

The Stock Performance of Financial Institutions After the Paris Agreement: The Case in China

Hanyue Wang

Wenzhou-Kean University, Wenzhou 325060, China

1129612@wku.edu.cn

Abstract. In 2015, the signing of the Paris Agreement marked a new stage in the green transformation of the international economy. This paper aims to study the stock performance of China's listed financial institutions after the signing and implementation of the Paris Agreement and the impact of green investment on the stock performance of China's listed financial institutions during the green transition period. The data sample covers 46 A-share listed financial institutions, of which 24 financial institutions or their subsidiaries have made green investments after 2016. This study uses the event study method (ESM), based on the market model and the Fama-French three-factor model. The empirical results show that listed financial institutions have a positive abnormal stock returns around $[-10, 10]$ after the first official announcement date of the signing of the Paris Agreement. Among them, the stocks of financial institutions that have issued green bonds have significant higher abnormal returns, outperforming those that have not issued green bonds. It reflects the positive attitude of investors towards the green transformation of China's economic market and is helpful for the formulation of green financial policies.

Keywords: Paris Agreement, Chinese Stock Market, Green Finance, Event Study.

1. Introduction

The Paris Agreement is a climate agreement adopted by the United Nations at the 2015 United Nations Climate Summit on December 12, 2015, replacing the Kyoto Protocol. Its purpose is to curb the trend of global warming jointly. On September 3, 2016, the National People's Congress (NPC) Standing Committee approved China's accession to the Paris Agreement. China's carbon emissions account for about one-third of the world's total. The Chinese government has taken a series of countermeasures in the past few years to accelerate the green transition. In this process, financial institutions play an essential role. The Paris Agreement states that governments need financial support for climate finance, as slowing global warming requires massive investment to help reduce carbon emissions. Financial institutions represented by banks, securities companies, and asset management companies undertake their due social responsibilities and seek development and progress in the wave of green finance. Therefore, Chinese financial institutions started their green transition after the Paris Agreement. For the first time since 2016, green bonds have appeared in the Chinese securities market. In 2020, China proposed a "dual carbon" policy, namely carbon peaking and carbon neutrality. The green transition of financial institutions will also further extend to reduce carbon emissions from corporate operations. Therefore, the green transition of financial institutions includes supporting projects with low carbon and carbon reduction effects and transforming their activities from high carbon to low carbon and even decarbonization [1].

The traditional investment model existed under the traditional economy. Its main feature is to achieve profit through capital investment without considering resource shortage and environmental protection or less consideration of these factors and consequences. The goal of traditional investing is to make a profit. This kind of investment behavior makes it easy for manufacturers to ignore the negative impact of production on society and the environment during the production process and to give up their corporate social responsibilities. Green investing is the opposite. The green investment generates green productivity, manifested in implementing clean production in production, that is, energy-saving, material-saving, waste-free, or less-waste material recycling production. In terms of products, it is miniaturized (less waste), multi-functional (multiple uses), recyclable, and less polluting to the environment. In terms of environmental protection, it manifests that carrying out

production and environmental protection simultaneously. The production process is not only the output process but also pollution prevention and control. The green investment reflects the harmonious relationship between the economy, society, and ecology based on sustainable development. The benefits of green investment are triple surplus, including economic, social, and ecological benefits. What traditional investment obtains is a single surplus, that is, profit. In terms of value creation, green investment creates long-term value, while traditional investment obtains short-term benefits. The Paris Agreement is a vital time node, which means that the government promotes the transformation of green finance through policies. In this process, financial institutions will play an important role.

This study examines the impact of the Paris Agreement on financial institutions from an event study perspective. Based on the event study method, the main research objectives of this study are:

1. After the Paris Agreement, whether the stock performance of China's A-share listed financial institutions has strengthened.
2. After the Paris Agreement, whether financial institutions make green investments affects stock performance.

2. Literature Review

2.1 Climate Change and Sustainable Development

The Paris Agreement created a new international climate regime. The new international climate regime does not impose mandatory emission reduction mandates. All parties can independently determine contribution goals and action plans according to their capabilities. The Paris Agreement requires the Chinese government to comprehensively coordinate the relationship between economic development, improvement of people's livelihood, environmental protection, and mitigation of carbon dioxide emissions to prevent the Paris Agreement from becoming a rigid constraint on economic development. However, on the other hand, if the world achieves the goal of controlling temperature rise to no more than two °C (or even 1.5°C), the global future total carbon emission space will be severely restricted (Teng et al., 2011). China will face the challenge of insufficient space for carbon emissions. To protect the ecological security of the earth and the survival and development of all humankind, China must carry out a green and low-carbon economic transformation of economic development [2].

Over the past decade, investors have been interested in sustainable finance. According to China Banking Regulatory Commission (2012), in 2014, the Chinese government fully implemented the Green Credit Guidelines (GCG), requiring all companies related to the environment, especially listed companies, to pay attention to their environmental, social, and governance information disclosure. It shows that a sustainable development strategy has become necessary for financial institutions.

Based on the Paris Agreement, in response to climate change and sustainable development strategies, the Chinese government has formulated green finance policies to guide the green transformation of the entire industry. In the financial industry, policies encourage financial institutions to make larger-scale green investments to help the industry's low-carbon transformation. A sound policy foundation provides a stable external environment and high-quality investment resources for the development of the financial industry. High yield and low volatility are critical criteria for financial institutions to make low-risk investments. Policy orientation has screened high-quality investment projects for financial institutions. Environmentally friendly investment projects will bring stable and excellent returns to financial institutions. According to structural equation modeling (SEM) based on partial least squares (PLS), technological innovation affects environmental performance and positively affects firm performance. For the financial industry, it will be a positive cycle. The Paris Agreement provides a sound policy basis. In the long run, this will lead to higher equity returns for financial institutions [3].

2.2 Green Finance and Stock Performance

Since 2016, the Chinese government has formulated policies to encourage green financing to reduce carbon emissions in the Paris Agreement, including increasing the issuance of green bonds by state-owned enterprises and big financial institutions. This policy will help these more creative businesses escape financing constraints and significantly release the green innovation of private enterprises, thereby promoting the green transformation of the Chinese economy. According to the bibliometric analysis, green finance will become the future market's development direction and promote the economy's sustainable development. In the long run, it will promote continued economic growth. It also means that there will be decent returns for financial institutions making green investments, which also means higher stock returns. Stock performance is essential for good corporate governance. Typically, shareholders and managers pursue excellent stock performance, and good stock performance attracts more investors. More investors mean financial institutions have more money to invest. It will create better profits and performance for financial institutions. Better performance means more investment capacity, which will help financial institutions increase the scale of green bonds and enhance their green transition. If there is a positive relationship between green transition and stock returns, it will be a good cycle [4].

The Chinese government has generally developed economic policies to encourage green investment. Stable policy support will positively impact industries that adapt to the policy (Gu et al., 2021). Green investment is the key to the green transition of financial institutions. To a certain extent, it determines the degree of green transformation of financial institutions. Green investment can help other companies reduce financing constraints, improve the green innovation capacity of the market, and increase the development potential of the future market. It will become a high-quality long-term investment project. Likewise, financial institutions with high-quality investments will have better returns over the long term, leading to higher stock returns. Therefore, we propose the first hypothesis [5].

H1: China's A-share listed financial institutions have achieved better stock performance after the Paris Agreement.

2.3 Green Financial Transition and Corporate Social Responsibility

Climate change is arguably one of the most significant global challenges. The Paris Agreement marked the beginning of international cooperation to improve climate change. Green economy policies play an integral role in addressing the challenges posed by climate change. At the United Nations Conference on Sustainable Development, governments worldwide affirmed the need to transition to a green economy. In China, green bonds appeared in the capital market for the first time in 2016. Green transition is transforming from the traditional development model to the scientific sustainable development model. It refers to the transformation of the development model to sustainable development based on the construction of ecological civilization, the basis of circular economy, and the guarantee of green management to realize resource conservation, environmental friendliness, ecological balance, and harmonious development of humans, nature, and society. Green finance is crucial in driving the green transition, especially in developing countries. It means that the green transition of financial institutions is of great significance to the whole industry's sustainable development [6].

Financial institutions provide power for the circulation of financial markets and accelerate the prosperity of financial markets. Financial institutions build bridges between retail investors, large corporations, and financial markets. Financial institutions can raise funds from many investors, turn them into pieces, make large-scale investments in the financial market, and promote market liquidity. Financial institutions usually raise funds for investment by issuing bonds, asset management projects, funds, and other means. The green transformation of financial institutions is an activity with the primary purpose of ecological protection and environmental governance. The green investment of financial institutions has important practical significance for promoting sustainable economic development. Research shows that green credit, green investment, and green securities, as well as

corporate social responsibility reporting, have significant positive associations with the green transition process of financial institutions [7].

Based on the difference-in-difference (DID) approach, climate change and sustainability strategies would effectively reduce corporate credit risk. Research shows that a reduction in credit risk will boost investor confidence, which boosts stock returns. As a result, a high level of concern about climate change means that financial institutions are undergoing a green transition and can earn higher stock returns, albeit perhaps not significantly. Nevertheless, a common concern about the environment means lower stock returns. Therefore, the severe environmental concern of financial institutions can enhance green transition and equity returns, strengthening the positive relationship between the two. Good corporate social responsibility attracts investment, lifts financing constraints, investee companies will have more technological innovation capabilities, improve company performance, and bring good returns to investment institutions. Therefore, we propose the following hypothesis [8].

H2: After the Paris Agreement, financial institutions that made green investments performed better than those without green investments in China's A-share market.

3. Research Methodology

3.1 Data Collection and Sample

The primary data source is China Stock Market & Accounting Research Database (CSMAR). The sample of this study is limited to financial institutions listed on China's A-shares in 2012 and before. The sample size is 46 A-share listed financial institutions. Among them, the samples include two groups: financial institutions that have made green investments and financial institutions that have not. Green Financial Institutions (GFI) are financial institutions that have made green investments with 24 companies. Traditional Financial Institutions (TFI) have yet to make green investments totaling 22 companies. The sample population is representative, covering major Chinese financial institutions. To avoid significant adverse impacts of COVID-19, we selected the daily closing prices and daily yields of 46 companies from January 1, 2013, to December 31, 2019, as well as the average daily yields of all A-share listed companies. The total amount of data exceeds 80,000 pieces. The sample size is universal. In addition, we downloaded the Fama-French three-factor daily data from CSMAR as a reliability test of the research results [9].

3.2 Measurement & Date analysis

The Event Study Method (ESM) is a standard method used by financial researchers to examine company stock prices. It mainly examines the abnormal returns of sample stock prices after a specific event occurs (Lee et al., 2020). We used the event study method in this research to examine the impact of the Paris Agreement on the stock market. Market models are the most used and have good predictive power. In this study, we used a market model as follows:

The normal rate of return is:

$$E(R_{i,t}) = \alpha_i + \beta_i R_{m,t} + \mu_{i,t}, \quad (1)$$

where $E(R_{i,t})$ is the expected return of a firm i on the t th day based on the estimation window. $R_{m,t}$ means the actual return of market index m where the firm i listed on the t th day. Furthermore, α , β , and μ denoted the intercept, slope of the market model, and a random error term, respectively.

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

where $AR_{i,t}$ represents the abnormal return of the listed company i on the t th day, and $R_{i,t}$ is the actual return of the firm i on the t th day. Then, cumulative abnormal returns (CARs) calculation is as follow:

$$CAR_{i,T} = \sum_{t=t_1}^{t=t_2} AR_{i,t}, \quad (3)$$

where $CAR_{i,T}$, is the cumulative abnormal return of the company i with the time interval $T[t_1, t_2]$, from initial moment t_1 to final moment t_2 .

Table 1. Descriptive Statistics of Chinese A-Share Listed Financial Institutions

Variables	N	Mean	StdDev	Min	Max	Skewness	Kurtosis
$R_{i,t}$	21789	0.6626	2.7783	-10.0194	10.0541	0.4341	7.5543
$R_{m,t}$	21789	-0.2937	1.3517	-7.8860	3.6379	-1.6626	9.8862
$E(R)$	21789	0.1021	1.4637	-9.3467	4.5542	-1.7413	11.8488
AR	2132	0.5604	2.2752	-10.0063	15.0001	1.0122	8.9902
CAR	2132	0.7843	9.0345	-30.6537	64.2959	2.7503	17.9218
$CAAR$	21789	0.8741	7.7109	-12.8177	49.7199	3.0060	19.5847

Table 1 shows that the average actual market return of China's A-share listed financial institutions is slightly less than 0. In contrast, the average abnormal return and cumulative abnormal return of these institutions are more significant than 0. Overall, the cumulative abnormal return of more than half of the financial institutions is greater than 0. To accurately study the investor's response to the outbreak, the study chose two different time nodes as event days. On December 12, 2015, at the United Nations Climate Change Conference 2015, 196 parties negotiated to sign the Paris Agreement. The Paris agreement marks a new era of global cooperation on curbing global warming, with policy implications. It means that the global green economy is imperative, and the transformation of green finance will become a new development goal of financial institutions. Another incident is that on September 3, 2016, The Standing Committee of the National People's Congress announced China's accession to the Paris Agreement. It means the official implementation of this international event in China. The Chinese government sets the direction and goals for China's economic development, transforming towards a low-carbon economy. This policy will significantly affect the entire stock market. It is good news for green finance and will boost the confidence of investors and policymakers. For traditional finance, it means coming changes. The event window is set 10 days before and after the announcement date ($t = 0$). It means the event window interval A is $[-10, 10]$. Moreover, the estimation window is defined as $[-200, -20]$ to avoid confounding effects.

Furthermore, the T-test statistical method checks the event study results, investigating whether the Paris Agreement impacts the sample firms' stock performance. The calculation is the following equations,

$$T - test_{ARR_t} = \frac{AAR_t}{S(AR_{i,t}) / \sqrt{N}}, \quad (4)$$

$$T - test_{CAAR_T} = \frac{CAAR_T}{S(CAR_{i,T}) / \sqrt{N}}, \quad (5)$$

where S is the standard deviation. Finally, the paper focuses on the results of CARs of two events for investigating the cumulative stock price influence of the Paris Agreement on Chinese financial institutions within the event window

4. Findings

4.1 Main Results

Figures 1 and 2 graphically show the trend of the cumulative abnormal returns of Chinese financial companies affected by the Paris Agreement during the event window $[-10, 10]$. Figure 1 shows the upward fluctuation of CARs of all sample companies within the event window on December 12, 2015, the day of the announcement. The CARs of financial institutions rose significantly the day after the Paris Agreement was signed. In subsequent dates, CARs exhibited a trend of increasing volatility.

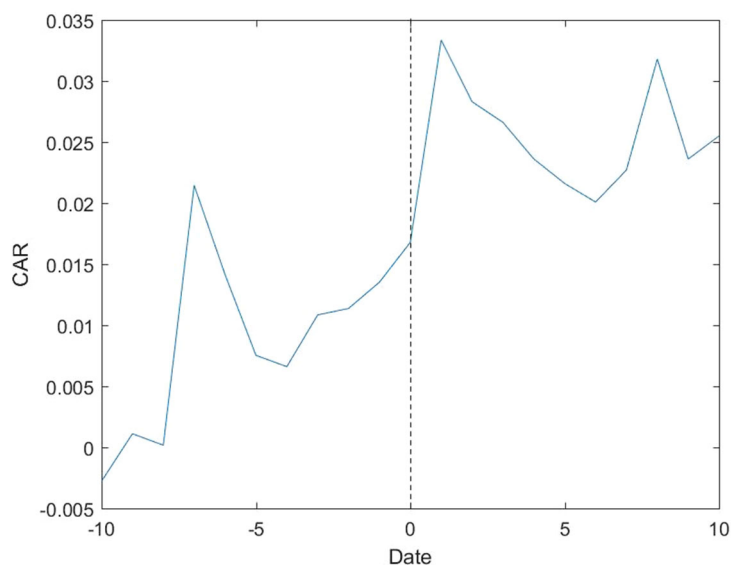


Figure 1. CARs for the first event date

Figure 2 shows that on the announcement date, the CARs of financial institutions listed on China's A-share market significantly increased. On the third day, CARs started to fall back again. Compared with before the event window, CARs showed an overall increase after the event window at the overall trend. This result shows that, overall, on the day of the signing of the Paris Agreement, the event had a significant positive impact on the stock performance of China's A-share-listed financial institutions. On the day China announced its official accession to the Paris Agreement, the stock market had a positive reaction, but not as dramatic as the first event date.

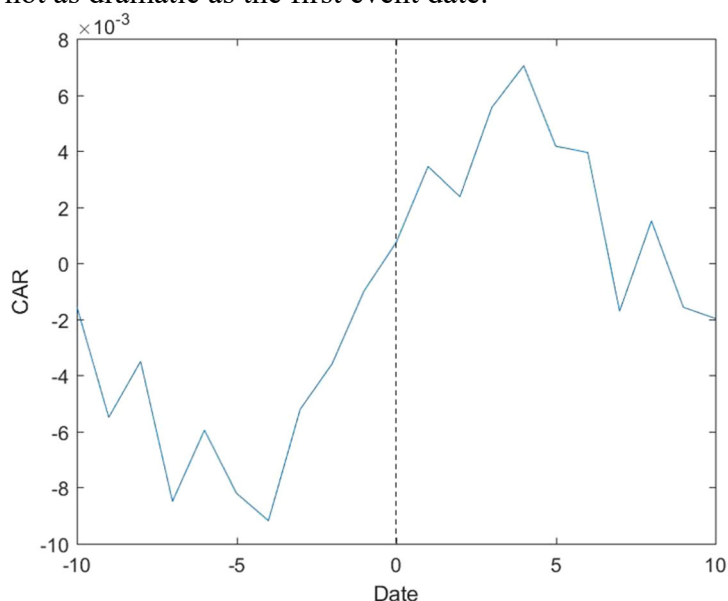


Figure 2. CARs for the second event date

To sum up, on the announcement day and implementation day of the Paris Agreement, the stock performance of Chinese financial institutions showed positive feedback. CARs rose to a greater extent on the first event date than on the second event date. As China is one of the principal signatories to the Paris Agreement, the Paris Agreement is in line with China's national conditions and sustainable development strategy. The market is full of positive sentiments toward the formulation of the agreement. At the same time, the public believes that China will join the Paris Agreement. Therefore, on the date when China officially announced its accession, there was temporary and significant positive feedback in the market, and then it stabilized again. Table 2 and Table 3 show the detailed values and t-test results [10].

Table 2. CARs in the early signing period of the Paris Agreement

Event Date: 2015/12/12		
Event window	CAR	t value
[-10, 10]	3.2592***	-5.6713
[-5, 5]	-0.3516***	-6.2324
[-4, 4]	-0.3528***	-8.6327
[-3, 3]	-0.3814***	-3.9725
[-2, 2]	0.0035	0.0758
[-1, 1]	-0.4053**	-2.638
[0]	-0.0705**	-2.3945
[-10, 0]	-0.0713***	-5.0217
[-5, 0]	-0.0736**	-2.3688
[-2, 0]	0.1249***	3.8932
[-1, 0]	0.1468***	3.9935
[-10, -1]	0.1904***	4.063
[-5, -1]	0.2529***	5.5639
[0, 1]	-0.0705**	-2.3945
[0, 2]	-0.4510***	-5.017
[0, 3]	-0.5377***	-6.2948
[0, 4]	-0.8496***	-6.2627
[0, 5]	-0.8673***	-6.8087
[0, 10]	1.0722***	7.9468
[1, 5]	1.1984***	4.1000
[1, 10]	3.6157***	7.2195

Table 3. CARs in the period after China began to implement the Paris Agreement

Event Date: 2016/9/3		
Event window	CAR	t value
[-10, 10]	-0.1281***	-5.3488
[-5, 5]	-0.1312***	-5.1417
[-4, 4]	0.1369***	3.9862
[-3, 3]	-0.1691***	-5.5969
[-2, 2]	-0.1892***	-8.4507
[-1, 1]	-0.1915***	-8.129
[0]	-0.0256***	-3.3938
[-10, 0]	-3.0341***	10.734
[-5, 0]	0.0351***	3.1766
[-2, 0]	-0.0376***	-6.4394
[-1, 0]	-0.0709***	-6.7681
[-10, -1]	-0.0759***	-4.0505
[-5, -1]	0.1034***	7.2068
[0, 1]	0.2079***	-7.6583
[0, 2]	0.3528***	4.8133
[0, 3]	1.4831***	-6.6357
[0, 4]	1.5866***	-5.2512
[0, 5]	1.6469***	3.5719
[0, 10]	1.7435***	-6.3502
[1, 5]	1.7522***	5.7541
[1, 10]	2.8550***	5.1158

4.2 Analysis of Green Financial Institutions and Traditional Financial Institutions in the Event Window

To better discover the impact of the Paris Agreement on Chinese financial institutions, we divided 46 companies into financial companies with green investments and financial companies without green investments to determine whether the company's green transition will affect the relationship. Green Financial Institutions (GFI) have made green investments, while Traditional Financial Institutions (TFI) have not. Table 4 and 5 compare the abnormal returns of green and traditional financial institutions on the two event dates. Table 2 gives the differences based on the date of the first event. The CARs of traditional and green financial companies were damaged two days before the event. Statistically, at the level of 5% on the announcement day, the CAR value of traditional financial companies did not become positive, and the change was not significant enough on the second day until the 10th day after the event day. The CAR of green finance companies has increased significantly and remained relatively stable. It shows that the Paris Agreement has an insignificant positive impact on traditional financial institutions but has a significant positive impact on green financial institutions. The overall financial market was favorable in the early days of the Paris Agreement. Ten days after the event, this positive effect fluctuates due to the hedging effect of traditional financial companies with green financial companies. There was no significant pullback in overall market performance when the Paris Agreement was signed, as the positive impact of green finance companies was more pronounced on the first event date. When China officially announced its accession to the Paris Agreement due to the hedging effects of traditional financial companies, the CAR value fluctuated wildly. It fell back to the level at the time of the incident. The results show that GFI stocks outperformed TFIs during the Paris Agreement period, and overall financial markets performed well. The Paris Agreement has given investors more trust and confidence in green finance [11].

Table 4. CARs of financial institutions with and without green investment, the first-time window (2015.12.12)

Event Date: 2015/12/12					
Event window	Green Finance		Traditional Finance		Difference
	CAR	t value	CAR	t value	
[-10, 10]	7.0736**	-2.3688	3.6157***	7.2195	3.4586
[-5, 5]	4.2529***	5.5639	0.3873***	4.1834	3.8650
[-4, 4]	3.1904***	4.063	-0.5377***	-6.2948	3.7270
[-3, 3]	2.0035	0.0758	-0.2592***	-5.6713	2.2620
[-2, 2]	1.0713***	-5.0217	1.1984***	4.1	-0.1267
[-1, 1]	-0.4053**	-2.638	0.1249***	3.8932	-0.5290
[0]	0.1468***	3.9935	-0.3814***	-3.9725	0.5270
[-10, 0]	-0.8673***	-6.8087	-0.0705**	-2.3945	-0.7970
[-5, 0]	-0.3528***	-8.6327	-0.8496***	-6.2627	0.4970
[-2, 0]	-0.3516***	-6.2324	-0.4510***	-5.017	0.1000
[-1, 0]	0.1680***	3.9759	1.0722***	7.9468	-0.9040
[-10, -1]	-0.004	-0.309	-0.1342***	-8.7069	0.1300
[-5, -1]	0.2024***	5.8731	-0.4709***	-6.4322	0.6720
[0, 1]	0.5925***	7.7877	1.1567***	5.0705	-0.5640
[0, 2]	0.2314***	6.1708	-0.0071	-0.1674	0.2380
[0, 3]	1.1563***	7.555	0.5802***	7.2752	0.5760
[0, 4]	2.2771***	5.0089	0.5582***	6.1125	1.7190
[0, 5]	3.0035	0.3152	-0.8421***	-6.1737	3.8450
[0, 10]	8.0931**	-2.2412	0.4822***	6.1122	7.6111
[1, 5]	4.0981**	2.5596	0.4311***	6.188	3.6670
[1, 10]	7.0297	0.8859	0.0459	1.6847	6.9840

Table 5 shows the CAR values for the two types of financial firms on the second event date. The results show that since China's accession to the Paris Agreement was not a surprise decision, the market only had a significant positive impact in the early stages of the event. This strong response returned within ten days to levels similar to those seen before the event. The second event date has an insignificant positive effect on the stock performance of Chinese financial institutions.

Table 5. CARs of financial institutions with and without green investment, continued Table 4, time window

Event Date: 2016/9/3					
Event window	Green Financial		Traditional Financial		Difference
	CAR	t value	CAR	t value	
[-10, 10]	0.0376***	-6.4394	-0.4831***	-6.6357	0.4460
[-5, 5]	0.0759***	-4.0505	-0.1312***	-5.1417	0.0560
[-4, 4]	0.0709***	-6.7681	0.3528***	4.8133	-0.4220
[-3, 3]	-0.0256***	-3.3938	-0.1691***	-5.5969	0.1440
[-2, 2]	0.1034***	7.2068	-0.5866***	-5.2512	0.6890
[-1, 1]	-0.2079***	-7.6583	-0.7435***	-6.3502	0.5360
[0]	0.0351***	3.1766	0.8550***	5.1158	-0.8200
[-10, 0]	-0.0752***	5.7541	0.0341***	10.734	0.7180
[-5, 0]	0.6469***	3.5719	-0.1915***	-8.129	0.8370
[-2, 0]	-0.1281***	-5.3488	-0.1892***	-8.4507	0.0610
[-1, 0]	-0.1175***	-6.1795	0.1369***	3.9862	-0.2530
[-10, -1]	-0.1242***	-3.8099	-0.0188	-0.7562	-0.1060
[-5, -1]	-0.0051	-1.1382	0.0612***	4.1588	-0.0660
[0, 1]	0.0099	1.3908	-0.2382***	-5.939	0.2470
[0, 2]	0.1058***	4.7173	0.6094***	6.2277	-0.5040
[0, 3]	-0.02	-1.4827	0.0218**	2.6962	-0.0410
[0, 4]	-0.0405***	-3.9413	-0.2603***	-6.5916	0.2200
[0, 5]	0.1032***	7.7009	0.0607***	4.0863	0.0430
[0, 10]	0.1455***	-4.5642	0.3766***	6.0158	-0.2305
[1, 5]	0.1815***	-4.8426	-0.0056	-0.4761	0.1865
[1, 10]	0.1547***	-6.3921	0.1428***	8.0783	0.0127

4.3 An Alternative Model

To avoid market model bias, we choose the Fama-French three-factor model (Fama & French, 1993a) as an alternative to re-estimating expected stock returns to obtain new CAR values. By comparing the results obtained by the two models, the reliability of the research results is tested. The abnormal return (AR) is calculated using the Fama-French three-factor model as follows:

$$E(R_{i,t}) = \alpha_i + \beta_{i1}R_{m,t} + \beta_{i2}SMB + \beta_{i3}HML + \varepsilon_{i,t}, \quad (6)$$

$$FARR_{i,t} = R_{i,t} - E(R_{i,t}), \quad (7)$$

where β_1 , β_2 , and β_3 are estimated by regressing the returns of three factors (daily market excess return, company size factor, and book-to-market value ratio) of financial institutions in the estimation window [-200, -20]. The $R_{m,t}$ represents the actual rate of return of the market index, the SMB_t and HML_t are the high-minus-low book-to-market and the small-minus-big size factor on day t , respectively.

Table 6-7 presents the CAR values for the two event dates and compares the results of green financial institutions and traditional financial institutions. Based on the Fama-French three-factor model, Table 6 shows the CAR results for the first event, similar to the CAR results under the market model. It shows that the conclusions of previous studies are reliable. Green financial institutions show more significant abnormal returns after the event, among which green financial companies receive significant positive shocks in the first three days after the event. The decline in earnings of traditional financial companies is even more apparent. Table 7 shows the results of re-estimating the second

event day based on alternative methods. The results are similar to the market model. The test based on the Fama-French three-factor model shows that the previous research results are valid. There is a significant positive shock to financial institution stock performance on the first event date. On the second event date, this positive shock is less significant. For both event dates, green financial institutions receive significantly more positive shocks than traditional financial institutions.

Table 6. CARs based on the Fama-French model, the first event window 2015.12.12

Event Date: 2015/12/12							
Event window	All companies		Green Finance		Traditional Financial		Difference
	CAR	t value	CAR	t value	CAR	t value	
[-10, 10]	3.1036***	-3.2767	7.1036***	-3.2767	3.7053***	7.2985	3.3986
[-5, 5]	1.2244***	5.5933	4.2244***	5.5933	0.4552***	4.5979	3.7690
[-4, 4]	0.1620***	3.6964	3.1620***	3.6964	-0.4351***	-6.1664	3.5970
[-3, 3]	0.0063	0.1494	2.0063	0.1494	-0.2199***	-5.9469	2.2250
[-2, 2]	-0.1058***	-8.1234	1.1058***	-8.1234	0.7459***	3.0914	0.3608
[-1, 1]	3.7053***	7.2985	0.6402***	-3.5061	0.3808***	7.4447	0.2602
[0]	0.4552***	4.5979	0.2050***	6.3889	-0.3193***	-3.4495	0.5240
[-10, 0]	-0.4351***	-6.1664	-0.8422***	-6.8015	-0.0600**	-2.7094	-0.7820
[-5, 0]	-0.2199***	-5.9469	-0.3251***	-8.3843	-1.0006***	-5.9051	0.6750
[-2, 0]	0.7459***	3.0914	-0.3316***	-6.271	0.3209***	4.6657	-0.6510
[-1, 0]	0.3808***	7.4447	0.1865***	4.368	1.1169***	7.7571	-0.9300
[-10, -1]	-0.6402***	-3.5061	-0.0163	-1.5614	-0.1036***	-8.6383	0.0870
[-5, -1]	-0.3193***	-3.4495	0.1786***	5.8884	-0.4699***	-6.7202	0.6470
[0, 1]	-0.0600**	-2.7094	0.1606***	8.2345	0.8709***	4.7517	-0.7100
[0, 2]	0.2050***	6.3889	0.2166***	6.0729	0.0017	0.0436	0.2150
[0, 3]	-0.8422***	-6.8015	0.1239***	8.2917	0.5557***	7.2153	-0.4320
[0, 4]	-1.0006***	-5.9051	0.2854***	5.3727	0.5640***	6.0473	-0.2790
[0, 5]	0.3251***	-8.3843	1.0302***	-3.4067	-0.7043***	-6.1132	1.7342
[0, 10]	1.3209***	4.6657	1.0648*	-2.083	0.4639***	6.0595	0.6018
[1, 5]	1.3316***	-6.271	1.0988**	2.798	0.4096***	6.071	0.6890
[1, 10]	3.1169***	7.7571	3.0405	1.5168	0.0598**	2.5469	2.9810

Table 7. CARs based on the Fama-French model, continued Table 6, the second event 2016.9.3

Event Date: 2016/9/3							
Event window	All companies		Green Finance		Traditional Financial		Difference
	CAR	t value	CAR	t value	CAR	t value	
[-10, 10]	2.0377***	-7.9547	0.0370***	-7.9547	-0.5859***	-6.1974	0.6220
[-5, 5]	1.0365***	-3.5439	-0.0365***	-3.5439	-0.0650***	-4.7604	0.0290
[-4, 4]	1.0320***	-8.2182	-0.0320***	-8.2182	0.2581***	4.6135	-0.2900
[-3, 3]	0.0531***	5.6365	0.0531***	5.6365	-0.1166***	-5.851	0.1690
[-2, 2]	0.1343***	7.9878	0.1343***	7.9878	-0.5834***	-5.121	0.7170
[-1, 1]	-0.5859***	-6.1974	-0.1704***	-7.9777	-0.6507***	-6.3002	0.4800
[0]	-0.0650***	-4.7604	0.1685***	5.922	0.7337***	4.8203	-0.5650

[-10, 0]	0.2581***	4.6135	0.7076***	5.8448	0.0931***	6.4063	0.6140
[-5, 0]	-0.1166***	-5.851	0.7841***	3.8258	-0.2416***	-7.6553	1.0250
[-2, 0]	-0.5834***	-5.121	-0.1026***	-5.2401	-0.2022***	-8.216	0.1000
[-1, 0]	-0.6507***	-6.3002	-0.0452***	-6.6335	0.0985***	3.4648	-0.1430
[-10, -1]	-0.1704***	-7.9777	-0.0766***	-3.3449	-0.0018	-0.0801	-0.0750
[-5, -1]	0.7337***	4.8203	0.0068**	2.2345	0.1379***	4.4871	-0.1310
[0, 1]	0.0931***	6.4063	0.0304***	4.66	-0.1919***	-5.5826	0.2210
[0, 2]	0.1685***	5.922	0.1541***	4.7745	0.6944***	6.0711	-0.5400
[0, 3]	1.7076***	5.8448	0.0087	0.9761	0.0610***	4.2086	-0.0530
[0, 4]	1.2416***	-7.6553	0.0655***	5.7339	-0.1875***	-7.606	0.2520
[0, 5]	1.7841***	3.8258	0.1200***	7.5219	0.0577***	4.2126	0.0630
[0, 10]	1.2022***	-8.216	0.0756***	-4.211	0.4329***	5.8126	-0.3564
[1, 5]	1.1026***	-5.2401	0.1053***	-4.8444	0.0666***	2.9368	0.0393
[1, 10]	2.0985***	3.4648	0.0845***	-7.9338	0.2132***	6.7007	-0.1285

5. Conclusions and Limitation

5.1 Conclusion

This study uses an event study method to empirically explore the impact of the Paris Agreement on China's financial sector stock performance. We find that the Paris Agreement positively impacts financial sector stock prices on the Shanghai Stock Exchange. The Paris Agreement has a more obvious promotion effect on the stock prices of China's green financial institutions. After the Paris Agreement, the stock return of financial institutions with green investments have risen more than those of traditional financial institutions without green investments. The Paris Agreement promotes financial flows consistent with low Greenhouse Gas (GHG) emissions and climate-resilient development pathways. As an identified supporter and practitioner of the Paris Agreement, the Chinese government has formulated policies for green financial transition and is committed to protecting the environment [12].

This study selects two event days, uses the Fama-French three factors to conduct a robustness test and draws conclusions:

1. After the Paris Agreement, Chinese financial institutions' stock performance has improved.
2. Green financial institutions (with green investments) have more positive stock performance than traditional financial institutions (without green investments).

The optimistic conclusions of this study will give policymakers more confidence in implementing the Paris Agreement. It will guide traditional financial institutions to increase green investment, expand the business, balance environmental protection and enterprise development, and seek more investment opportunities. Based on the research results, investors can strengthen their confidence in the green industry and adjust their investment portfolio to obtain greater stock returns.

5.2 Limitations and future research

In future research, we will use the Fama-French five-factor model to delve deeper into the impact of the Paris Agreement. In a more extended time dimension, study the long-term impact of green financial policies on the stock market to help investors, managers, and policy makers improve the system, balance the relationship between the environment and economic development, and achieve long-term sustainable development.

References

- [1] Anghel, A., Dumitrescu, D., & Tudor, C. Modeling portfolio returns on Bucharest Stock exchange using the Fama-French multifactor model[J]. *Romanian Journal of Economic Forecasting*, 2015, 17(1):22-46.
- [2] Antoniuk, Y., & Leirvik, T. Climate Transition Risk and the Impact on Green Bonds[J]. *Journal of Risk and Financial Management*, 2021, 14(12):597.
- [3] Anzolin, G., & Lebdioui, A. Three dimensions of green industrial policy in the context of climate change and sustainable development[J]. *The European Journal of Development Research*, 2021, 33(2):371-405.
- [4] Awawdeh, A. E., Ananzeh, M., El-khateeb, A. I., & Aljumah, A. Role of green financing and corporate social responsibility (CSR) in technological innovation and corporate environmental performance: a COVID-19 perspective[J]. *China Finance Review International*, 2021, 12(2): 297-316.
- [5] Benston, G. J. Economies of scale of financial institutions[J]. *Journal of money, credit and banking*, 1972, 4(2):312-341.
- [6] Berechman, J., & Paaswell, R. E. Evaluation, prioritization and selection of transportation investment projects in New York City[J]. *Transportation*, 2005, 32(3):223-249.
- [7] Fahlenbrach, R. Founder-CEOs, investment decisions, and stock market performance[J]. *Journal of Financial and Quantitative Analysis*, 2009, 44(2):439-466.
- [8] Fama, E. F., & French, K. R. Common risk factors in the returns on stocks and bonds[J]. *Journal of financial economics*, 1993, 33(1):3-6.
- [9] Fama, E. F., & French, K. R. A five-factor asset pricing model[J]. *Journal of financial economics*, 2015, 116(1): 1-22.
- [10] Goyenko, R. Y., Holden, C. W., & Trzcinka, C. A. Do liquidity measures measure liquidity[J]. *Journal of financial Economics*, 2009, 92(2):153-181.
- [11] He, P., Sun, Y., Zhang, Y., & Li, T. COVID-19's impact on stock prices across different sectors—An event study based on the Chinese stock market[J]. *Emerging Markets Finance and Trade*, 2020, 56(10):2198-2212.
- [12] Jiang, B., Sun, Z., & Liu, M. China's energy development strategy under the low-carbon economy[J]. *Energy*, 2020, 35(11):4257-4264.