the present research status of green bonds and stock prices in the domestic and international markets. The second section is methodology descriptions, in which, the event study approach is utilized to examine the stock price of 25 listed companies that issued green bonds in Shanghai and Shenzhen Stock Exchange Market from 2018 to 2020. Find the fluctuations in share prices of listed companies following the issuance of green bonds as well as general debentures. The third section is the results and discussions based on theoretical and practical research, figuring out the different results on the stock price of issuing the green bonds and normal bonds. And the fourth section is the conclusions and recommendations to the market institutions, companies, and government for better development of green bonds markets are drawn out.

IV. METHODOLOGY

A. Data source and sample collection

In order to study the impact of green bonds issued by companies on their share prices, 98 listed companies that have issued green bonds between 2018 and 2020 in both Shanghai and Shenzhen stock exchanges were selected as the subjects of the study. The green bond issuance dates as well as basic company information were obtained from the wind database. In order to ensure the precision of the study and the accuracy of the data, the dataset was processed before conducting the data analysis. Firstly, the listed companies with st (referring to the stocks listed in China that are subject to special treatment and also delisting risk warning) in the observation period were excluded. Next, bank stocks were excluded, as well as samples that did not issue ordinary debentures and could not be compared. The final sample contains a total of 25 bonds issued by 18 listed companies covering four main areas.

TABLE I: 25 LISTED COMPANIES AND INDUSTRIES

Manufacturing	Environmental	Energy company	Infrastructure
000709(Hbis Company Limited)	601016(CECEP Wind-Power Corporation)	002594(BYD)	Shenzhen Expressway Company Limited
000778(Xinxing Ductile Iron Pipes Co.,Ltd.)	600008(Beijing Capital Eco-Environment Protection Group Co.,Ltd.)	000027(Shenzhen Energy)	600168(Wuhan Sanzhen Industry Holding Co.,Ltd)
600547(Shandong Gold Group Co.,Ltd.)	000598(Chengdu Xingrong Environment Co., Ltd.)	000791(Gepic Energy Development Co.,ltd.)	
600176(China Jushi Co., Ltd)	000826(Tus Environmental Scienceand Technology Development Co.,LTD)	600674(Sichuan CHANTOU Energy CO.,LTD.)	
000301(Jiangsu Eastern Shenghong Co.,Ltd)	300237(Shandong Meichen Science & Technology Co.,Ltd.)	601669(Power Construction Corporation of China,Ltd.)	
		600795(GD POWER DEVELOPMENT CO.,LTD)	

DATA SOURCE: WIND

B. Event Study

1) Definition

Event Study is one of the most common methods used in the financial markets today to study stock price changes. The market analysis method considers that the market responds to the transmission of information about company events and generates fluctuations in the relevant factors, and the original event analysis method was used to analyze the impact of financial information on stock prices [10]. In this study, the specific event is the release of information about the issuance of green bonds by the company. Such events are announced to the market and investors, and the assumptions and conditions of the event analysis method are applied.

The basic idea of the event study method is to first estimate the normal return of a stock before the impact of a specific event occurs. Then observe the abnormal effect of the particular event on the stock price. After that, the abnormal return can be generated by the event on the stock price is calculated and its significance is calculated. Finally, compared the abnormal stock return rate resulting from the issuance of green bonds to the abnormal return rate from the issuance of regular bonds to evaluate whether green bonds have a particular impact on the company's stock price.

2) Data analysis

In this study, the announcement of releasing green bonds by listed companies is defined as the event, and the event date is set as the date of the announcement. According to the event study method, the time window in this study is selected as 5 trading days before and after the announcement of the company's green bond issue [-5, 5]. In this paper, 120 trading days before the event are selected as the estimation window of the event study method [-130, -11] for calculating the normal return.

$$E(R_{it}) = \alpha + \beta R_{mt} + \varepsilon_i \quad (1)$$

$R_{it}$is the normal return rate of company during the event window, $R_{mt}$is the return rate of the corresponding CSI 300 index, and $\varepsilon_i$is the random error.

In order to calculate the normal rate of return of the company's stock, in this paper, a stable linear relationship between market returns and security returns is assumed by the market model approach. This method uses a linear regression model to obtain the relationship between the market index return rate and the company's stock return rate, and then brings the market index return during the event window into this equation to estimate the expected return rate for the company's stock during the event window.

The abnormal return on the company's stock during the event window is equal to the actual return on the company's stock during the event window, minus the predicted return from the market model.

$$AR_{it} = R_{it} - E(R_{it}) \quad (2)$$

AR_{it} is the abnormal return during the event window, R_{it} is the actual return of the company's stock during the window, and $E(R_{it})$ is the expected return calculated by the model.

The follow equation calculated the average abnormal return, the abnormal returns of n sample companies are summed and averaged to obtain the average abnormal return on day t.

$$AAR_{it} = \frac{1}{n}\sum_{i=1}^{n} AR_{it} \quad (3)$$

Moreover, to estimate the abnormal returns of the i th study company in the event window are summed to obtain the cumulative abnormal returns.

$$CAR_i(t_1, t_2) = \sum_{i=t_1}^{t_2} AR_i \quad (4)$$

A T-tests were conducted to compare the results with 1%, 5%, and 10% significance levels. Analyze whether the effect of the event on the market share price of the company in question after the event is significant. If the result is significant, it means that issuing green bonds influences the price of the company, otherwise, it means that the effect is not significant.

V. RESULT AND DISCUSSION

After calculating the average abnormal returns as well as the cumulative abnormal returns and also performing t-tests, the following tables (Table II and Table III) were obtained. One table corresponds to the effect of information on the company's share price from the release of green bonds, and one table corresponds to the effect of information on the company's share price from the release of ordinary bonds.

TABLE II: RESULTS OF EVENT STUDY TESTS FOR GREEN BOND ISSUANCE

date	AAR_t	CAR_t
-5	-0.02252774	-0.02252774
-4	-0.02382169	-0.04634944
-3	-0.02715165	-0.07350109**
-2	-0.02460798	-0.09810907
-1	-0.02334255	-0.12145162
0	-0.02507149	-0.14652312***
1	-0.02153974	-0.16806285
2	-0.02149459	-0.18955744
3	-0.01740045***	-0.20695789***
4	-0.02714412***	-0.23410201***
5	-0.02339354	-0.25749556

NOTE: * INDICATES SIGNIFICANT AT THE 10% LEVEL, ** INDICATES SIGNIFICANT AT THE 5% LEVEL, *** INDICATES SIGNIFICANT AT THE 1% LEVEL

TABLE III: RESULTS OF EVENT STUDY TESTS FOR COMMON BOND ISSUES

date	AAR_t	CAR_t
-5	-0.01919944	-0.01919944
-4	-0.02598728	-0.04518673
-3	-0.03165156	-0.07683828
-2	-0.02242876	-0.09926704
-1	- 0.02476733	-0.12403437
0	-0.02477168	-0.14880605
1	-0.0269733	-0.17577935
2	-0.02548912	-0.20126848
3	-0.02187817	-0.22314665
4	-0.02148891	-0.24463556
5	-0.03006484	- 0.2747004

The results in Tables II and III show that the sample has a negative average return over the 11 days of [-5, 5]. Starting from the day of the announcement (after date 0), the overall sample shows negative abnormal returns, and the trend decreases from days 1-3, reaching a high value of -0.027 on the fourth day. Compared to green bonds, the average yield of common debentures also shows a decreasing trend after the announcement, and the decreasing trend of stocks after the announcement is greater than the decreasing trend of issued green bonds.

The change in the cumulative abnormal return shows that the cumulative abnormal return of green bonds fluctuates between (-25.7%, -2.2%) during the 11 days. Throughout the 11 days, the cumulative yield gradually decreases and reaches its lowest value on the 11th day. During the event window, the cumulative yield impact on the company's stock price was negative for both the release of the green bond and the regular bond, and both had a significant negative stock price impact on the stock for five days after the announcement date. In summary, this result is consistent with the proposed H_1 hypothesis.

The impact of issuing green bonds on share prices is almost the same as that of regular bonds. After issuing ordinary

debentures, investors consider whether the company is forced to issue bonds due to lack of funds, triggering investors' negative attitude toward future performance and leading to a decrease in the company's stock price. Green bonds, on the other hand, may be due to the current market and investors' lack of knowledge about it, resulting in investors' reactions to the issuance of green bonds comparable to the issuance of normal bonds.

VI. Conclusion

A. Key finding

Following the clarification of theoretical explanation of how introduction of green bond issuance affects the company, and data analysis of examination of the effect of green bond issuance on the company's stock price.

The result of the study indicates that the green bond issuance period has a significant impact on the company's stock price as the majority of share price at green bond issuance periods is negative and consistent.

B. Recommendations

Based on the result, three suggestions to market institutions, companies, and government could be drawn out.

1) *Market institutions could contribute to the promotion of green bond.*

Market organizers and institutions need to actively carry out education towards green bond investors and expand the influence of the green bond market by establishing a green corporate bond segment and compiling a green bond index, Meanwhile, the promotion of the implementation of preferential measures for green bond investors, such as tax relief and reduction of risky capital employed will also contribute to the publicize of green bond. Despite of the negative and consistent effect on stock prices found in this study, which caused by the fact of early stage and lack of development of green bond market in China, green bond could provide of source of funding green credit and investment for companies and reduce the risk of maturity mismatch in the long term.

2) *Corporate should integrate social and environmental values into business management and operational strategies*

Companies have been the most prolific issuers to issue labeled bonds since green bond indexes appeared in 2014 showing an increasing trend of emphasis on company sustainability and social responsibility. Issuing green-labeled bonds is effective and economical method to establish a well-structured Environmental, Social and Governance (ESG) disclosure framework and internal reporting system to react to the stakeholders' long-term interests and reputation. It suggests that responsible business should not only focus on achieving short-term financial gains, but also make necessary changes in re-aligning business strategies with social and environmental responsibility, to gradually transform into a combination of economic and environmental interests.

3) *Policies intervention is critical to regulate green bond issuance market*

Green bonds, as compared to standard bonds, have the risks of higher prices, lower yields, and longer investment period, indicating a lack of liquidity in green bond markets. Moreover, the additional of green bond evaluation and certification requirements will increase the cost, which may also reduce companies' willingness of green bond, especially for small and medium-sized businesses. Another significant detriment is lack of a precise definition of a green bond. Investors may not know where their money is going, which implies it may be used inappropriately. As a result, government should establish appropriate policy and guidelines to regulate green bond issuance market.

At the early stage of China's green bond market, it is necessary to draw on international experience and combine it with domestic conditions to establish regulations for China's green bond market. Therefore, the bond market could be effectively supported to develop and provide financing support for green industries.

VII. References

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