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The Impact of Tariff Changes on China's Carbon Trading Market

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Since Trump took office, the US government has introduced new tariff policies, leading to the outbreak of the Sino-US tariff issue. This paper studies the impact of drastic changes in tariffs on China's carbon trading market under the background of the Sino-US trade war. This paper aims to explore how tariff changes affect the carbon price in China's carbon trading market by affecting economic indicators such as the stock market, gold prices, and exchange rates. By constructing a regression model, this paper analyzes the impact of the S&P 500 Index, the Dow Jones Industrial Average Index, the Shanghai Composite Index, gold futures prices, and the US dollar-RMB exchange rate on the carbon price in China's carbon trading market during the adjustment of the US tariff policy on China in 2025. The regression results show that the exchange rate, the Dow Jones Industrial Average Index, and the Shanghai Composite Index have a positive impact on the price, and the gold price and the S&P 500 have a negative correlation with the price. Stock market fluctuations and changes in gold prices have little impact on carbon prices, and exchange rate fluctuations will have a relatively large impact on carbon prices. It is proposed that in order to promote the healthy development of the carbon trading market, it is recommended that the government strengthen the monitoring and supervision of the exchange rate market and promote the adjustment of the energy structure. At the same time, the carbon trading market mechanism should be improved, the market transparency and fairness should be improved, the investment threshold should be lowered, and more investors should be attracted to participate. It also suggests that the mutual impact between the carbon trading market and other investment markets in the future deserves continued attention and in-depth research.

1. Introduction

With China's rapid development, China's economic and technological level is gradually moving towards a world-leading position. At the same time, the United States continues to introduce new policies in the economic and technological fields, among which the main means is to change the economic policy. With Trump's re-election in 2025, the tariff policy toward China will show the characteristics of "comprehensive upgrade + structural adjustment", and its core goal is to reduce the trade deficit with China, hit strategic industries, and reshape the supply chain. Starting from February 2025, the United States will increase the tariff rate on Chinese goods from 20 % to 125 %. Combined with the previous tariff rate, the comprehensive tariff rate of some goods (such as steel and aluminum products) has soared to 145 % (Bai et al., 2025)

America's tariffs are also hurting its own economy. Figures 1 and 2 show the trend of the Standard & Poor's 500(S&P 500) and Dow Jones Industrial Average in the United States since 2025. It can be seen that since the United States announced its tariff policy, the US stock market has been falling. Reuters reported on the 11th that the US tariff policy has greatly shaken investors' confidence in US assets. The US dollar fell to a 10-year low against the Swiss franc that day, and the price of gold broke through 3,200 USD per ounce. The three major stock indexes in New York Stock Exchange fell significantly on April 10 (Li and Dai, 2025).

China's carbon trading market is a market-based mechanism established by China to control and reduce greenhouse gas emissions and promote the realization of the "carbon peak" and "carbon neutrality" goals. The product traded in the carbon market is called carbon sink. How et al. (2024) proposed to promote the strategic planning of the carbon credit market by incentivizing industry to reduce carbon emissions and allowing enterprises to outsource decarbonization work when internal measures are not feasible.

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Since the United States imposed tariffs on China in early 2025, the price of carbon sinks in China's carbon trading market has continued to fall. Table 1 lists the carbon trading prices processed weekly by China's carbon trading market.

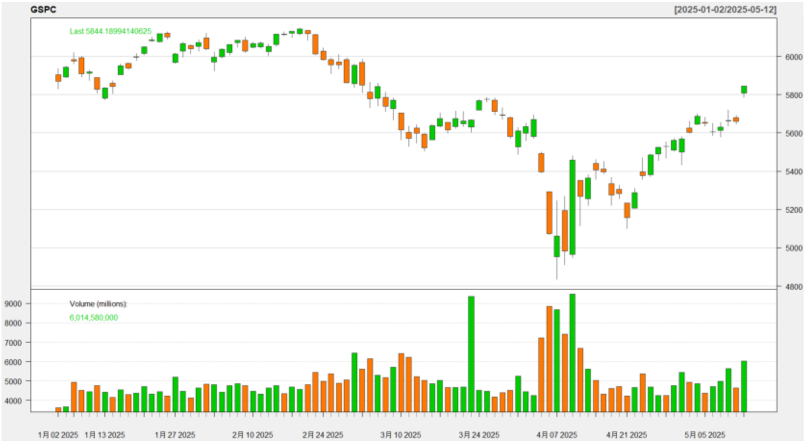

Figure 1: S&P 500 K-line and daily transaction amount (Yahoo Finance, 2025)

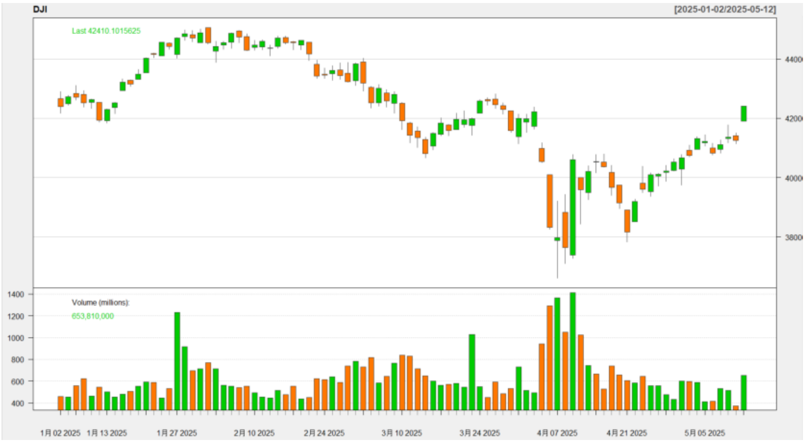

Figure 2: Dow Jones Industrial Average K-line and daily transaction amount (Yahoo Finance, 2025)

Table 1: Descriptive statistics of relevant variables of China's carbon market from January to May 2025

Date	Price	Date	Price	Date	Price
Jan 2- 3	96.89	Feb 17- 21	91.16	Apr 7- 11	85.46
Jan 6- 10	95.27	Feb 24- 28	89.96	Apr 14- 18	82.46
Jan 13- 17	94.76	Mar 3- 7	89.48	Apr 21- 25	76.96
Jan 20- 24	93.35	Mar 10- 14	87.91	Apr 28- May 2	72.54
Jan 27- 31	Close	Mar 17- 21	87.84	May 5- 9	70.97
Feb 3- 7	93.43	Mar 24- 28	86.59	May 12- 13	70.14
Feb 10- 11	92.16	Mar 31- Apr 4	85.69		

In early April, the Dow Jones Index and the S&P 500 Index fell sharply. A week later, from April 21 to 25, China's carbon trading prices fell sharply. After the United States imposed tariffs on China, companies will inevitably move their production plants to areas not affected by tariffs in order to continue to make profits. This trade transfer effect may cause the problem of "carbon leakage". As an international trading market, the carbon trading market is inevitably affected by many factors. Among them, how changes in tariffs will affect the carbon price in the carbon trading market is worthy of in-depth discussion.

2. Research Methods

2.1 Literature Review

For China, the carbon trading market has just started. At present, domestic and foreign literature on China's carbon trading market and tariffs mainly focuses on carbon tariffs, such as the impact of carbon tariffs on imports and exports. Tu and Yu (2020) pointed out in the article that the introduction of carbon tariffs may be beneficial to the implementation of China's sustainable development strategy to a certain extent, but in general, it will have a great negative impact on China's industrial development, especially the future development pattern of high-carbon manufacturing industry, foreign trade, national security, etc. Lockwood and Whalley (2010) believed that changes in exchange rates, prices, wages and other factors would offset the effects of carbon tariffs, and that the impact of carbon tariffs on trade, production and consumption is neutral. Huang and Leong (2025) pointed out in the article that the establishment of China's carbon trading market can effectively promote the import and export of green products, and drive the green transformation of enterprises and product production. The globalization process of China's carbon trading market not only concerns the development of its own low-carbon economy, but also has a profound impact on the integration and deepening of the global carbon trading market. (Huang and Leong, 2024)

Currently, more research focuses on the impact of changes in tariff policies on the stock market. Bomfim et al. (2000) proposed that changes in government policies will also affect stock market fluctuations. Policy uncertainty may mislead investors. The US tariff policy on China has significantly affected the short-term volatility of the Chinese stock market, and there are heterogeneous effects and time-varying properties. The implementation of tariff policies has a heterogeneous impact on the stock price fluctuations of listed companies. (Wang et al., 2023) Furceri et al. (2019) believe that the output scale and labor productivity of emerging industries in developing economies will decline more than those in developed economies after the imposition of tariffs. Dong (2018) compared the reactions of the stock markets of China and the United States to the Sino-US trade friction incident and believed that the Sino-US trade friction not only caused the Chinese stock market to show a downward trend, but also had a certain impact on the US capital market.

Some scholars have also conducted some research on the relationship between gold prices and tariffs. Zong (2025) proposed in the article that the role of gold as a safe-haven asset has once again emerged when central banks of various countries increase their gold reserves, the attractiveness of the US dollar and US bonds decreases, geopolitical conflicts continue, and the global tariff war intensifies, leading to uncertain economic prospects.

Changes in tariff policies and the occurrence of trade wars will have a huge impact on the existing economic environment and have a great impact on the current trade situation. The carbon trading market is also an international trading market, and carbon assets are also a new type of investment product. Tariff fluctuations will not only have a direct impact on the industry, but also bring spillover effects to upstream and downstream industries through the input-output relationship between industries (Javorcik, B. S., 2004). Therefore, changes in tariffs will also have an impact on carbon assets. There are relatively few studies on the impact of changes in tariff policies on carbon trading. What impact will changes in tariff policies and the occurrence of trade wars have on carbon trading and carbon markets? It is worth in-depth study. Since tariffs do not change frequently, whenever tariff policies change, they often have an impact on other major investment markets. Therefore, this article will study the impact of Sino-US trade frictions on China's carbon trading market through the relationship between China's carbon trading price and the US dollar-RMB exchange rate, the performance of the US stock market, and the price of gold futures.

2.2 Variable Design

The goal of this study is to study the impact of changes in tariff policies on carbon prices in China's carbon trading market. However, because tariff rates are policy rigid, and in order to ensure the stability of trade and the friendly relations between trading countries, tariffs are not adjusted every day, but only on specific dates, specific times or special circumstances. However, changes in tariffs often lead to huge fluctuations in the stock market, gold prices, exchange rates, etc., so this article uses the three most influential aspects of the stock market, gold prices, and exchange rates to establish a regression equation with carbon prices. To explore the changes in carbon prices under the Sino-US trade war.

2.3 Construction of regression model

By constructing a basic regression model, we analyzed the impact of the S&P 500 Index, the Dow Jones Industrial Average Index, gold futures and exchange rates on carbon prices in China's carbon trading market. The data selected from the stock market are the S&P 500 Index and the Dow Jones Industrial Average Index. Due to the Sino-US trade war, the exchange rate is the exchange rate data of the US dollar against the RMB, and the gold price is the futures commodity data traded on the New York Mercantile Exchange (CMX). The constructed regression equation is shown in Eq(1):

$$Y_{CCP} = \alpha + \beta_{2025SP500} * X_{2025SP500} + \beta_{2025DJI} * X_{2025DJI} + \beta_{2025GP} * X_{2025GP} + \beta_{2025CER} * X_{2025CER} + \varepsilon_{CCP} \tag{1}$$

2.4 Data Processing

This article is based on the event that the Trump administration of the United States will significantly increase tariffs on China in 2025. The data used for regression analysis is taken from January 1, 2025 to May 13, 2025. The carbon trading price of China's carbon trading market comes from the data published by the Beijing Carbon Exchange and the Shanghai Carbon Exchange, and the S&P 500, Dow Jones Industrial Average, , gold futures prices and exchange rate data come from Yahoo Finance. According to the data analysis requirements of the regression model, after excluding non-common trading days, a total of 70 valid transaction data are obtained. The basic information of the data used in the regression model is shown in Table 2.

Table 2: Descriptive statistics of relevant variables of China's carbon market

Variables	Variable name	Obs	Mean	Std	Max	Min
Dependent variable						
CCP	Carbon trading prices in China's carbon trading market	70	86.81843	7.303658	97.01	69.86
Independent variable						
2025SP500	S&P 500 daily adjusted closing price	70	5726.131	260.6511	6129.58	4982.77
2025DJI	Dow Jones Industrial Average daily adjusted closing price	70	42068.23	1614.29	44873.28	37645.59
2025GP	Gold Aug 25 daily adjusted closing price	70	2996.09	214.1419	3411.4	2638.4

3. Results and Discussions

3.1 Regression results

The results of the impact of the S&P 500, Dow Jones Industrial Average, Shanghai Composite Index, gold futures and exchange rate on the carbon price in China's carbon trading market are shown in the Table 3. From the regression results, the value of Significance F is less than 0.05, so the regression results are reliable. From the regression coefficients of each item, the exchange rate, Dow Jones Industrial Average are positively correlated with carbon trading prices, while the S&P 500 and gold prices are negatively correlated with carbon trading prices. From the comparison of the values of the Lower 95 % and Upper 95 %, the impact of the exchange rate is higher than other influencing factors.

Table 3: Regression results of China's carbon trading market

Regression Statistics					
Multiple R	0.959525711	Adjusted R Square	0.91580895	Observations	70
R Square	0.920689591	Standard Error	2.134508418		

	df	SS	MS	F	Significance F
Regression	4	3437.891325	859.4728313	188.6411386	5.23003E-35
Residual	65	296.148202	4.556126185		
Total	69	3734.039527			

	Coefficients	Standard Error	t Stat	P-value	Lower 95 %	Upper 95 %
Intercept	-102.160055	66.29198677	-1.541061899	0.12815632	-234.5542948	30.23418476
2025CER	32.55773292	8.043667899	4.047622718	0.000140086	16.49341884	48.62204701
2025SP500	-0.031281674	0.004048857	-7.726050791	8.95199E-11	-0.0393678	-0.023195549
2025GP	-0.029391319	0.001717279	-17.1150539	9.0645E-26	-0.032820962	-0.025961676
2025DJI	0.005211537	0.000666279	7.821857928	6.04907E-11	0.003880886	0.006542187

3.2 Robustness test

A robustness test is conducted to test the feasibility of the conclusion. Considering the trade war between China and the United States, not only the US stock market will be affected, but also the Chinese stock market. Therefore, the Shanghai Composite Index data is added to the original equation. This data represents the impact of the fluctuation of the Chinese stock market on the carbon price in the Chinese carbon trading market. The regression equation tested is Eq (2), and the regression results are shown in Table 4. Judging from the results of the robustness test, the exchange rate will still have a significant impact on China's carbon market, while neither the Chinese stock market nor the US stock market nor the gold market will have an impact on China's carbon market

$$Y_{CCP} = \alpha + \beta_{2025SP500} * X_{2025SP500} + \beta_{2025DJI} * X_{2025DJI} + \beta_{2025GP} * X_{2025GP} + \beta_{2025CER} * X_{2025CER} + \beta_{2025SHCI} * X_{2025SHCI} + \varepsilon_{CCP} \tag{2}$$

Table 4: Descriptive statistics of relevant variables of China's carbon market

	Coefficients	Standard Error	t Stat	P-value	Lower 95 %	Upper 95 %
Intercept	-169.808267	83.13562956	-2.04254503	0.045221504	-335.8907795	-3.725754484
2025CER	39.8078218	9.666498145	4.118122323	0.000111633	20.4967718	59.1188718
2025SP500	-0.030161371	0.004111342	-7.336136771	4.77159E-10	-0.038374722	-0.02194802
2025GP	-0.030295688	0.001836621	-16.49534144	9.82675E-25	-0.03396476	-0.026626616
2025DJI	0.004919328	0.00069756	7.052193954	1.50664E-09	0.003525792	0.006312864
2025SHCI	0.007099291	0.005319235	1.334645178	0.186721367	-0.003527102	0.017725684

3.3 Discussions

The exchange rate has a significant impact on the carbon price in China's carbon trading market, and changes in tariff policies have a greater impact on the exchange rate, resulting in large fluctuations in the exchange rate. Exchange rate changes will have a direct impact on the import and export of enterprises. Exchange rate changes will prompt enterprises to transform their production structure and improve energy efficiency. Energy structure transformation and industrial activity adjustments require time and capital investment, and these adjustments often lead to production cuts by enterprises, thereby reducing the demand for carbon sinks and exerting downward pressure on carbon prices. In addition, the cost of tariffs imposed in the trade war will be added to the sales price of goods, further pushing up commodity prices. In this Sino-US trade war, the tariff policies of both China and the United States have led to a further decline in the trade volume between the two sides. As exports decrease, enterprises are forced to reduce production, and the demand for carbon sinks also decreases. This will inevitably have a significant impact on carbon prices.

The stock market and gold prices have little impact on carbon prices. Although changes in tariff policies will also have an impact on the stock and gold markets. However, as traditional investment markets, stocks and gold have a long history and a sound system. Whether pursuing stable returns or expected high returns, investors can find investment products that suit them in the investment market. In addition, both the stock market and the gold market have formed mature trading rules and regulatory systems, and have a wealth of investment products, providing investors with diversified investment strategies and risk management methods. Gold is also a safe-haven asset and currency. From the perspective of macroeconomic sensitivity, gold usually rises during economic recessions due to its safe-haven properties. From an investment perspective, precious metal investment or stock market investment has become very mature in modern society, and the security of funds can be effectively guaranteed.

In contrast, the carbon sink market is still in a relatively early stage of development. As the latest product concept, carbon sinks have not yet fully risen to the status of investment products. Although carbon sinks have certain investment value in theory, in reality, the carbon sink market is not very active and the market liquidity is insufficient, which makes investors face trading difficulties when buying and selling carbon sinks, increasing investment risks. The purchase of carbon sink products in the Chinese market also sets a high threshold for ordinary investors. It is difficult for ordinary investors to invest in carbon sink products because they need to go to relevant websites to obtain trading qualifications, and there are certain requirements for investors' professional knowledge and financial strength. Due to the conservative psychology of investors, in the current global economic downturn, investors will invest their funds in more stable equity portfolios rather than new carbon sink investment areas. Therefore, even if the tariff policy will impact the stock and gold markets, it is still difficult to impact carbon prices due to investment attributes.

4. Conclusions

Tariffs affect the exchange rate, stock and gold markets, while the exchange rate affects China's carbon trading market. However, since the exchange rate is used as the intermediate value, the tariff does not directly affect the carbon trading market, but indirectly through the tariff. The influencing factors of this study are limited to analyzing the impact of the stock market, gold market and Sino-US foreign exchange market on China's carbon trading market. However, the carbon trading market is also affected by many factors such as market supply and demand, China's own political policies, and environmental protection development trends. Tariff policies will have an impact on exchange rates, stocks and gold markets. Exchange rates have an impact on China's carbon prices, while the impact on gold prices and stock markets is relatively small. In the future, enterprises, governments and financial institutions need to jointly deal with exchange rate fluctuations to promote the development of the carbon sink market. High-emission enterprises should pay more attention to exchange rate fluctuations, predict future carbon price fluctuations through exchange rate fluctuations, and reasonably allocate production resources. The government should also guide investors to invest rationally, promote the healthy development of China's carbon trading market, and achieve low-carbon green development goals.

It is also crucial to make good future predictions. Under the general environment of global green development, the investment attributes of the carbon market will surely be further developed in the future, and more and more investors will pay attention to the emerging investment market of the carbon market. The government should strengthen the guidance of carbon sink investment, increase investors' investment interest, cultivate talents in carbon market-related fields, and lay a good foundation for the development of my country's carbon trading market. The market environment is always in a dynamic change, and the mutual influence between the carbon trading market and other investment markets in the future deserves continuous attention and in-depth research.

References

Bai Y., Yang S., Xie W., 2025, Can the average American family afford the "tariff bill", Global Times, 2025-4-12(A08).

Bomfim A N, Reinhart V R, 2000, Making News: Financial Market Effects of Federal Reserve Disclosure Practices, SSRN Electronic Journal,2000(07), 1-37.

Chad P., 2021, The US–China trade war and Phase One agreement, Journal of Policy Modeling, 43(4) ,805-843.

Dong S., 2018, The "warm tone" of China-US trade negotiations is rising, Securities Daily, 2018-12-12(A01). (in Chinese)

Huang G., Leong W., 2024, China's Carbon Trading Market Globalization Strategy: A Conceptual Review, Journal of Business and Social Sciences, 2024(20),1-7.

Huang G., Leong W., 2025, The Impact of the Establishment of the Carbon Trading Market in China, ASM Science Journal, 2025 (20)2 ,1-9.

How B.S., Tan A.S.T., Aviso K.B., Migo-Sumagang M.V., Andiappan V., Tan R.R., 2024, Exploring Feasible Carbon Trading Scheme via Graph-Theoretic Method, Chemical Engineering Transactions, 114, 43-48.

Javorcik B. S., 2004, Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages, American Economic Review, 94(3), 605-627.

Li M., Dai R., 2025, The US is "self-defeating" by abusing tariffs, Global Times. 2025-4-12(A08).

Lockwood B., Awhalley J., 2010, Carbon motivated border tax adjustments: Old wine in green bottles?, The World Economy, 33(6), 810-819.

Carbon emissions trading data, 2025, Shanghai Environment Energy Exchange, <cneeex.com/jysj/> accessed 14.05.2025.

Tu N., Yu W., 2020, The Research on the Impact of Carbon Tariff on the Embedding of Global Value Chain in Manufacturing Industry: Based on the Background of WTO Reform, Ecological Economy,36, (9), 25-31. (in Chinese)

Wang H., Ji Y., Liu X., 2023, The Impact of Tarifis Policy Expectation and Implementation on Stock Market Volatility; A Quasi-natural Experiment Based on Sino-US Trade Friction, World Economy Study, 2023(3), 105-136. (in Chinese)

Yahoo Finance, 2025， S&P 500 (^GSPC), Yahoo Finance, <finance.yahoo.com/quote/%5EGSPC/> accessed 14.05.2025.

Yahoo Finance, 2025 ， Dow Jones Industrial Average (^DJI), Yahoo Finance, <finance.yahoo.com/quote/%5EDJI/> accessed 14.05.2025.

Yahoo Finance, 2025 ， USD/CNY (CNY=X), Yahoo Finance, <finance.yahoo.com/quote/CNY%3DX/> accessed 14.05.2025.

Yahoo Finance, 2025， Gold Aug 25 (GC=F), Yahoo Finance, <finance.yahoo.com/quote/GC%3DF/> accessed 14.05.2025.

Yu E., 2019, The Financial Effects of the Sino-US Trade War: An Event Study Based on the Chinese and US Stock Markets, Securities & Futures of China, 2019(3),9-21. (in Chinese)