

Research on the Impact of Carbon Barriers on China's Economy and Countermeasures under the Background of Green Trade

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Abstract. Faced with the severe challenge of global climate change, the international community has generally agreed to reduce greenhouse gas emissions and promote green and low-carbon development. National security and green decarbonization "is becoming a new trend in the industrial and trade policies of Europe and the United States, gradually forming a "carbon barrier "for developing countries' foreign trade and low-carbon industrial transformation. This article first systematically reviews the current major international carbon barrier laws, and then deeply analyzes the various impacts of carbon barrier policies on the Chinese economy, specifically manifested as obstacles to the development of the export trade system, significant increases in export costs for enterprises, and increased risks of industrial intelligence exposure. At the same time, this article also points out China's problems in dealing with carbon barriers, including incomplete response mechanisms, inadequate institutional policies and technical standard systems, insufficient recognition of such policies by enterprises, and ineffective synergy of technical support forces. In response to the above issues, this article proposes corresponding countermeasures and suggestions to enhance the ability of enterprises to cope with carbon barriers.

Keywords: Green trade; carbon barriers; Chinese economy.

1. Introduction

Recently, the agenda for carbon barrier policy formulation in developed Western countries has significantly accelerated, aiming to compete for the leading role in the global response to climate change and the right to formulate international trade rules, thereby affecting the global industrial landscape and division of labor. With "carbon" becoming a hot topic both domestically and internationally, green trade has also become a focus of international attention. In September 2020, China proposed at the United Nations General Assembly to strive for peak carbon dioxide emissions before 2030 and to achieve "carbon neutrality" before 2060. To achieve this "dual carbon" goal, China has adopted multiple policies, including the formal establishment of a carbon trading market in July 2021. In addition, under the background of international green trade and the "dual carbon" goal, addressing climate change has become a new hotspot affecting international relations and trade competition. Currently, developed countries that are leading in green and low-carbon technologies are attempting to establish new international trade rules around "climate" and "carbon emissions". Among them, "carbon tariffs" have become a tool for superficially practicing environmental protection but upgrading trade protectionism, and are a major form of carbon barrier policy that developing countries need to attach great importance to.

The challenge of global climate change is becoming increasingly severe, and the development of a low-carbon economy has received widespread attention from the international community and governments around the world. Against the backdrop of increasingly intertwined international trade rules and climate change response rules, developed economies intend to establish a "climate alliance" and establish mutually recognized new climate change regulations within the alliance, attempting to use their influence in the economic and trade fields to expand mechanisms and supporting standards to a global scale. Carbon barriers refer to various trade policies, measures, and standards set by some economies in the name of addressing climate change and reducing greenhouse gas emissions. In

recent years, developed countries such as the United States have been planning to set up carbon barriers, formulate a series of policy bills and green standards, and raise market access barriers to reduce their carbon emissions, avoid carbon leakage, transfer emission reduction costs, and protect the competitiveness of their products in the market. Carbon barrier policies have become a hot topic of discussion in the field of addressing climate change internationally. According to Chinese customs statistics, the total import and export volume of China's foreign trade in 2022 is 42.07 trillion yuan, ranking first among countries worldwide. In recent years, the agenda for formulating international carbon barrier policies has significantly accelerated. As a new type of green trade barrier, carbon barriers will have a profound and lasting impact on China.

Liu Xiaqing and others conducted a study on the impact of CBAM on the development of China's textile and clothing industry. The results showed that in the context where CBAM only targets the Chinese textile and clothing industry, it will lead to a slight decline in China's GDP, threatening the survival and development of small and medium-sized enterprises in the Chinese textile and clothing industry [1]. Fu Tiantian and others summarized the similarities and differences in key indicators between the EU's new battery regulations and China's battery industry policies, providing suggestions and inspiration for Chinese lithium-ion battery companies to adapt to the EU's new battery regulations [2]. Liu Nan drew on the legal system design experience of the EU's new battery regulations and proposed suggestions to accelerate the legislation on the recycling and utilization of power batteries for new energy vehicles in China [3]. Luo Jincheng and others analyzed the specific requirements of the new EU battery regulations and summarized the problems and countermeasures of China's power battery carbon footprint accounting system [4]. Liao Hongyun and others summarized the policy points of the EU's new Circular Economy Action Plan (CEAP) and its implications for China's development of a circular economy [5]. The latest research on carbon barrier policies in China mostly focuses on a single bill, and the perspective is not systematic and comprehensive enough. Except for CBAM, research on other bills is limited to their reference and enlightening significance for China. The research on green trade barriers lacks updates on key provisions of carbon barrier policy bills in recent years. This article systematically reviews, compares, summarizes, and analyzes the progress of international carbon barrier laws, proposes countermeasures and suggestions for China to address carbon trade barriers, and studies the establishment of short-term, medium-term, and long-term policy goals and key work.

2. Forms and Development Trends of Carbon Barriers

At present, the European Union and the United States are the main driving forces for implementing carbon barriers. They implement new green trade barriers targeting emerging economies, aiming to compete for global leadership in addressing climate change, leading global action on climate change, and formulating international trade rules, thereby influencing global trade, industrial patterns, and division of labor systems. The "barriers" set by the International Carbon Barrier Act are mainly reflected in the following three aspects. Firstly, trade barriers mainly refer to the direct increase in export costs through tariffs and other forms. Secondly, mandatory disclosure of product carbon footprint and other information. Thirdly, there are inherent requirements for green and low-carbon products throughout their entire lifecycle.

The carbon barrier bill exhibits characteristics such as concealment, diversity, and broadness. The concealment of carbon barriers is mainly reflected in CBAM's concealment of the essence of unilateral trade protectionism under the pretext of preventing carbon leakage and dumping. CEAP requires the disclosure of product digital passports, traceability of product lifecycle suppliers, raw material ratios, and other information, which is essentially "conditional market access" or leads to the leakage of trade secrets. The diversity of carbon barriers is mainly reflected in the fact that CBAM currently mainly involves six energy-intensive basic products, while CEAP and the EU's new battery regulations focus on the "sustainability" of products, covering a significantly expanded range of products, mainly including downstream industrial chain and supply chain products in the

manufacturing industry. IRA also covers traditional industries and various low-carbon products through direct economic subsidies. The broadness of carbon barriers is mainly reflected in the need to have more initiative in rules. Carbon barrier bills mostly adopt a broad institutional framework and reserve operable regulatory space. CBAM has not yet clarified the details of product carbon intensity calculation and export country carbon cost deduction during the formal implementation stage. Under the CEAP framework, different industry sub-bills may be introduced one after another to meet the demand for EU green trade.

Recently, carbon barrier policies have mainly focused on transitional improvement, with minimal substantive impact. The EU CBAM requires importers to report product quantities and carbon emissions every quarter, but they are not yet required to pay carbon tariffs. CEAP will gradually introduce digital product passports in key industries such as textiles, construction, industry, electric vehicle batteries, consumer electronics, and packaging, further improving various details under the framework of the circular economy. The battery regulations require some battery products to provide a carbon footprint declaration, but no mandatory threshold has been set yet. Developed countries such as the United States and the United Kingdom may follow the example of the European Union and gradually introduce and implement carbon barrier policies such as CCA. The mid-term carbon barrier policy will gradually have substantial impacts: the free quota for CBAM at the EU level will be reduced, carbon tariffs will increase year by year, and the scope of products subject to carbon tariffs will gradually expand. CEAP fully implements the circular economy development strategy, and products entering the EU market must strictly meet sustainability requirements. Multiple battery products are subject to mandatory carbon footprint thresholds for market access. Carbon barriers involve products and countries, and the influence of alliances such as climate clubs is gradually expanding, posing challenges to China's foreign trade pattern. Long-term carbon barriers will continue to expand, with accounting boundaries gradually widening, industry coverage continuously expanding, participating countries and regions increasing, and the impact on the world trade pattern and economic and social development deepening. But as green trade gradually becomes a global consensus, strategic cooperation for carbon neutrality on a global scale will become possible.

3. The Impact of International Carbon Barrier Policies on the Chinese Economy

With the successive formulation, implementation, and gradual expansion of a series of international carbon barrier policies, China will be deeply affected.

Firstly, China's export trade system has been continuously impacted. The carbon barrier policy will change the international trade system and industrial pattern, reconstruct the global supply chain, and have significant and far-reaching impacts on China's traditional advantageous industries and emerging industries. The EU is a pioneer in international carbon barrier policies and an important economic and trade partner of China. According to the European Union Statistics Office, the total import and export trade between the 27 EU countries and China in 2022 was 856.3 billion euros. China has become the EU's second-largest trading partner, first-largest import source, and third-largest export market. According to statistics from Chinese customs, China's total exports to the European Union increased from 1.84 trillion yuan to 3.73 trillion yuan from 2015 to 2022, accounting for 15.6% of China's total exports in 2022. Germany, the Netherlands, Italy, and France are the main export countries of China. At present, CBAM, CEAP, and other laws cover six traditional high-emission and high-pollution products, including steel, aluminum, cement, fertilizer, chemical (hydrogen), and electricity, as well as key manufacturing and emerging industries such as textiles, chemical fibers, photovoltaics, automobiles, batteries, papermaking, packaging, and petrochemicals. Compared with EU enterprises with smaller carbon footprints or non-EU competitors, Chinese production enterprises with high carbon emission intensity will be at a disadvantage, and China's export trade pattern will face challenges.

Secondly, the international competitiveness of Chinese products has declined. The implementation of carbon barriers such as CBAM will directly increase the cost of Chinese export goods, weaken the international competitiveness of enterprises, affect their market share in Europe and America, and thus affect the basic structure of China's foreign trade. Taking the impact of CBAM on the steel industry as an example, domestic steel companies mainly use the blast furnace converter steelmaking method, which has a low emission intensity per ton of steel, about 1.84 tCO₂eq/t steel, second only to the EU's 1.81 tCO₂eq/t steel. But in terms of carbon prices, the average price of the national carbon market in 2022 is 55.3 yuan/tCO₂eq, and the average price of the EU carbon market is 81 euros/tCO₂eq. Due to the significant carbon price difference between the two countries, Chinese steel products exported to the European Union will need to pay more carbon tariffs in the future, weakening the comparative advantage of export enterprises in product prices and thereby reducing the international competitiveness of similar products and upstream and downstream products in the industrial chain.

Thirdly, the risk of industrial intelligence exposure has increased. The Carbon Barrier Act proposes requirements such as digital passports for products, requiring exporters to cooperate in providing information on the carbon emission intensity of related products, carbon prices paid in third countries, as well as information on manufacturers, equipment, capabilities, etc., and to trace sensitive commercial information such as suppliers and raw material ratios throughout the product lifecycle and make it transparent and public. A large amount of data involves corporate secrets, which may lead to the leakage of commercial confidential information. The initiating country of carbon barriers can monitor the situation of overseas enterprises through product carbon information, trace the production scale, technological level, process layout, and other intelligence of other countries' industries, and bring industrial security risks.

4. Domestic Carbon Barrier Response Strategies and Existing Problems

To actively respond to international carbon barriers, the Chinese government and relevant departments have launched a carbon footprint assessment, green low-carbon product certification, national carbon market construction, and related standard formulation work. Guangdong Province, Zhejiang Province, and Shandong Province have taken the lead in conducting research and practice on carbon footprint and carbon labeling. Chengdu, Beijing, and Shanghai are implementing subsidies for green trade and emission reduction development, while Beijing and Guangdong provinces are actively promoting the construction of carbon markets.

There are still prominent problems and difficulties in China's response to carbon barriers. Firstly, a mechanism for addressing carbon barriers has not yet been established. Research has found that there is currently no collaborative work or negotiation mechanism established at the national level to address carbon barriers, and no information statistics, warning, or consulting system has been established for the types, quantities, names, regions, major industries, direct and indirect losses of carbon barriers. Secondly, the national carbon market is still in its early stages of construction. Taking the CBAM bill as an example, the EU recognizes the "explicit carbon price" borne by enterprises in foreign carbon market trading mechanisms as an offsetting measure for carbon tariffs. However, the Chinese carbon market only covers eight major industries including power generation, petrochemicals, chemicals, building materials, steel, non-ferrous metals, papermaking, and aviation. Currently, only companies in the power generation industry participate in trading. Many enterprises find it difficult to participate in carbon market trading and cannot effectively utilize the CBAM carbon price deduction mechanism. Thirdly, the policy and technical standard system for addressing carbon barriers are not sound enough. Taking economically developed coastal provinces as an example, a survey shows that nearly 30% of key industry enterprises have been affected by carbon barriers. Leading textile and battery companies have been directly required by downstream EU importers, including product carbon footprint disclosure and carbon intensity accounting. However, due to the lack of unified accounting methods and standards, most enterprises have not yet carried out carbon

footprint certification and corporate carbon neutrality-related work. Some companies, due to the lack of a localized carbon footprint database, use international default emission factors to calculate results that are higher than their actual carbon emissions levels, and it is difficult to gain recognition from European and American customers. Fourthly, enterprises have insufficient awareness of green trade rules. Taking economically developed coastal provinces as an example, a survey shows that more than 60% of the surveyed key industry enterprises lack understanding of the International Carbon Barrier Act, and more than half of the surveyed enterprises hope that relevant departments can strengthen publicity and education, and hold training on how to deal with carbon barriers. Fifth, the core technological support has not yet formed a joint force. Relevant departments, enterprises, industry associations, etc. have not yet formed a joint force, and the existing capacity building for carbon barrier response policies, comprehensive plans for green transformation of industrial chains, high-end expert talent teams, and financial incentives is lagging.

5. Conclusion

To effectively address the challenge of international carbon barriers, ensure smooth international circulation, continuously promote high-quality development, and seize the initiative in addressing climate change, China needs to accurately respond to carbon barrier policies and propose timely countermeasures and suggestions. Clarify the key points of international carbon barriers in the near, medium, and long term, establish policy objectives for each stage, propose policy key tasks and suggestions, and provide support for China's precise response to carbon barrier policies.

Firstly, China should accelerate the pace of innovation in green and low-carbon technologies, and strengthen the layout of basic research, cutting-edge technology research and development, and scientific and technological breakthroughs. Secondly, China should apply green and low-carbon technologies to foreign trade. At the same time, leveraging the advantages of low-carbon technology, actively crossing carbon barriers, and participating in international competition. Therefore, the development of low-carbon technologies is seen as a strategic measure to overcome carbon barriers.

Although there is controversy over the compliance and rationality of carbon barriers, low-carbon production methods have become an important trend in line with the development of the times. So, carbon barriers are both a challenge and an opportunity for China, and the following countermeasures and suggestions are proposed from the short-term, medium-term, and long-term temporal dimensions. Firstly, people need to plan top-level institutional design to address issues such as the lack of a carbon barrier response mechanism and inadequate institutional policies in China. It is necessary to strengthen the top-level institutional design. Secondly, improve carbon accounting certification standards, benchmark against international standards, establish universal standards for carbon accounting certification and detailed rules for key industries (products) and study the establishment of a localized carbon basic database. Thirdly, promote multilateral climate consultations, strengthen international dialogue, exchange, and cooperation, and actively participate in the formulation of international rules to address climate change. Strengthen international dialogue, exchange, and cooperation, and actively participate in the formulation of international rules to address climate change. Fourthly, people need to improve the construction of the national carbon market, which is one of the important policy tools to address carbon barriers. It is necessary to accelerate the expansion of the carbon market industry, improve the carbon pricing mechanism, and promote international mutual recognition of carbon accounting in the carbon market. Fifth, build a green and low-carbon industrial system, promote the research and application of key technologies for "dual carbon", and optimize the green and low-carbon design and production of the product lifecycle.

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