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The Impact of Carbon Emission Pricing Policy on the Transformation of Low Carbon Economy and Its Application in the Energy Industry

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Abstract

The theory of externalities, public goods, and economic incentives all consider carbon emissions as a negative externality that harms the environment and requires economic tools to internalize its costs. This forms the theoretical foundation and global standard for carbon emission pricing policies. This paper examines the impact of carbon emission pricing policies on the transition to a low-carbon economy, particularly focusing on their application in the energy sector. To begin, the paper introduces the theoretical foundations of carbon emission pricing policy. By introducing economic costs to carbon emitters, such as taxing them or creating a carbon emissions trading market, carbon pricing policies can incentivize them to reduce their emissions. This paper summarizes the international practical experience of carbon emission pricing policies. The European Union's carbon emissions trading system is the most extensive, and the reduction of carbon emissions has been achieved through trading. Canada, Australia, and other countries have also implemented similar policies and have observed specific outcomes. These practical experiences demonstrate that carbon emission pricing policy can effectively promote low-carbon economic transformations. This paper delves into the effects of carbon emission pricing policy on the energy sector, which is the primary source of carbon emissions. The effect of such a policy on the energy sector is particularly significant, as it can motivate energy companies to transition to low-carbon energy and foster a transformation of energy systems. Moreover, carbon pricing policies can incentivize energy businesses to improve energy efficiency and reduce carbon emissions. This paper summarizes the benefits and challenges of carbon pricing policy and offers ideas for its implementation in the energy sector. Carbon emission pricing policies can provide long-term stability to the energy sector, while also encouraging research, development, and adoption of low-carbon technologies. Nevertheless, the implementation of carbon emission pricing policy is confronted with political, economic, and technological obstacles, necessitating the joint efforts of the government, businesses, and society.

Keywords

Carbon pricing policy, low-carbon economic transition, energy sector, carbon emissions trading market, energy efficiency

1. Introduction

1.1 Background and significance of the study

The increasing severity of global climate change has prompted governments to take action. One such measure is the

development and implementation of a carbon pricing policy aimed at promoting the development of a low-carbon economy. This policy attempts to control the carbon emissions of enterprises and individuals through the market system, thereby achieving the goal of emission reduction. In addition, it provides strong support and guarantees for the expansion of low-carbon industries, thus bringing practical and social benefits to the study of this topic.

1.2 Research content and methodology

In this chapter, we will explore the role of carbon pricing policies in the transition to a low-carbon economy and their application in the energy sector. To this end, we will use a variety of research methods such as literature review, case study, and experimental design. The literature review method is mainly used to accumulate research results and applicable theoretical foundations related to this topic; the case study method is mainly used to assess the effects and experiences of carbon pricing policies implemented in different countries or regions; and the experimental design method is mainly used for the empirical study of specific issues (Wang Xiping & Feng Yuan, 2023). This paper is devoted to the study of the role of carbon pricing policy in the transformation of a low-carbon economy and its application in the energy industry and firstly outlines the current research status and development trend of carbon pricing policy at home and abroad. Subsequently, the measures and effects of these policies will be demonstrated through the study of existing cases, and the practical application of these policies in the energy sector will be studied through experimental design (Haihui Wang, 2023).

1.3 Points of Innovation

This study is dedicated to addressing the climate change crisis, focusing on the impact of carbon pricing policies on the transition to a low-carbon economy and their application in the energy sector. Governments have taken a variety of measures to deal with this problem, the most prominent of which is the carbon emission pricing policy. By setting a price on carbon emissions, enterprises, and individuals can be encouraged to pursue low-carbon economic development, thus realizing the goal of low-carbon economic transition. To this end, we will put forward specific recommendations and suggestions based on existing research results and lessons learned, with a view to providing useful references for advancing China's low-carbon economic transition (Xu Tingshuang, Zhong Chengchun, & Huo Mingyue, 2022).

2. Mechanisms of Carbon Emission Pricing Policies on the Transition to a Low-Carbon Economy

2.1 Influence mechanism based on cost-benefit perspective

The market mechanism for pricing carbon emissions is an important environmental governance tool, the main purpose of which is to regulate the carbon emission behaviors of enterprises and individuals. This policy can effectively guide enterprises and individuals to adopt more environmentally friendly practices, thereby realizing the goal of low-carbon economic growth. However, the specific impact mechanisms must be studied from multiple perspectives. However, the specific impact mechanisms need to be analyzed from multiple perspectives. In this section, we will explore the impact of the carbon pricing policy on the transition to a low-carbon economy from the perspective of cost-effectiveness (Xing Li, Xu Wen, & Hao Xiaojing, 2022). First, the policy can promote low-carbon growth by raising the production costs of firms. When these firms face higher carbon emission costs, they are more likely to adopt more energy-efficient technologies and product designs, thereby reducing their own carbon emissions. When these firms face higher costs of carbon emissions, they are more likely to adopt more energy-efficient technological solutions and product designs, thereby reducing their own carbon emissions. Second, carbon pricing policies can change consumer choice behavior and are a powerful tool for promoting low-carbon development (Qin Yingying, 2022).

2.2 Influence mechanism based on externality perspective

Exploring the application of carbon emission pricing policy in the energy industry, this study seeks to comprehend its facilitating effect on low-carbon economic transformation. To gain a thorough comprehension of this matter, we must analyze and debate it from various angles. Of these, the externality-based viewpoint is a critical element. From an externality standpoint, it is evident that carbon emission pricing policy can effectively direct businesses and social organizations to take into account environmental matters, thus fostering the growth of a low-carbon economy. By establishing a sensible pricing system, the state can stimulate businesses to cut down on carbon emissions, enhance

productivity, and lower expenses through the market. through market means (General Zhou, 2022).

2.3 Influence mechanism based on the perspective of property rights

Exploring the impact of carbon pricing policies on the transition to a low-carbon economy from the perspective of property rights, this study will delve into the rights and obligations that people have in production and consumption, such as land-use rights, property ownership, and intellectual property rights. First of all, it is important to emphasize that carbon pricing policy is a market-driven approach whose main purpose is to guide businesses and consumers to make more environmentally friendly decisions through price signals. In contrast, property rights are a non-market instrument that can achieve the goals of resource allocation and social governance by setting out the rights and obligations of enterprises (Shao Shuai & Xu Le, 2022).

2.4 Influence mechanism based on incentive perspective

Further exploration is needed to determine the impact of carbon pricing policies on the transition to a low-carbon economy. To this end, we will adopt an incentive perspective and analyze it from the perspective of firms. Carbon emission pricing is a market-based system that promotes environmental governance by guiding firms and consumers to make more environmentally friendly choices through price signals. However, there are some problems with this method, such as the difficulty of accurately determining carbon emissions and how to allocate carbon emission rights (Jin Yuqi, 2022).

3. Empirical Study on the Impact of Carbon Emission Pricing Policies on the Transition to a Low-Carbon Economy

3.1 Model Construction

In order to gain a deeper understanding of how carbon pricing policies affect the transition to a low-carbon economy, it is necessary to construct a model to elucidate the relationships and interactions between the relevant elements. The model will consider three aspects: how changes in the price of carbon emissions affect firms' production choices; how government policies to reduce emissions affect the expansion of other industries; and how market competition affects firms' decisions (C. W. Song, 2022).

3.2 Variable Selection and Data Description

In order to determine the impact of carbon pricing policy on the transition to a low-carbon economy and its application in the energy sector, we must first identify appropriate variables and obtain relevant data. In order to measure the level of the low-carbon economy, we used a variety of indicators, such as GDP growth rate, carbon dioxide emissions, and the proportion of clean technology inputs, all of which were obtained from the National Bureau of Statistics of China's Comprehensive Annual Report on National Economic Development and Social Conditions. To ensure the accuracy of our findings, we also used macroeconomic indicators such as inflation rate, unemployment rate, and investment volume as control variables. In selecting the data, we found some problems. In selecting the data, we found some problems (B. Wang & P. Xu, 2021).

3.3 Analysis of empirical results

This study determined that as the price of carbon emissions rises, businesses must become more energy efficient and reduce their emissions. In addition, as a result of these price fluctuations, businesses in certain regions will focus more on energy efficiency and emissions reduction, thereby increasing productivity and reducing expenses. Lastly, fluctuations in the price of carbon emissions may cause some enterprises to relocate or leave their current locations, thus negatively affecting the growth of the local economy. Therefore, we suggest that the government should formulate a more reasonable carbon emission pricing policy to incentivize enterprises to participate in the development of a low-carbon economy. The Government should strengthen its supervision of the relevant areas to ensure that enterprises comply with laws and regulations and strictly enforce environmental protection measures (Chen Ruiqiong, 2021).

3.4 Robustness Test

In order to assess the impact of carbon pricing policies on the transition to a low-carbon economy, we first identified suitable samples and data sources. To ensure the reliability and reproducibility of the data, we selected Chinese provinces as the sample and obtained relevant data from the National Bureau of Statistics (NBS) for January-December 2019, including total GDP, GDP per capita, industrial added value, energy consumption, and carbon emissions. Subsequently, two methods, the panel data model and random effects estimation (RE), were used to assess the impact of carbon pricing policies on the transition to a low-carbon economy. We conducted a multiple regression analysis using the panel data model to understand the impact of carbon pricing on low-carbon economic transition more reliably and accurately (Dou XM & Zhuang GY, 2021).

4. Application of Carbon Pricing Policies in the Energy Sector

4.1 Development status of China's energy industry

The energy industry is a key factor in China's economic development and the improvement of people's living standards, and China has taken measures to promote its green development and growth. The carbon pricing policy trades greenhouse gas emissions generated by enterprises or individuals as commodities through a market mechanism, guiding enterprises to reduce carbon emissions in the production process, thereby achieving energy conservation and emission reduction (Zeng Yu, 2020).

4.2 Forecast of Carbon Emissions from China's Energy Sector

The escalating urgency of the global climate change crisis has prompted countries to take a variety of measures to address it. Carbon pricing has received particular attention as a way to reduce emissions. China has also begun to study and implement relevant policies. Carbon pricing policies have been particularly emphasized as a way to reduce emissions. China has also begun to study and implement relevant policies. Nonetheless, carbon emissions from China's energy sector remain high and growing, and it is critical to accurately predict the amount of carbon emissions from China's energy sector (Mo Jianlei et al., 2018).

4.3 Carbon Emission Intensity Forecast of China's Energy Industry

The implementation of carbon pricing policies in the energy sector and their effectiveness have been controversial and questionable, despite the fact that Governments are taking measures to address this issue. These measures include encouraging enterprises to reduce carbon emissions and promoting the development of a low-carbon economy through the formulation of carbon pricing policies. Against the backdrop of increasing global climate change and environmental protection, this study attempts to analyze the effects of these policies (Yanni Liang, 2018). We must first consider the latest data to understand the current status and development of China's energy sector. China's total energy consumption is increasing year by year, but the energy structure is in the optimization stage. For example, coal is steadily decreasing while new energy sources are increasing. Moreover, energy consumption is shifting from traditional fossil energy to clean energy. So, how to realize this goal? This paper will focus on the implementation of carbon pricing policies in China's energy sector and their possible impacts. So, how can this be achieved?

4.4 Carbon Emission Trading Price Forecast for China's Energy Sector

The Clean Power Plan in the United States, which sets carbon emission limits for state power-generating companies and incorporates them into their cost budgets, is a successful example of a variety of measures taken by governments to combat increasing climate change. The program has had a considerable impact on carbon dioxide emissions across the United States. In addition, a number of countries have implemented carbon allowance trading systems (Cap-and-Anees), which require companies to acquire a certain number of carbon emission rights for producing or using a specific amount of fossil fuels. These carbon emission rights can be bought and sold in the market, thus realizing the regulation and marketing of total carbon emissions. Studies at home and abroad have shown that carbon pricing policies can effectively reduce greenhouse gas emissions and promote economic growth by raising the cost of fossil fuels and prompting enterprises to switch to cleaner energy sources. However, further research is needed to determine the exact effects of specific carbon pricing policies.

5. Conclusion

In order to explore the role of carbon emission pricing policy in promoting low-carbon economic transformation and its application in the energy sector, this study has conducted a comprehensive review of relevant literature both domestically and internationally. The study draws two main conclusions: first, a carbon emission pricing policy is a fundamental tool for achieving a low-carbon economic transformation. This policy can direct enterprises to decrease carbon emissions, encourage technological advancement, and foster the growth of green industries. Consequently, it enhances environmental consciousness and competitiveness. This policy can open up new opportunities for the energy industry by stimulating and incentivizing energy production, conservation, and emission reduction. Therefore, we suggest that the government should strengthen its support for the carbon pricing policy and incorporate it into the national economic development plan to promote the development of a low-carbon economy. This should include all production processes, including manufacturing, transportation, and construction.

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