



A Study on Carbon Finance Policies to Promote the Transition of China's Industrial Structure Toward the Low-Carbon Economy

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Abstract. With the deterioration of the global environment, the issue of sustainable development has become a worldwide concern. To cope with environmental and climate change, China is actively committed to promoting its industrial structure transition toward the low-carbon economy, among which the improvement of the carbon finance system should be given priority. This paper presents a theoretical analysis of the low carbon economy and the carbon finance market and also discusses the operation mechanism of the carbon finance market in the acceleration of the transition of China's industrial structure. In addition, problems faced by China's carbon finance market are summarized, and corresponding policy recommendations are put forward based on the analysis results. It is hoped that this paper can contribute to the refinement of public policies in the field of carbon finance in China, and thus help China to achieve the goal of transitioning its industrial structure toward the low-carbon economy and carbon neutrality.

Keywords: Industrial structure transition · Public policy · Carbon finance · Low-carbon economy

1 Introduction

China has made a remarkable economic leap in the last two decades, but urbanization and industrialization have also led to serious environmental problems in China. From 2001 to 2020, China's per capita CO₂ emissions increased from 2.71 tons to 7.41 tons, which is a rise of 173.94%. And China's CO₂ emissions in 2020 were 9893.5 million tonnes, ranking first in the world (Fig. 1).

The situation shows the urgent need for China to control its carbon emissions, and it also indicates that there is a great potential for the development of China's carbon finance market. However, the problem of unreasonable industrial structure in China has been long-standing, mainly manifested by the high proportion of heavy industries, the failure of the tertiary sector to keep pace with the needs of the country and the people, and the low production of high value-added products. Therefore, the transition of the domestic industrial structure toward the low-carbon economy is urgently required by China for achieving the goal of carbon neutrality by 2060 [9].

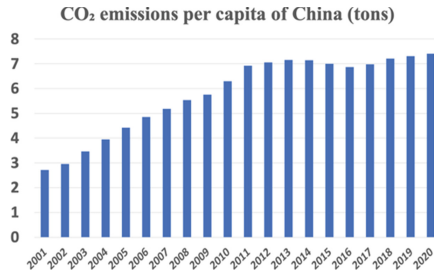


Fig. 1. Carbon dioxide emissions per capita in China from 2001 to 2020 [4]

This paper will provide an analysis of how the Chinese government should combine the public policy of carbon finance with the market economy mechanism, so as to promote China's industrial structure toward a low-carbon economy.

2 Low-Carbon Economy and Public Policy

In terms of economics, a low carbon economy means decoupling carbon emissions from economic growth, i. e., making the growth rate of GDP higher than the rate of greenhouse gas emissions [10]. The major strengths of this model are low energy requirements, low carbon dioxide emissions, and low levels of pollution [8]. To eradicate the root of the climate problems, China has to exit from its reliance on fossil fuels that produce high carbon emissions, such as coal and oil, to the path of developing a low-carbon economy. And the core of the low-carbon economy is to explore a win-win path for reducing environmental greenhouse gas emissions and energy consumption while ensuring high economic growth. Green industries, clean energy, renewable raw materials, and low-carbon technologies are necessary components in the process of promoting the low-carbon economy.

However, since both climate and environment are public goods with non-competitive and non-exclusive nature, the private sector has no incentive to pursue these factors. China has a distinctive political system structure in which the central government rules over the whole country. And all the state-owned enterprises and local governments are controlled by the central government within a hierarchical framework. Therefore, the public sector must assume a leading responsibility for the development of the low-carbon economy, and the refinement of relevant public policies should be given priority.

3 The Concept of Carbon Finance

Carbon finance is defined as a series of financial institutional arrangements and financial trading activities that adopt financial market instruments to transfer environmental risks and meet the goal of environmental optimization. The narrow definition of carbon finance is mainly the trading of carbon emission rights spot and the trading of financial derivatives with carbon emission rights as the underlying assets, while the generalized definition of it also covers the business of carbon insurance, carbon fund, carbon credit and intermediary

services of carbon finance [7]. Carbon finance can thus facilitate the flow of various resources and capital from high-carbon emission areas to low-carbon emission areas, and foster the efficient allocation of resources in the carbon market.

As a market-based incentive tool, carbon finance is very conducive to the realization of a low-carbon economy. The central government ought to guide enterprises and local governments to take advantage of the carbon finance market for resource allocation [8]. This is because the promotion of the low-carbon economy requires a large amount of capital investment, and the payback period is long. The financial leverage of the carbon finance market can provide a continuous financial impetus for its progress.

4 The Mechanism of the Carbon Finance Market to Optimize Industrial Structure

4.1 The Development and Innovation of Low-Carbon Technology

Firstly, the carbon finance market formed by innovative financial instruments such as carbon insurances and carbon funds can be used to support the exploitation of low-carbon technologies that are needed for mitigating pollution in cities such as transportation and power generation. Secondly, the main source of carbon emissions in China is the energy consumption in the production process of enterprises. So, the enterprises will need to be more proactive in increasing research and development and innovation of technologies related to carbon emission reduction and carbon pollution treatment. Even those enterprises that have difficulties in restructuring their energy consumption will try to maximize their energy use efficiency. Therefore, the carbon finance system can promote the innovation of low-carbon technologies in various industries and drive China's industrial structure toward low carbon economy.

4.2 The Mechanism of Carbon Emissions Trading Market

The carbon emissions trading market is designed for converting emissions pollutants into assets for producers based on environmental compensation schemes. When the price of purchasing a unit of carbon allowance in the market is higher than the marginal cost of emission reduction, enterprises can have surplus emission allowances by reducing carbon emissions, and then they can sell the quotas in the market. In a converse situation, they will buy carbon allowances in the market [3]. Sellers of emission quotas will invest more in low-carbon technologies to sustain their surplus of allowances, while buyers will try to reduce carbon emissions for reducing their demand for emission quotas. When the government appropriately allocates carbon quotas, China can achieve industrial structural transformation driven by both a reduction in total carbon emissions and the development of low-carbon technologies (Fig. 2).

4.3 Capital Flows in Carbon Finance Market Drive the Restructuring of Energy Chain

The policy of carbon finance can promote the promotion of activities such as private equity and venture capital in the carbon finance market and can diversify the mobilization of resources to support the low-carbon industries. By doing so, it can change the

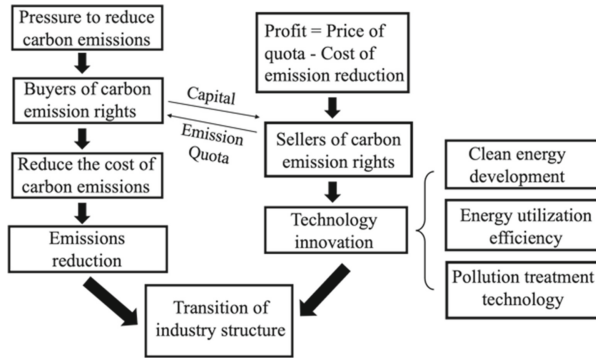


Fig. 2. Working system of carbon emission right trading market

dependence of China's energy consumption on carbon energy and promote the transformation of the energy chain from a high-carbon to a low-carbon one. The carbon finance market turns the invisible costs of carbon emissions into explicit costs. Even if the price of energy itself remains constant in the market, the carbon price generated through the carbon finance market will make the actual energy price vary among enterprises. It means that the policy of carbon finance can impact the relative price of energy. Higher carbon emissions in a given industry mean higher production costs and companies in that industry will be more proactive in using clean energy in order to minimize energy costs [5]. The industrial structure of China can thus reduce its reliance on heavy industry and expand the share of green industries with a low-carbon focus.

5 Existing Problems of China's Carbon Finance Market

5.1 High Dependence on Fiscal Support

The funding source of China's carbon emission trading market relies mainly on fiscal support, which is often gratuitous and earmarked. However, such funds are ultimately limited in quantity, and the approval process is quite complex with long periods, bringing obstacles to the timely availability of and access to replenishment and flexibility in the use of fiscal funds. Such a situation can result in various problems such as inefficient and unsustainable use of funds in production and cause less dynamic transactions that can increase the riskiness of bank guarantees in the carbon finance market. In addition, the uneven distribution of carbon emission rights in the majority of Chinese pilot cities is also a reason for the low dynamics within the carbon finance market.

5.2 Imperfect Carbon Finance Market Mechanism

First, China's carbon finance market is centered on the Clean Development Mechanism (CDM), while quota trading is relatively rare. Second, the carbon finance market of China is mainly dominated by primary products of carbon emission rights trading, while the derivatives market, such as futures and options, is currently in a vacant state. Third, the

application of innovative technologies related to the low-carbon economy of industrial development is insufficient. The above three levels of structural problems have led to a poorly developed carbon finance market in China, which has resulted in a weak market operation mechanism and hindered the potential of China's carbon finance market.

5.3 Insufficient Investment and Financing

The overall size of the carbon finance market in China is relatively small, but China's total amount of carbon emissions is ranked first in the world. The trading volume of the carbon finance market in China is not compatible with its status as a large carbon-emitting country. In addition, the carbon trading price in China's carbon market varies significantly among different pilots, revealing that the trading price in China's carbon market is disturbed by non-market factors. These reasons have led to a lack of capital investment in the carbon market, which, in turn, has led to the sluggish development of China's carbon finance market.

5.4 The Lack of a Uniform Carbon Finance Trading Platform

Since dissimilarities in the level of economic development, political structure, and industrial properties, different standards have been set for carbon emissions trading policies based on specific conditions. However, there are large variances in the transaction price across regions in the pilot carbon markets of China, and there are also geographical gaps in the certification of carbon emission allowances and certified emission reductions. Moreover, the lack of uniform standards in the platform will lead to market fragmentation and interfere with the realization of the real value of the carbon emission rights market and the smooth operation of the market mechanism [7].

6 Policy Recommendations

6.1 Constructing a Favorable Environment for Carbon Finance

China could use the carbon index as a supporting tool for the carbon finance market, which could reflect the overall price and the price movements of various financial derivatives in the carbon finance market. The carbon index can stimulate the investment interest of profit-oriented investors and encourage the injection of social capital into the carbon finance market. China should take carbon insurance seriously, as it is an important tool for risk management in the carbon finance market. Using carbon insurance to hedge the operational risks of low-carbon industries and to reduce default risks and investment risks, so as to ensure that transactions related to carbon finance can be carried out smoothly.

6.2 Creating Robust Carbon Finance Trading Mechanism

China should focus on cultivating the carbon emission rights trading market. As for the types of products, China can start by refining the management system and the trading system to promote the product inventions for enriching the categories of carbon

finance derivatives. In the context of the shrinking CDM market, China should emphasize the integration of low-carbon technology application projects. The reason is that such projects have a higher return per unit of carbon emission reduction, which helps to increase the overall profit of carbon trading.

6.3 Upgrading the Investment and Financing System of Carbon Finance

China should focus on promoting tradable carbon finance equity funds for public type and private type, both of which have a certain investment-driven effect and can also foster support for the development of low-carbon-related projects. China should also strengthen the investment of commercial banks in carbon credit to enhance the support of low-carbon production of enterprises, and this act should focus on intensifying the innovation of banking services and financial products about carbon finance.

6.4 Constructing a Nationwide Carbon Finance Platform

The construction of a unified carbon finance platform is of great significance for the cross-regional flow of resources and the optimal allocation of carbon assets on a national scale. Firstly, China should adopt the lessons learned from the current pilot market of carbon finance in the process of constructing a unified market. Second, China could try to build a system that uses the carbon finance market in different regions as the primary market and a nationwide unified market as the secondary market. China should also continuously promote the experience and mechanism of the pilot regions to the non-pilot regions, and gradually merge these two kinds of markets for realizing the establishment of a complete market for carbon finance.

7 Conclusion

This paper firstly provides theoretical analyses of the low-carbon economy and carbon finance market and then concludes that the carbon finance market can accelerate the transition of China's industrial structure by changing energy consumption structure, optimizing the carbon emission trading market, and speeding up the flow of capital in the market. This paper then identifies the problems that exist in China's carbon finance market including reliance on fiscal funds, deficient mechanism, small scale of investment and financing, and the lack of a unified trading market. Finally, the corresponding policy recommendations for the improvement of the carbon finance market are proposed.

References

1. Chen, S. (2018). Evaluation of regional low-carbon economic transformation. *Energy, Environment and Economic Transformation in China*, 131–147. <https://doi.org/10.4324/9780203374627-8>
2. Lewis, J. I. (2010). The evolving role of carbon finance in promoting renewable energy development in China. *Energy Policy*, 38(6), 2875–2886. <https://doi.org/10.1016/j.enpol.2010.01.020>

3. Lu, L., & Chen, X. (2012). Optimal production policy of complete monopoly firm with carbon emissions trading. *2012 International Conference on Computer Science and Information Processing (CSIP)*. <https://doi.org/10.1109/csip.2012.6308896>
4. Ritchie, H., Roser, M., & Rosado, P. (2020, May 11). *China: CO₂ country profile*. Our World in Data. Retrieved July 6, 2022, from <https://ourworldindata.org/co2/country/china#citation>
5. Siqin, Z., Niu, D., Li, M., Zhen, H., & Yang, X. (2021). Carbon dioxide emissions, urbanization level and industrial structure: Empirical evidence from North China. <https://doi.org/10.21203/rs.3.rs-342919/v1>
6. Wu, T., & Kung, C.-C. (2020). Carbon Emissions, technology upgradation and financing risk of the Green Supply Chain Competition. *Technological Forecasting and Social Change*, 152, 119884. <https://doi.org/10.1016/j.techfore.2019.119884>
7. Yang, B. (2017). China's low-carbon economy development and Carbon Finance Market Supervision Mechanism. *Low Carbon Economy*, 08(04), 97–105. <https://doi.org/10.4236/lce.2017.84008>
8. Yuan, Y. (2016). The development status, problems and countermeasures of China's carbon financial market. *Low Carbon Economy*, 07(01), 62–69. <https://doi.org/10.4236/lce.2016.71007>
9. Zeng, Q., Ma, F., Lu, X., & Xu, W. (2022). Policy uncertainty and carbon neutrality: Evidence from China. *Finance Research Letters*, 47, 102771. <https://doi.org/10.1016/j.frl.2022.102771>
10. Zhang, Z. X. (2016). Making the transition to a low-carbon economy: The key challenges for China. *Asia & the Pacific Policy Studies*, 3(2), 187–202. <https://doi.org/10.1002/app5.138>

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