

Research on the Impact of Carbon Emission Trading Market on Regional Economic Development: A Case Study of East China

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Abstract

This article delves into the impact of carbon emission trading mechanism on regional economy, especially in East China, and focuses on analyzing how this mechanism promotes green transformation and high-quality development of the economy by influencing green technology innovation of enterprises. Research has found that carbon emission trading not only incentivizes companies to reduce greenhouse gas emissions, but also guides capital and technological innovation to flow towards low-carbon areas through market mechanisms, thereby promoting the optimization of industrial structure and sustainable economic development. This article also discusses the impact of different quota allocation methods on green innovation in enterprises, pointing out that the benchmark method can more effectively stimulate the innovation drive of enterprises compared to the historical method. Therefore, according to the research findings, it is necessary to improve the construction of carbon markets, scientifically formulate quota allocation systems, avoid negative impacts on early green innovation enterprises, and provide policy support to reduce innovation costs for enterprises.

Keywords

Carbon Emission Trading; Regional Economy; Green Innovation; East China.

1. Introduction

With the increasingly severe challenges posed by global climate change to human society, controlling and reducing greenhouse gas emissions has become a global consensus. As one of the world's largest emitters of carbon dioxide, China's policies and measures in addressing climate change have a significant impact on global climate governance. In this context, carbon emission trading, as a market-oriented environmental policy tool, is highly expected to incentivize enterprises to reduce carbon emissions through economic means, while promoting the development of green technology and clean energy (Li Zhiguo and Wang Jie, 2021). The East China region, as one of the most developed and industrialized regions in China, plays a crucial role in national economic development and environmental protection. The region has unique advantages in implementing carbon emission trading, such as a mature market economy system, advanced manufacturing foundation, and a relatively complete environmental management system. However, the impact of carbon emission trading on regional economy is multifaceted. It not only relates to the production costs and market competitiveness of enterprises, but also involves the adjustment of regional economic structure, changes in employment market, and improvement of environmental quality (Cui Changbin, 2009).

This article aims to explore in depth the implementation of carbon emission trading mechanisms in the East China region, analyze their incentive effect on green technology innovation of enterprises, and how this incentive affects the development of the entire regional

economy through technological innovation activities at the enterprise level. Through the evaluation of carbon emission trading policies in East China, this article will provide reference and inspiration for carbon emission trading policies in other regions and even the whole country, and provide policy recommendations for achieving green transformation and sustainable development of the Chinese economy. Through the research in this article, it is expected to provide scientific decision-making basis for policy makers, help enterprises better adapt to carbon emission trading policies, and provide new research perspectives for the academic community, promoting the further development of environmental economics and regional economics.

2. Overview of Carbon Emission Trading Mechanism

2.1. Basic Concepts of Carbon Emission Trading

Carbon emission trading is a market mechanism aimed at reducing greenhouse gas emissions through economic incentives. It allocates carbon emission quotas to enterprises through a government set upper limit on total carbon emissions, making emission rights a scarce resource. Enterprises can buy and sell these quotas in the market based on their own emissions, thereby incentivizing economic activities to reduce carbon emissions. This mechanism not only promotes the development and application of emission reduction technologies, but also optimizes resource allocation through market forces, enabling effective allocation of emission reduction costs within society. The implementation of carbon emission trading is of great significance for promoting the transformation of the economy towards a low-carbon model and achieving sustainable development (Fu Qiang and Li Tao, 2010).

2.2. Overview of Carbon Emission Trading Mechanism

The carbon emission trading mechanism is an environmental and economic policy tool that establishes a market trading platform for carbon emissions by setting a total cap on carbon emissions and allocating or auctioning emission quotas to enterprises. In this market, companies can freely buy and sell emission quotas based on their own emission needs and cost-benefit analysis, thereby incentivizing the reduction of carbon emissions. The introduction of this mechanism has made carbon emissions economically valuable. While pursuing economic benefits, enterprises also need to consider their environmental costs and encourage them to adopt more sustainable production methods, such as improving energy efficiency, using clean energy, and developing low-carbon technologies (Hao Haiqing, 2012). Carbon emission trading not only provides the government with a flexible and cost-effective means of emission reduction, but also promotes technological innovation and industrial upgrading through market mechanisms, playing an important role in promoting the green transformation of the economic structure.

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3. Carbon Emission Trading and Enterprise Green Technology Innovation

The carbon emission trading mechanism, as an innovative environmental and economic policy, promotes the active development of enterprises in green technology innovation through market-oriented means. The core of this mechanism lies in setting specific values for carbon emissions, enabling enterprises to seek to reduce emissions through technological innovation under the pressure of emission costs, in order to adapt to this policy orientation (Shao Shuai and Li Xing, 2022). Specifically, in order to reduce the expenditure on purchasing carbon emission quotas or increase the profits obtained by selling excess quotas, enterprises will actively invest in research and development, promote the progress of energy-saving and emission reduction technologies, which not only includes process improvements to improve energy efficiency, but also innovation in developing new energy, renewable energy, and clean energy technologies.

The carbon emission trading mechanism also guides funds to flow towards green technology and clean production by providing market signals, accelerating the marketization and commercialization process of low-carbon technology (Wang Sufeng, 2014). In this process, enterprises can not only reduce emissions through technological innovation, but also gain economic benefits through participating in carbon market trading. This win-win model of economy and environment greatly stimulates the innovation drive of enterprises. At the same time, carbon emission trading has also prompted companies to pay more attention to long-term sustainable development strategies, incorporating environmental responsibility into the core of corporate decision-making, thereby forming a new competitive advantage within the company (Xiong Linbo et al., 2024).

Driven by the carbon emission trading mechanism, green technology innovation in enterprises not only helps to mitigate climate change, but also promotes the optimization and upgrading of industrial structure, and promotes the transformation of the economy towards low-carbon development. This transformation is of great significance for achieving the United Nations Sustainable Development Goals, and also provides new growth points and market opportunities for enterprises participating in the carbon market. With the increasing global attention to climate change, carbon emission trading mechanisms are expected to become an important driving force for promoting global green technology innovation and low-carbon economic development.

4. The Impact of Quota Allocation Methods on Green Innovation in Enterprises

The quota allocation method, as a core component of the carbon emission trading mechanism, has a decisive impact on the green innovation of enterprises. In the carbon emission trading system, the allocation of quotas directly affects the economic incentives and emission reduction pressure of enterprises, which in turn affects their research and development investment and technological innovation behavior (Zhou Jie, 2023). The allocation method based on historical emissions may lead to a lack of sufficient incentives for enterprises to engage in green innovation, as they may receive fewer quotas due to lower historical emission levels, thus being at a disadvantage in the carbon market.

On the contrary, allocation methods based on performance standards or benchmarks, namely the benchmark method, can provide additional quotas for enterprises that can meet or exceed industry standards. This positive incentive mechanism encourages enterprises to engage in green technology innovation to achieve lower emission levels and potential economic benefits (Wang Fen, 2023). In addition, the fairness, transparency, and predictability of quota allocation are also important factors affecting green innovation in enterprises. A scientifically reasonable,

fair and efficient quota allocation system can better stimulate the innovation vitality of enterprises, promote the adoption and diffusion of low-carbon technologies, and thus promote the green transformation and sustainable development of the economy.

5. Potential Impact of Carbon Emission Trading on Regional Economy

Carbon emission trading, as an environmental and economic policy tool, has multiple potential impacts on regional economy. Firstly, it pricing carbon emissions through market-oriented means, encouraging enterprises to seek technological innovation in energy conservation and emission reduction under cost pressure. This not only promotes the improvement of energy efficiency, but also promotes the research and application of clean energy and low-carbon technologies, thereby driving the optimization and upgrading of regional economic structure (Dong Yu et al., 2024). Secondly, the carbon trading mechanism incentivizes enterprises to reduce carbon emissions, which helps regional economies achieve green transformation and improve their sustainable development capabilities. Carbon emission trading can also guide capital flow towards low-carbon projects and green industries, promote the formation of new economic growth points, and enhance the vitality and competitiveness of regional economies.

However, carbon emission trading may also have an impact on some traditional industries with high carbon emissions, leading to industrial restructuring and changes in the job market. This requires regional economies to properly handle potential socio-economic issues during the transformation process. Overall, the impact of carbon emission trading on regional economy is complex and far-reaching. It requires policy makers to comprehensively consider the coordinated development of economy, society, and environment when designing and implementing carbon trading mechanisms, in order to achieve long-term prosperity of regional economy and maximize social welfare.

6. Conclusion and Recommendations

Carbon emission trading, as an innovative environmental and economic policy tool, effectively promotes positive actions of enterprises in energy conservation, emission reduction, and green technology innovation by pricing carbon emissions through market-oriented means, thereby promoting the optimization of regional economic structure and industrial upgrading. This mechanism provides economic incentives for enterprises to reduce greenhouse gas emissions, not only enhancing their competitiveness and market vitality, but also guiding capital towards low-carbon technology and green industries, bringing new growth points and development opportunities to the regional economy. Meanwhile, reasonable quota allocation methods, such as benchmark methods, are more effective in motivating green innovation in enterprises compared to historical methods, avoiding negative impacts on early green innovation enterprises. However, while promoting emissions reduction, carbon emission trading also requires policy makers to comprehensively consider the coordinated development of the economy, society, and environment, ensuring a smooth transition and maximizing social benefits. Therefore, future policy design should pay more attention to a scientific and reasonable quota allocation system, as well as rewards and subsidies for enterprise emission reduction performance and green innovation achievements, in order to achieve green transformation and sustainable development of the regional economy.

Based on the analysis of the impact of carbon emission trading on regional economy and green innovation of enterprises, the policy recommendations and practical implications proposed in this article mainly include: firstly, continuing to promote and improve the national carbon emission trading market, using it as a platform to promote enterprise emission reduction and green technology innovation; Secondly, it is necessary to establish a scientific and reasonable quota allocation mechanism, considering the use of benchmark allocation to incentivize

enterprises to improve energy efficiency and adopt clean technologies, while avoiding the adverse effects that historical allocation may have on early green innovation enterprises; In addition, policy makers should pay attention to the heterogeneity of the impact of quota allocation on different types of enterprises, ensuring that policies are both fair and effective; At the same time, it is recommended to provide policy support and rewards for the green innovation achievements of enterprises, such as tax incentives, financial subsidies, or increased research and development funding, to reduce the innovation costs and risks of enterprises; Finally, it is necessary to strengthen the supervision of the carbon emission trading market, ensure the transparency and fairness of transactions, as well as the accuracy and reliability of emission data, in order to provide clear market signals and a stable policy environment for enterprises and investors.

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