

# ***Exploring the Price Volatility of Designated Financial Derivatives for EU Carbon Emission Allowances***

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**Abstract:** Determining the price of financial derivatives and the relationship between the EU carbon emission quota and derivatives price fluctuation are the core of carbon emission quota trading. This has a great impact on the stable development of the carbon emission quota market. This paper collects and uses the market data of financial derivatives, uses EVIEWS as a tool, and uses econometric knowledge to analyze. It is found that the two main factors, best\_ask, and best\_bid, have a significant impact on financial prices. When analyzing the complexity of the financial derivatives market, this paper not only relies on EVIEWS' intuitive data display function but also skillfully combines many econometric methods such as time series analysis and regression analysis. The comprehensive application of these methods enables us to capture the market dynamics more comprehensively and reveal the deep-seated laws hidden behind the data. This paper provides relevant suggestions for China to promote the green transformation of enterprises and reduce carbon emissions.

**Keywords:** EvIEWS tools, Econometrics, EU carbon emission allowances, Financial derivatives.

## **1. Introduction**

Huang employed the GARCH model along with the Monte Carlo simulation method, using risk-neutral conditions to empirically analyze data from EU carbon finance futures and options. He concludes that: Among many GARCH family models, GARCH (1, 1) model has a good description of the volatility of carbon futures products;

Through the comparison between the simulated pricing of options and futures products and the real price, it is found that the risk-neutral method is very efficient in pricing the EU carbon financial derivatives market[1].

This paper holds that there is a lot of discussion on the economic and environmental value of carbon emission quota itself in today's literature. This paper focuses on its financial derivatives, explores the relationship between carbon emission quota and the price fluctuation of designated financial derivatives, and uses Eview's to analyze the impact of multiple variables on the final price. Studying such issues helps to re-examine whether the EU carbon emission quota is reasonable, whether it maximizes economic benefits, or whether this method can alleviate environmental problems. This paper holds that carbon financial derivatives account for the vast majority of carbon emission trade, and become the object that should be focused on.

More discussions between developed and developing countries about the effectiveness of using economic theory to solve the environment. Different positions and angles will lead to different conclusions. There are two main ways to solve environmental problems in economic theory: one is to use market emission trade and taxation means; The second is administrative control means based on administration. Specifically applied to the carbon market, market means are considered by the mainstream economics circles to be more efficient means[2].

Which market-based emission trade or tax means is more efficient in the process of realizing low-carbon economy has always been the focus of debate in western academic circles. In the current carbon market, emissions trading is undoubtedly at the core of carbon finance. The major carbon emissions trading markets around the world are all based on emissions trading systems, making the development of these systems a primary focus for researchers. Western scholars primarily concentrate on two key aspects of constructing carbon emissions trading systems: the allocation efficiency of the carbon emissions trading market and the operational efficiency of the market. At present, with the increasingly prominent financial attributes of the carbon emissions trading market, the research on carbon finance has become the most important research direction[3].

### 1.1. Carbon Finance

Carbon finance refers to the "Kyoto Protocol" And arose Low-carbon economy Investment and financing activities, or Carbon Financing And the buying and selling of carbon materials. I.e. serving restrictions Greenhouse gas emissions Direct investment and financing of technologies and projects, carbon rights trading and BANK LOANS and other financial activities.

Carbon finance generally refers to all services that help limit greenhouse gas emissions. Financial activities include direct investments, financing, carbon trading, and bank loans, among others[4].

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## 2. Method

The original intention of Eviews is to Socio-economic relations with economic activity The quantitative law is observed by econometric methods and techniques. The core of econometric research is Design model, collecting data, estimating models, testing models, Application model (Structural analysis, economic forecasting, policy evaluation). At the beginning of the study, this paper holds that the price fluctuation of carbon financial market has a strong correlation with the data of inventory quantity, buying price and selling price.

The Formula of an Estimable Theoretical Model used in this study is shown:

The formula used in Eviews:  $y_t = \beta_1 + \beta_2 x_{2t} + \dots + \beta_k x_{kt} + u_t$

So this article collects European Energy Exchange Based on the data of carbon finance market from 2005 to 2009, six independent variables x, [Abs \_ change], [best \_ ask], [best \_ bid], [last \_ volume], [settlement \_ price] and [vol \_], are proposed to form functional formula with price y, and the influence of independent variables change on price is studied. In this paper, the heteroscedasticity test of the obtained data is carried out, and the data are excluded dummy variables, Serial correlation LM test, Normality test and Quandt-Andrews breakpoint test, significance To prove that all five independent variables are inseparably related to the dependent variable.

By using the Eviews model, six independent variables x and price y are brought in to form a functional formula, and the regression formula is finally obtained in this study as shown in Figure 2

The return of x and y:

$$\text{Return} = 0.007256 + 0.07328 \text{Abs\_change} - 0.061236 \text{best\_ask} + 0.180238 \text{best\_bid} - 0.001487 \text{last\_volume} + 0.060614 \text{settlement\_price} - 0.001986 \text{vol\_}$$

This regression formula illustrates the direct relationship between price and six independent variables, in which best \_ ask and best \_ bid are the best buyers required price and the best sellers required price. These two data have a greater impact on the regression results. The buyers required price is negatively correlated with the selling price y, because buyers always want to buy goods at a lower price, while the sellers required price is positively correlated with y. It is worth mentioning that when the result of best \_ ask-best \_ bid is smaller, the faster the transaction occurs.

### 3. Discussion

#### 3.1. Analyze the Role of Data on the Carbon Financial Market

After observing and analyzing the data of the European Energy Exchange from 2005 to 2009, this article finds that the number of volumes and open interest has increased steadily, which means that more and more buyers and sellers have entered the carbon finance market, which also means that carbon finance The attention of the carbon emissions market is increasing.[5] This means that more and more people are beginning to pay attention to the harm of carbon emissions to the world, and believe that the carbon emissions market is an indispensable backbone to limit carbon emissions and avoid the formation of a serious greenhouse effect. In addition, some phenomena can be glimpsed from the details of the data. For example, although the total volume and open interest are rising, the growth rate varies from year to year. Especially since the second half of 2007, with the deepening global understanding of climate change and the promotion of international agreements such as the Kyoto Protocol, the activity of the carbon financial market has accelerated significantly. The average number of Open interest has soared from 850 to nearly 3,500, and even exceeded 7,500 in 2008, which means that more buyers believe that the carbon emissions market will grow steadily, and its financial attributes will bring immeasurable benefits to the world. This trend is not only reflected in the surge in transaction volume, but also in the diversity of participants. More and more industries, countries and regions are beginning to join this market.

#### 3.2. The Importance of Controlling Carbon Emissions and the Significance of Carbon Financial Market

Excessive carbon emissions will produce a greenhouse effect, which will cause a variety of ecological problems; In addition, it will also cause sharp weather changes in some areas in a short period of time, leading to abnormal climate, resulting in aggravation of natural disasters such as high temperatures, heat waves, tropical storms and tornadoes. In addition, the greenhouse effect leads to an increase in the frequency of extremely hot weather, which leads to an increase in the incidence of various diseases, thus directly threatening human health. [6] Taking Suzhou, Jiangsu, China as an example, September 2024 is already one month after entering autumn. The average temperature in Suzhou from September 1 to 19 is still 28 ° to 29 °, and the highest temperature reached an astonishing level on the 19th. 32 °, the temperature turned sharply to 21 ° on the 21st, and soared to 29 ° on the 27th. Such a huge temperature change in one month is likely to be related to the large amount of carbon emissions in today's society, so it is urgent to solve the carbon emission problem. Combining finance with carbon emissions can explore a variety of innovative solutions to global climate change and sustainability challenges. Nowadays, the rapid development of society, the development of science and technology, and the increasing improvement of people's living standards have led to the increasing consumption of carbon. When the global environment deteriorates further, the world has to control carbon emissions. This is the significance of studying carbon emissions and the price of their financial

derivatives. The impact on carbon Pricing emissions to control emissions, and determining correct and reasonable prices can ensure that everyone follows this principle, thereby promoting the process of global climate governance. The establishment of the carbon emissions trading market is based on this concept and uses market mechanisms to guide enterprises and individuals to reduce carbon emissions and achieve low-carbon transformation.[7]

### 3.3. Analysis and Suggestions on Response of china to Global Carbon Finance Trade Trends

By the end of 2019, the total trading volume of pilot carbon market quotas in seven provinces and cities—Beijing, Tianjin, Shanghai, Chongqing, Guangdong, Hubei, and Shenzhen—reached 356 million tons, equivalent to over 7.3 billion yuan. Affected by the epidemic, some pilot projects have delayed the compliance date in 2020, but carbon prices have not fluctuated significantly.[8] The national unified carbon emissions trading market (thermal power industry) was officially established at the end of 2017, and the first compliance cycle was officially launched on January 1, 2021. From a domestic perspective, the relevant systems of the national unified carbon emissions trading market are low, and the regulatory rules, statistical systems, disclosure requirements and other detailed rules are still unclear. In addition, the legal attributes of carbon emission rights assets are unclear and the value evaluation system is weak, which hinders the promotion and innovation of carbon financial product tools. From an international standpoint, the power to set carbon pricing is primarily held by developed countries, putting my country in a subordinate position in the realm of carbon pricing and trading. Currently, the euro serves as the main currency for pricing and settling carbon trades. The carbon market in china is still at the end of the industrial chain and has smaller power of discourses. [9]

China actively develops local carbon markets to promote the green transformation of enterprises, so as to better develop the national carbon market in the future. Since carbon trading has strong financial attributes, China has introduced financial derivatives trading mechanisms such as carbon futures to better discover prices and conduct risk management. Encourage relevant financial institutions and carbon asset management companies to participate in market transactions and innovate product tools. Explore the establishment of a self-discipline mechanism for the carbon finance industry.

With the participation of diversified financial institutions and financial products, the carbon market can be more active and carbon pricing can be more efficient. [10]

## 4. Conclusion

This paper uses the Eviews tool to analyze the factors affecting financial prices after controlling carbon emissions from the financial market data from 2005 to 2009, and obtains the influence of two main factors, best \_ ask and best \_ bid, on financial prices. However, due to the data collected only from 2005 to 2009, the time span of the data is short, which limits the depth and breadth of the analysis to some extent, and the knowledge covered in this paper is also limited. The EU carbon emissions trading market is a new industry, which started in 2005 and developed rapidly. However, there are also some problems, such as an imperfect carbon emissions trading mechanism and a strong market speculation atmosphere, which leads to unstable and unpredictable growth and decline of market data. This has a certain impact on the research results. Despite these shortcomings, this paper believes that with the continuous improvement of the carbon emissions trading market and the increase of trading data, the influence of the carbon emissions market is immeasurable, which will lay a solid foundation for the future research.

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