

Impact of the Green Financing Policy on the Stock Market - Short-Term Impact Analysis using the Green Sector as an Example

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Abstract: The purpose of this study is to analyze the impact of green financing policies on the short-term stability of China's stock market, with a focus on the Green Sector. Using the "Guiding Opinions on Strengthening Financial Support for the Transformation of the Green Economy" issued by the State Administration of Financial Supervision and Administration on 31 July 2023 as the event to be studied, the event study methodology was used to calculate the abnormal rate of return (AR) and the cumulative abnormal rate of return (CAR) of A-share companies listed in the green sector under the SSE Index and the Shenwan Primary Industry Classification on a daily basis to measure the market's stability before and after the date of the event. By analyzing the green industry sector as a whole, this paper enhances the efficiency and representativeness of the study and provides a clear direction for subsequent analysis. The abnormal return (AR) and cumulative abnormal return (CAR) were calculated to measure the market reaction to the policy before and after the event date. The study found that after the enactment of the policy, the Greens sector did not experience the expected sustained significant abnormal gains. The study found that after the policy was enacted, the green sector did not experience the significant and sustained abnormal returns that had been expected, and the market's reaction was relatively stable, indicating that the policy's impact on market prices and volatility was relatively limited in the short term. This study provides empirical support for evaluating the market impact of the Green Finance Policy, and also serves as a reference for investors.

Keywords: Green Finance Policies; Event Study Methods; Abnormal Rates of Return; Green Industries; Stock Market Stability

1. Introduction

1.1 Research Background

As global warming intensifies, climate uncertainty becomes more pronounced, and its impact on national and global economic development becomes increasingly severe, green financing is coming to the forefront as an emerging field. In order to promote a green economy and sustainable development, many countries have introduced a series of green financing policies (e.g., carbon markets, green bonds, green credits, etc.). Although green financing policies were initially designed to promote sustainable development, because stock markets are sensitive to policy changes and market sentiment, the enactment or implementation of such financing policies may have an impact on investors' expectations of the future of the market, which in turn may change the direction of capital flows in the stock market and may have an impact on the stability of the stock market. As a cross-cutting research field that integrates the environment, economics, and finance, exploring the impact of green finance on stock market stability will enrich the theoretical system of green finance, as well as provide some practical guidance to enhance the stability of the capital market. The implementation of a green financing policy can guide capital flows to green, environmentally friendly and low-carbon areas, increase the capital market's attention to green investments, and promote the sustainable development of the capital market. An in-depth study of how the green financing policy affects the stability of the stock market by promoting corporate innovation and alleviating financing constraints and debt crises can provide policy recommendations for enhancing the resilience of the capital market and reducing the risk of financing. In addition, by revealing the mechanism by which the green financing policy affects the stock market, it can

help investors optimize their investment strategies in the relevant stocks and reduce the potential risks to the market caused by climate uncertainty and policy changes.

1.2 Literature Review

As the green financing policy continues to advance, academics have conducted multidimensional studies on its impact on corporate performance and the capital market, focusing mainly on financing costs, market reaction, innovation incentives, and asset pricing mechanisms. In domestic studies, in terms of financing effects, green bonds significantly reduce credit spreads and ease corporate financing costs due to their "green" attributes, while at the same time enhancing stock liquidity through the "reputation spillover" effect [1]. The issuance of green bonds reduces the risk of corporate debt default, and the mechanism for utilizing green bonds encompasses the alleviation of financing constraints, the reduction of financing costs, the improvement of stock liquidity, and the enhancement of a green reputation [2]. In terms of market reaction, the issuance of green bonds can significantly increase the share price and trading volume of enterprises through the investor attention mechanism, and the effect is more obvious in third-party certification, polluting industries, and state-owned enterprises. However, the "dual-carbon" goal did not significantly strengthen the market response in the short term, and some carbon-neutral bonds even showed negative incentives [3]. In terms of innovation incentives, it was found that green financing significantly promotes green non-invention patents (strategic innovation) by alleviating financing constraints, has a non-significant effect on green invention patents (substantive innovation), and provides stronger incentives to SOEs, regions with strong intellectual property rights protection, and non-polluting enterprises. Green patent innovations also help to improve corporate financial performance, and patents for inventions further improve environmental performance [4]. In terms of the asset pricing mechanism, the green factor was introduced into the six-factor asset pricing model, and it was found that the model could more effectively explain the risk premium in the A-share market, oriented towards the increase in investor green preference after the Paris Agreement, the investment risk of polluting enterprises was

significantly higher than that of non-polluting enterprises, and the green factor possessed significant pricing power [5]. In summary, the existing studies show that green financing policies play a positive role in reducing financing costs, improving market performance, incentivizing green innovation, and promoting the pricing of risk, etc. They have initially revealed the key pathways through which green financing influences corporate performance and the capital market, and have provided theoretical and empirical support for further in-depth studies of investor performance and the transmission mechanism of green policies. By systematically contrasting the performance differences between China's Green Index and traditional market indices for the first time, the advantages of the ESG integration strategy in long-term investment were confirmed, providing an empirical basis for investors to construct sustainable investment portfolios and a reference for policymakers to promote the standardization of green financing [6]. In a foreign study, the stock market reaction to 124 green bond issuances by 29 companies around the world from 2010 to 2022 was examined using multidimensional scalar analysis and a two-step clustering method, and it was found that the stock price effect was affected by multidimensional factors, such as company size, issuance size, national GDP, and the corruption index, and that companies with large issuance and high ESG performance were more likely to receive a positive reaction, and companies with high ESG performance were more likely to receive a positive reaction. In addition, the study found that the development of green bond market can attract institutional investors and analysts by attracting them to the market, which is the most important factor for the development of green bond market [7]. In addition, based on the data of Chinese A-share non-financial listed companies in Shanghai and Shenzhen, it was found that the development of green financing can significantly suppress the risk of stock price collapse by attracting the attention of institutional investors and analysts and reducing information asymmetry, and the effect is more obvious for companies with a higher degree of information asymmetry, which provides microscopic evidence that green financing maintains the stability of the financial market [8].

1.3 Research Significance and Objectives

Although existing research has yielded some results on the impact of green financing on financing, innovation, and yields, it has generally used industry classifications to construct green factors, which makes it difficult to accurately reflect the actual performance of companies in reducing emissions and their policy responses, and ignores the heterogeneity of the corporate sector. In addition, current research focuses mainly on the impact of yields, with less attention paid to how green financing affects the volatility and stability of the stock market, and there is a lack of systematic analysis of the transmission mechanism of investor behaviors. Therefore, it remains to be explored whether and how the green financing policy affects market stability through investor expectations and behaviors. This study examines how the green financing policy affects the stability of the stock market and evaluates the impact of the green financing policy on the low-carbon industry, taking into account the impact of factors such as climate uncertainty and adjustments in investor behavior on the volatility of the stock market.

2. Materials and Methods

2.1 Data Sources and Methods

The purpose of this study was to analyze the impact of the green financing policy on the stability of China's stock market, particularly in the green industry sector. The data used for this study was obtained from the CSMAR database, which includes data on the daily closing prices of A-share companies listed on the Shanghai Stock Exchange (SSE) and in the relevant sectors of the green sector (based on the first-level industry classification of Shenwan). In order to ensure the accuracy and representativeness of the data, the sample of the study excludes ST stocks, companies that have been suspended from trading for a long period of time and companies that were delisted prior to the event period, and the corporate data will be aligned with the date of the event. The core event selected for the study is the "Guiding Intentions on Strengthening Financial Support for the Transformation of the Green Economy" issued by the State Administration of Financial Supervision and Administration on July 31, 2023. The policy is considered to be a green financing guidance document with significant information

content and systemic implications, making it suitable as a representative event for analyzing green policy shocks. Based on the event study methodology, we set the event date ($t=0$) to be the policy announcement date (31 July 2023), the event window to be 10 trading days before and after the event date (this is $[-10,10]$, for a total of 21 days), and the estimation window to be the 120th day to the 11th day prior to the event date (this is $[-120,-11]$) to construct the normal return model.

2.2 Estimation Models

Specifically, the study uses a market model to estimate the normalized return of individual stocks under no policy shocks, and uses the SSE as the market benchmark return. The form of the model is as follows:

Market model - Calculate the normal rate of return (R_t) during the event period:

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

R_t denotes the actual return of all A-share companies listed in the green sector (based on the first-level industry classification of Shenwan) in the relevant industry on date t , calculated as (closing price of all companies in the sector on the current day - closing price of all companies in the sector on the previous day)/(closing price of all companies in the sector on the previous day); $R_{m,t}$ denotes the market benchmark rate of return; and α, β denote the regression coefficients. The model calculates abnormal returns (AR) for the window period $[-10, 10]$ and further calculates cumulative abnormal returns (CAR) within the event window to evaluate the difference in response between the green sector and the overall market before and after the policy was introduced.

Abnormal Rate of Return (AR):

$$AR_t = R_t - (\alpha + \beta R_{m,t}) \quad (2)$$

Cumulative Abnormal Rate of Return (CAR):

$$CAR_t = \sum_{t=-n}^{t=n} AR_t \quad (3)$$

AR_t denotes the abnormal return rate of companies in the green sector in period t ; R_t denotes the actual return rate of companies in the green sector in period t ; $\alpha + \beta R_{m,t}$ denotes the expected return rate of companies in the green sector in period t ; and CAR_t , the cumulative abnormal return rate, is the cumulative value of the abnormal return rate on a daily basis.

2.3 Test Models

In terms of statistical tests, a one-sample t-test

was conducted on the mean of the AR and CAR series during the event period to test whether they were significantly different from zero, in order to determine whether the policy had a statistically significant impact on the overall market performance of the Green Mining Industry. In addition, graphical analyses of the trends in AR and CAR were conducted to provide additional information on possible changes in market expectations as a result of the policy information.

$$H_0: AR_t = 0, CAR_t = 0 \quad (4)$$

$$t_{AR} = \frac{AR_t}{S(AR_t)/\sqrt{n}}, t_{CAR} = \frac{CAR_t}{S(CAR_t)/\sqrt{n}} \quad (5)$$

Where t-values range from -10 to 10, to compute whether the statistic obeys a t-distribution with a degree of autonomy of $n-1$. If the test shows rejection of the original hypothesis and $CAR_t > 0$,

the policy is overall positively interpreted by the market during the event period and positively affects abnormal returns, and conversely, if $CAR_t < 0$, the policy raises concerns in the market and results in significantly negative abnormal returns.

3. Results and Discussions

3.1 Validity Check

Based on the market reaction profile, the abnormal return AR per day and the cumulative abnormal return CAR for the whole sample for a total of 21 days (-10, +10) were calculated to determine the significance of the abnormal returns, and the results were used to obtain the volatility of the returns shown in Table 1.

Table 1. AR_t and CAR_t , and Their Corresponding Significance Per Date in the Event Window for all Samples

date	AR	CAR	date	AR	CAR
-10	0.618%**	0.618%	1	-1.008%***	-2.302%***
-9	0.068%	0.687%*	2	0.674%**	-1.627%***
-8	-0.834%***	-0.148%	3	1.09%***	-0.538%
-7	0.003%	-0.145%	4	0.187%	-0.350%
-6	-0.884%***	-1.029%**	5	-0.334%	-0.684%*
-5	-0.834%***	-1.863%***	6	-0.498%*	-1.182%***
-4	0.203%	-1.660%***	7	3.726%***	2.544%***
-3	1.304%***	-0.356%	8	-0.137%	2.407%***
-2	-0.374%	-0.730%*	9	1.398%	3.805%***
-1	-1.053%***	-1.783%***	10	-0.116%	3.688%***
0	0.490%*	-1.293%***			

Note: * indicates significant at 10% level, ** indicates significant at 5% level, *** indicates significant at 1% level.

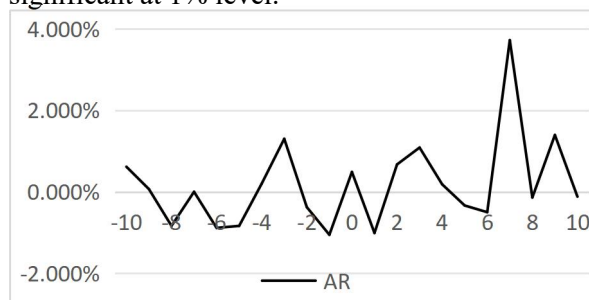


Figure 1. Variation of Abnormal Return (AR) Per Date for the Total Sample at (-10,10)

3.2 Analysis of Abnormal Rate of Return

First, in terms of daily abnormal returns (Figure 1), the abnormal rate of return (AR) of the Green sector during the event window were generally characterized by high volatility and a lack of a consistent trend. In the pre-event period ($t = -10$ to $t = -1$), negative ARs were recorded 8 days

before the announcement date and 6 days before the announcement date, but significantly positive ARs were recorded in the first 3 days, and significantly negative ARs were recorded one day before the event date. The ARs fluctuated up and down around the 0-axis on the whole (-1.035%, 1.304%). On the day of the event, AR shows a slight but limited increase, and by the next day of the announcement ($t=1$), AR declines and falls below the 0 axis. After showing a significant positive AR from 2 to 5 days after the announcement, the AR dropped again, indicating that the market did not react strongly and that the overall performance stabilized. However, on the 7th day of the event window, there was a significant positive AR, which reached the peak of the window, but the upward trend did not continue, and the AR quickly dropped to near the 0-axis on the following day. At the end of the event window ($t = 9$ to 10), the AR rose slightly again and then fell to a value close to zero, and overall the Green Sector did not show a strong

and sustained positive response.

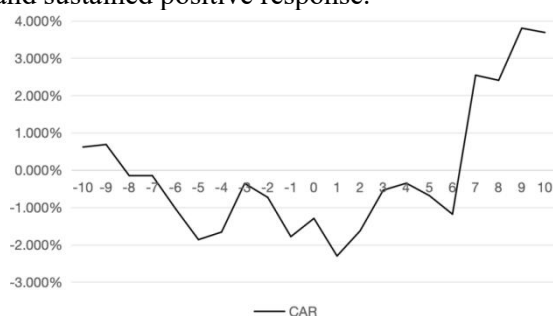


Figure 2. Variation of Cumulative Abnormal Returns (CAR) for the Overall Sample at (-10, 10)

3.3 Analysis of Cumulative Abnormal Rate of Return

As can be seen from the change in cumulative abnormal returns (Figure 2), the cumulative abnormal rate of return (CAR) of the overall sample fluctuated in the range of (-2.302% to 3.688%). The overall sample exhibits a significantly negative CAR from the 8th day before the announcement date to the 6th day after the announcement date. Among them, although there is an upward trend in the CAR from the 3rd day before the announcement date ($t=-3$), the magnitude of the trend is small, and the overall sample exhibits an overall downward trend from the 7th day before the announcement date to the next day after the announcement date ($t=1$), and reaches the lowest point, and exhibits a slight upward trend after that. From the 7th day after the announcement date to the last day of the event window, this is, the 10th day after the announcement date, the CAR increased significantly, offsetting the negative cumulative abnormal returns in the previous period and showing a significant positive short-term impact effect. As shown in Fig. 3, the announcement of the Green Finance Policy resulted in a positive cumulative excess return for the Green Mining Industry, which was significant at the 1% level.

3.4 Analysis of Research Results

The results show that the policy had a phased and lagged market impact on the green sector of China's A-share market after its release. In the short term, abnormal rate of return (AR) did not show a consistent trend before and after the date of the event, and although they rose slightly on the day of the event, they quickly fell back, reflecting the fact that the market was still in a wait-and-see mode in the early stages of the release of the policy, with investors reacting

cautiously to the policy release, and the market's expectations were not immediately realized. This short-term volatility reflects the fact that investor behavior is heavily influenced by sentiment and that there is a time lag in the transmission of policy effects. In contrast, the dynamics of the cumulative abnormal rate of return (CAR) reveals the market effect of policy information more clearly. In the early part of the event window, the CAR was basically negative, reflecting the overall weak market sentiment in the green sector prior to the release of the policy. However, after the policy was announced, the CAR gradually increased, especially in the later part of the event window, and passed the t-test at a significance level of 1%, suggesting that the policy's effect was gradually absorbed and recognized by the market over time. The significant improvement in CAR suggests that although the market's initial reaction to the policy was cautious, as the information was gradually digested, the positive impact of the policy on the industry's expectations and investment sentiment gradually emerged. Combining the empirical results of the AR and CAR, it can be concluded that the green financing policy has a positive impact on the stock market of the green manufacturing industry, but this impact is not immediate, and is manifested gradually after a certain time lag. The release of the policy's effect is characterized by gradualness and stages.

3.5 Research Limitations

This study also has certain limitations, that is, the research at the plate level may mask individual differences, as this study analyzes the green industry as a whole, and calculates AR and CAR by treating the industry as a unified market entity. This simplifies the calculations, but it may overlook significant differences within the industry in terms of the sensitivity of the industry to policy, its financial condition, and its green credentials. A follow-up study could use the methodology of individual stock-level event studies to calculate abnormal returns for each company individually, and further cross-compare the companies by grouping them according to their green ratings, ESG performance, or degree of policy influence, in order to obtain more detailed conclusions. In addition, this study focuses on a single policy event, the "Guiding Opinions on Strengthening Financial Support for the Transformation of the Green Economy,"

which was released on July 31, 2023, and the event window is ± 10 trading days, which makes it difficult to capture the full impact of the policy. In the future, it would be possible to conduct a multi-event study with multiple green finance policy events, or to extend the window to more than 30 days to examine the medium- and long-term effects and improve the robustness of the conclusions.

4. Conclusion

4.1 Summary of Results

This study empirically analyzes the short-term impact of the green financing policy on the market stability of China's A-share green industry sector using the event study methodology, focusing on the "Guiding Intentions on Strengthening Finance to Support the Transformation of the Green Economy," which was issued by the State Administration of Finance on 31 July 2023.¹ This study also examines the short-term impact of the green financing policy on market stability of China's A-share green industry sector. A market model was constructed to estimate and calculate abnormal rate of return (AR) and cumulative abnormal rate of return (CAR) during the event window to assess the volatility and reaction of the market before and after the promulgation of the policy. The study found that the green financing policy had a positive impact on the stock market of the green sector, but that the effect was not immediate and was only realized gradually after a certain time lag. The effects of the policy are gradual and phased, and although the policy has the function of guiding expectations, its effect on market stability and capital inflows is limited in the short term. This study theoretically tested the hypothesis that "the release of green policies will affect market returns in the green sector," and the results reflect that the transmission of policy signals is not uniform within the green sector. This finding suggests that the actual effect of a green financing policy depends not only on the content of the policy itself, but is also closely related to factors such as market structure, the degree of information disclosure, and investor behavior.

4.2 Summary of Methodology

In terms of methodology, this study attempts to take the overall performance of the sector as the object of study to reveal the market impact of the

green financing policy from a macroscopic point of view, thus providing a new entry point for subsequent studies. In the course of the study, some inadequacies have been identified, such as the fact that the data are calculated on the basis of the overall sector, which fails to analyze the differences between different companies, and the fact that the study only focuses on one policy event, which results in a limited sample representation. In the future, improvements can be made in the following ways: one is to add multiple policy events for comprehensive analysis; two is to introduce company-level data to observe the different responses of companies to policies; and three is to use more complex models, such as the GARCH model, to study the impact of policies on market fluctuations. In addition, factors such as news and public opinion and investor sentiment can be combined to further understand the irrational reaction of the market after the release of the policy. Overall, this study has a certain reference value for understanding the market transmission mechanism of the green financing policy, improving the green financing evaluation system, and promoting the quantitative assessment of the policy's effects, and also provides investors with an analytical framework and risk management ideas when dealing with the impact of the green policy.

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