Proceedings of ICEMGD 2026 Symposium: The Role of Blue Economy in Promoting Human Sustainable Development
DOI: 10.54254/2754-1169/2026.GT32722

SWOT Analysis of China's Economic Development from a Carbon Tax Perspective

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Abstract. In the current era where global industrial expansion has exacerbated the adverse impacts of the greenhouse effect, the transformation of traditional corporate structures toward green finance has gradually emerged as a core objective for China's economic development both now and in the future. This paper adopts the SWOT analysis method to comprehensively examine China's economic development from a carbon tax perspective across four distinct dimensions. It concludes that China's economic development based on the carbon tax system boasts the advantages of a complete supply chain and robust green technology support, while it faces the weaknesses of regional disparities in industrial structures. Meanwhile, it is presented with opportunities including fiscal subsidies and accumulated institutional experience, and confronted with threats pertaining to distributional and affordability issues, as well as challenges in statistical accounting and information asymmetry.

Keywords: Carbon tax, economic development, China, SWOT

1. Introduction

Since the 20th century, society and technology have kept moving forward, and human beings have stepped into the information age completely. But there are a lot of possible challenges behind this fast and huge development. At the beginning of development, most technologies and energy sources were developed by overusing fossil fuels. This situation has made many non-renewable resources run out, and it has also caused serious environmental damage that can never be fixed. Now, more and more people and groups related to this issue have realized this urgent problem. Because of this, more and more kinds of clean energy and new energy products have appeared and spread widely, just to meet the needs of the market.

New energy technologies have become more and more perfect these days. But the cost of using new energy is still quite high, so many companies still choose to use traditional energy sources that rely on fossil fuels. This kind of reliance on the old way has made it really hard to promote the development of new energy. To make industrial production lines more green and solve the emission problems in all fields, the basic way is to carry out a carbon tax policy. A carbon tax means the government charges taxes to different organizations. The tax is based on how much carbon the fossil fuels they use contain, or how much carbon dioxide they send out. The main goal of this tax is that the government makes it more expensive to use fossil fuels. In this way, those organizations will be

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encouraged to use green and new energy sources that produce less waste gas and work with higher efficiency. But the real effects of a carbon tax are much more than this. When a country brings in a carbon tax, it will surely have deep and lasting effects on every part of the country's development.

This paper centers on China's economic development and takes the carbon tax as the research angle. It uses the SWOT analysis method to study the different kinds of effects that carrying out a carbon tax will bring. The paper makes a deep and careful analysis of how carbon taxes influence China's economic development at present and in the future. The analysis is done from four different sides, which are strengths, weaknesses, opportunities and threats respectively.

2. Literature review

The first part of related research looks into how carbon taxes affect people's consumption, business investment and international trade including imports and exports. Through the study of price-driven substitution and price transmission rules, the calculation of household energy demand shows that carbon taxes bring different welfare effects to different groups. Without targeted ways to reuse the tax income, rural families and low-income groups have to take on much heavier burdens [1]. In manufacturing industries with a few competitive enterprises, carbon taxes and cap-and-trade systems lead businesses to make totally different optimal decisions on pollution reduction and product pricing. These different decisions further affect when businesses make investment and what kind of capital they use [2]. Analysis of different possible situations proves that adjusting the energy structure in a reasonable way under carbon tax policies can help cut down emissions and improve the overall economic performance, as long as the tax rate is set in a proper range. But if the tax rate is set too high, it may have bad effects on economic output [3]. From a macro economic view, comparisons made by using computable general equilibrium models show that policy design is extremely important. A mixed policy that combines carbon taxes and an emissions trading system can make the price signals for pollution reduction more clear and push forward industrial structural adjustment. This has great and lasting influences on the imported materials of industrial sectors and the ability of products to compete in international export markets [4,5]. Research findings from the power industry specifically also show that renewable portfolio standards and carbon taxes can complement each other. Together, they affect the use of green technologies, the import of clean technology products and the embodied carbon problems of export goods [6].

The second part of related research studies how carbon taxes influence employment. The empirical research results from China's low-carbon city pilot projects—these projects use policy tools that match the goals of carbon pricing well—show that urban employment has increased on the whole. At the same time, the research also finds that carbon pricing has obvious different effects on different areas. For example, it has short-term negative impacts on cities that rely heavily on resource development. This shows that it is necessary to provide targeted support for the economic transition and offer vocational skill training for workers. These measures can help the labor market adjust smoothly under the guidance of carbon price signals [7].

Besides the above, other related research mainly focuses on the environmental effects of carbon taxes and how the tax burden changes under such policies. The simulation results of multiple policies show that a single carbon tax policy can help China cut CO_2 emissions by about 10–13% by 2030, a single ETS can reduce emissions by 12–14%, and a mixed policy combining carbon taxes and ETS can achieve an emission reduction of 18–28%. These data fully show that combined policy tools have a much greater potential in reducing carbon emissions [4]. When water-footprint accounting is added into the research analysis, it is found that carbon taxes can help reduce the country's total water consumption. But at the same time, the water use intensity of the primary

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industry may go up, which means supporting policy measures are needed in this field [8]. Research assessments focusing on technology development point out that carbon taxes can drive technological innovation through price adjustment, which helps improve production efficiency and promote the use of cleaner production technologies. Of course, this process will bring a small amount of transitional welfare losses [9]. Research on income distribution shows that reusing the carbon tax income—such as giving targeted transfer payments to affected groups—can ease income inequality and reduce welfare losses for the public. It can also make people more willing to accept carbon tax policies, and at the same time keep the policies effective in protecting the environment [10]. Other supporting research results also confirm that green investment channels play a key role in promoting the use of clean energy and achieving long-term environmental sustainability [11].

Based on the above review of existing research, this paper has several main potential contributions. First, in the choice of research topic. Many studies have discussed carbon taxes in the big background of China's national green finance development, but there are very few studies that connect carbon taxes with the overall development of China's economy. So the research topic of this paper is quite new, up-to-date and innovative. It not only adds new content to the existing research in related fields but also starts a new research direction. Second, in the research method. This paper uses the SWOT analysis method to fully analyze the strengths, weaknesses, opportunities and threats that China's economic development faces under the influence of carbon taxes. This method breaks down a broad and overall research topic into four clear and structured parts. It makes the research content easier to understand and explore in a deeper way. Third, in the research implications. Based on carbon taxes and other green finance tools, this paper puts forward targeted policy suggestions for China's future economic development, and these suggestions are suitable for different regions and different social groups.

3. SWOT analysis

3.1. Strengths

3.1.1. Industrial scale and comprehensive supply chain coverage

China has built a complete industrial classification system. This system includes 41 major industrial types, 207 medium industrial types and 666 minor industrial types. A carbon tax may make the running costs of high-carbon industries go up, but China has a large industrial scale. This large scale can reduce the influence of these extra costs through the economies of scale, so the international competitiveness of finished industrial products can be kept. What's more, this complete industrial chain creates a good condition for green technologies to spread fast and for their costs to go down. Researches have proved that green investment is an important way to boost the use of clean energy and to push forward the sustainable development of the environment [11]. When the price signals of carbon tax reach every part of the whole industrial chain, China's huge manufacturing industry can create a large market demand for green technologies and green equipment. This demand will then help lower the costs of using such technologies and equipment by virtue of economies of scale. In this way, it speeds up the green transformation of the whole industrial chain, starting from the production of green raw materials in the upstream to the manufacturing of low-carbon finished products in the downstream.

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3.1.2. Advanced green technologies and strong digital capabilities

China has built well-developed digital infrastructure, which includes carbon accounting platforms, smart power grids and carbon traceability systems based on blockchain technology. In the fields of renewable energy technologies and digital technologies, China has rich technological reserves and great potential for industrialization. All these aspects form a firm base for the effective carrying out of a carbon tax policy. Carbon taxes encourage technological innovation by sending price signals, which helps raise production efficiency and promote the wide spread of cleaner production technologies [9]. The accurate collection of carbon taxes depends on trustworthy emissions data. Digital carbon accounting platforms can effectively reduce the possibility of false data reporting and cut down the costs of law enforcement and supervision work. At the same time, smart power grids make the grid connection of the fast-growing renewable energy capacity better—this capacity expansion is driven by the incentives of carbon taxes. Blockchain traceability technology also makes it possible to track the carbon flows in industrial production during the whole life cycle. All these things not only make sure that the carbon tax policy is carried out in a fair and open way, but also provide precise data support for China to take part in international carbon governance systems like the Carbon Border Adjustment Mechanism (CBAM).

3.2. Weaknesses

3.2.1. Coal-dominated energy structure and severe regional development disparities

China has a specific energy resource endowment. It has large coal reserves, but relatively little oil and natural gas resources. This feature means that coal will still be the main energy source in China's energy consumption structure for a long time to come. This unbalanced energy structure becomes a very big challenge for putting a carbon tax into practice. A carbon tax directly makes the prices of coal and other fossil fuels go up. Adjusting the structure of energy use under the carbon tax policy is expected to both cut carbon emissions and improve the overall economic performance. But if the carbon tax rate is set too high, it will bring losses to the country's economic output as a result. Many areas in China are now facing three big pressures at the same time: keeping the economy growing, making sure employment is stable and reducing carbon emissions. These pressures greatly push up the overall costs of promoting the green transition in a coordinated way across the whole country.

3.2.2. High proportion of energy-intensive industries and risks of carbon leakage

Energy-intensive industries like steel, cement and chemicals still take up a large part of China's economic structure. These industries usually have rather narrow profit margins, and they are very sensitive to any changes in energy costs. Putting a carbon tax into practice will directly reduce their profit margins, and this will weaken their ability to compete in the international market. Researches point out that in manufacturing industries with only a few competitive enterprises, carbon taxes bring unique changes to businesses' best decisions on cutting emissions and setting product prices, and they further affect when businesses make investment and what kind of capital structure they adopt [2]. If the design and implementation of carbon tax policies are not done properly, high-carbon production activities may move to regions where carbon regulation policies are more relaxed. This is a phenomenon called "carbon leakage". Such a situation will not only hold back the global efforts to reduce carbon emissions, but also bring great uncertainty to the domestic investment in the related industrial chains.

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3.3. Opportunities

3.3.1. Strong policy commitment and excellent governance capacity

China's Dual Carbon Goals, which stand for reaching carbon peak and achieving carbon neutrality, act as the top-level plan and a firm political promise for the country's green economic transformation. China has a strong ability in governance, which makes sure that once the carbon tax policy is put into practice, it can be carried out effectively with high-quality tracking and supervision systems in place. Mixed policy tools that combine carbon taxes and an ETS make the price signals for emission reduction more powerful, and they also push forward the upstream structural adjustment in the energy and industrial fields [4,5]. This kind of regulatory coordination lets China use various policy tools in a flexible way. In this way, the country can achieve more notable effects in cutting carbon emissions with lower economic costs, and avoid the development bottlenecks that come with the implementation of a single policy.

3.3.2. Mature carbon market and accumulated institutional experience

China's national carbon emissions trading market has gained valuable institutional experience in its operation process, built a solid data base and optimized the regulatory framework. All these achievements lay a solid foundation for the launch of a carbon tax policy. Researches show that renewable energy quota policies and carbon tax policies can support each other, and together they drive the power sector to cut CO_2 emissions to a great extent [6]. This fact tells us that a carbon tax does not take the place of existing policy tools like the ETS and renewable energy quotas. Instead, it exists side by side with these tools, forming a diverse and multi-layered climate policy system. Such institutional compatibility and the experience accumulated over time allow the carbon tax to be integrated into China's current climate policy framework in a more effective way. This integration creates synergistic effects among different policies and raises the overall efficiency of the country's emission reduction work.

3.4. Threats

3.4.1. Distributional and affordability challenges

By its very nature, a carbon tax is a regressive tax, and it has different effects on people with different income levels and in different regions. The rise in the prices of energy and consumer goods caused by the carbon tax brings a relatively heavier burden to rural households and low-income families. Researches on household energy demand show that without special mechanisms to reuse the tax revenue, carbon taxes bring widely different welfare impacts, and rural and low-income groups take the main pressure of these impacts [3]. Another research also finds that carbon taxes may make income inequality more serious, yet this negative effect can be reduced to the minimum by reusing tax revenues through targeted transfer payment methods [7]. This makes it clear that potential social equity problems may appear when a carbon tax is put into practice if there are no effective compensation mechanisms in place.

3.4.2. Limitations in statistical accounting and severe information asymmetry

The effective collection and enforcement of a carbon tax rely on carbon emissions data that is recorded accurately and fully open and transparent. Yet businesses often have strong motives to

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report less emissions than they actually produce or to fake the related data, which is a typical problem of information asymmetry. This issue seriously weakens the environmental effects of carbon tax policies and damages their social fairness. Although China has made great progress in digital governance, building a national carbon accounting system that cannot be altered and covers all taxable entities and emission sources still faces huge technical difficulties and needs extremely high costs for law enforcement and supervision. The poor quality and inaccuracy of emissions data will in turn limit the precision of carbon tax policy design, lower the effectiveness of policy enforcement, and raise the risks of policy distortion.

4. Conclusion

This paper systematically analyzes the economic and structural impacts of China's green finance policies on the market and society from a carbon tax perspective. China possesses distinct strengths in carbon tax implementation: its extensive industrial scale and comprehensive supply chain coverage, coupled with advanced green technologies and strong digital capabilities, all provide robust support for advancing carbon tax reform and green finance development. Nevertheless, China also faces prominent weaknesses in carbon tax implementation, including a coal-dominated energy structure, severe regional development disparities, a high proportion of energy-intensive industries in the national economy, and the attendant risks of carbon leakage. Meanwhile, China is presented with favorable opportunities for carbon tax implementation, such as the strong policy commitment embodied in the Dual Carbon Goals, excellent national governance capacity, a mature carbon market, and rich accumulated institutional experience. At the same time, China also confronts notable threats and challenges, including distributional and affordability issues caused by the regressive nature of carbon taxes, as well as practical difficulties in statistical accounting and severe information asymmetry in carbon emissions data.

Based on the above analysis of the conditions for China to carry out the carbon tax policy, the following policy suggestions are put forward. First, China should make use of its relatively complete industrial system and the integrated structure of industrial chains to put the carbon tax into practice step by step. Relying on the internal price transmission mechanism of industrial chains, the policy should guide the large-scale development of green technologies and low-carbon products. This development can drive down the costs of these technologies and products as their production scales expand, and thus push forward the overall green transformation of the national economy. Second, with the solid foundation China has in green technology and digital governance, the country should further boost the development of carbon emissions accounting platforms and relevant digital infrastructure. This measure can cut down the operational and regulatory costs of the carbon tax system, and at the same time improve the transparency and verifiability of the policy's implementation. Third, considering that coal will still be the main energy source in China for a certain time, the carbon tax rates must be matched with the speed of the national energy structure adjustment. This is to avoid overly sharp rises in energy costs that may disturb the stable growth of the economy and the stability of employment. For energy-intensive industries such as steel, cement and chemicals, the government should work out differentiated policy arrangements and transitional support policies. These policies can ease the cost pressures on these industries, stabilize the investment expectations of enterprises, and lower the risks of industrial relocation and carbon leakage. Fourth, under the institutional framework of the Dual Carbon Goals and with the support of China's strong governance capacity, the carbon tax policy should not be implemented alone. Instead, it should be combined with existing policy tools like the carbon emissions trading system and renewable energy quota policies. By making the most of the institutional experience accumulated

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from the operation of the carbon market, China should develop a more flexible and diverse set of emission reduction policies to realize the maximum synergistic effects of various policies. Fifth, in light of the more obvious negative impacts of carbon taxes on rural and low-income groups, the government should set up targeted compensation mechanisms such as tax rebates and direct subsidies. These mechanisms can ease the distributional pressures brought by the carbon tax and raise the social acceptability of the carbon tax policy. Finally, to improve the overall effectiveness of carbon tax implementation, it is necessary to constantly polish and perfect a unified, standardized and transparent carbon emissions statistics and regulatory system. This system can reduce policy distortions caused by information asymmetry and ensure that the carbon tax policy is carried out in a fair and effective way.

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