Proceedings of the 2nd International Conference on Social Psychology and Humanity Studies
DOI: 10.54254/2753-7048/39/20240669

Analysis of the Potential Impact of the EU Carbon Border Adjustment Mechanism on China

Yang Song[1,a,*]

[1]*Faculty of Law, Macau University of Science and Technology, Taipa, China*
a. 1210008669@student.must.edu.mo
**corresponding author*

Abstract: Excessive carbon dioxide emissions are one of the major causes of global warming. To effectively respond to global climate change, all countries are making efforts and changes in this regard. As one of the largest carbon markets in the world, the European Union (EU), to better respond to the Paris Agreement, introduced the European Green Deal and the EU Carbon Border Adjustment Mechanism (CBAM). The mechanism requires that high-carbon products imported into or exported from the EU pay a corresponding amount of tax or refund the corresponding carbon emission allowances. The implementation of the EU Carbon Border Adjustment Mechanism (CBAM), which is essentially a carbon tariff, has also had a significant impact on the Chinese market. The more carbon-intensive steel industry has been the first to be hit, affecting the competitiveness of the industry's exports in the EU to a certain extent, while also increasing compliance costs for the development of other related industries. Chinese enterprises should strengthen innovation and research, and actively introduce low-carbon technologies. At the same time, China should continue to improve its own voice and accelerate the construction of the national carbon market.

Keywords: Carbon tariffs, steel sector, carbon border adjustment mechanism

1. Introduction

Global carbon emissions are a growing concern. Carbon dioxide is one of the main greenhouse gases, and it creates a greenhouse effect in the atmosphere, leading to an increase in global temperatures. This triggers climate change, including more frequent and severe extreme weather events, sea level rise, etc., posing a huge threat to ecosystems, economies, and societies across the globe. According to the assessment of the United Nations Intergovernmental Panel on Climate Change (IPCC), rising greenhouse gas (GHG) emissions from human activities have been a major driver of global warming since 1750. These greenhouse gases mainly come from human activities in the fields of energy, transportation, construction, and manufacturing [1]. Climate change, as a global issue, is not limited by national boundaries. To effectively respond to climate change, countries need international cooperation, joint efforts to reduce carbon emissions, and common policies and action plans.

The Paris Agreement was agreed at the United Nations Climate Change Conference in 2015 and aims to address climate change on a global scale. The goal of the Agreement is to limit the increase in global average temperature to 2 degrees Celsius above pre-industrial levels and to seek to limit the increase to 1.5 degrees Celsius. The creation of the Paris Agreement has essentially facilitated communication and cooperation among countries on global climate change, and many countries have

DOI: 10.54254/2753-7048/39/20240669

committed themselves internationally to fulfilling their responsibility to respond to climate change by reducing carbon emissions. In 2021, the European Parliament voted to adopt the Carbon Frontier Regulation Mechanism (CFRM). Subsequently, the European Commission formally put forward a series of comprehensive environmental proposals covering climate, energy, land use, transportation, and taxation. This comprehensive proposal aims to ensure that the EU's greenhouse gas emissions are reduced by at least 55% by 2030 compared to 1990 levels [2]. This marks a solid step forward in advancing the EU's environmental agenda, and the launch of the mechanism can also be seen as an important step towards fulfilling the EU's commitment to the Paris Agreement, advancing global climate action, and ensuring that local businesses can compete fairly in the global marketplace.

As one of the largest carbon markets in the world, the European Union (EU) has been striving to promote greenhouse gas (GHG) emission reduction, and the EU has been a global leader in the low-carbon transition path. The EU Carbon Border Adjustment Mechanism (CBAM) is one of the measures introduced by the EU to fulfill its commitments under the Paris Agreement. As early as when the countries signed the Kyoto Protocol, the EU has put forward the idea of adopting "carbon tariffs" for countries that have not signed the Act, to limit the levy on energy-consuming products with high carbon emissions. However, due to the opposition of other international organizations it has not been effectively implemented, delayed until today [3]. Therefore, the establishment of the EU carbon border adjustment mechanism is the early years of the "carbon tariff" idea on the ground, effectively limiting carbon emissions.

As the world's first climate trade mechanism with the significance of "carbon tariffs", the implementation of CBAM will have an inevitable impact on China at the level of climate governance and international trade [4]. As an implied carbon exporting country, the implementation of carbon tariffs will seriously increase the export costs of China's steel and other carbon-intensive industries. As a major trading partner of China's exports, the EU has always played an important role in importing Chinese goods. This trade status quo means that the carbon border tax is bound to have a certain impact on China. Scholars generally agree that the EU Carbon Border Adjustment Mechanism (CBAM) will seriously impact China's high-energy-consumption commodity exports, which is not conducive to the development of China's related trade commodities. Therefore, it is especially important to analyze and study the content of the EU carbon border adjustment mechanism and its potential impact.

2. Description of the EU Carbon Border Regulation Mechanism

The EU Carbon Border Adjustment Mechanism (CBAM), also known as the Carbon Border Tax or Carbon Tariff, is a tax imposed by the EU on the carbon emissions of some imported goods. The mechanism requires that high-carbon products imported into or exported from the EU pay a corresponding amount of tax or refund the corresponding carbon emission allowances. Using steel as an example, let's say that domestic steel company A, with a carbon intensity of 1.5tCO2/t of steel, and EU steel company A, with a carbon intensity of 1.0tCO2/t of steel, export 1,000t of steel. The average unit price of EU ETS in the exporting state is €80/t, and the EU importer is required to levy a carbon adjustment tax on the steel company as follows (1.5 - 1.0) * 1000 * 80 = 40,000 (€). It can be seen that the EU levy on exporters is essentially a carbon tariff.

Due to the anarchic nature of the international system, any country whose competitiveness is weakened by the response to climate change will take practical action to avoid this disadvantage [3]. The European Union is the world's most mature carbon trading market, so in recent years climate change has paid more attention to the limitation of carbon emissions, the carbon border adjustment mechanism profoundly reflects the EU's determination to promote decarbonization and the power of action.

DOI: 10.54254/2753-7048/39/20240669

The legal nature of the EU Carbon Border Adjustment Mechanism (CBAM) is based on the fact that it aims to address the imbalance of carbon emissions in the global market [3]. The core objective of the mechanism is to adjust the level of carbon emissions in different jurisdictions by imposing carbon tariffs on products produced from different countries and regions. This means that when products circulate across borders, tariffs are levied based on the carbon emissions they contain, ensuring that imported goods are produced in line with EU environmental standards. CBAM therefore aims to encourage compliance with carbon emissions in international trade and to motivate global producers to adopt more environmentally friendly, low-carbon production methods. Its legal nature covers a wide range of areas such as international trade, environmental protection and carbon emissions management, and it promotes more sustainable and environmentally friendly production and trade patterns globally by adjusting the carbon costs of products from different regions.

3. Potential Impacts of the EU Carbon Border Adjustment Mechanism on China

3.1. The Iron and Steel Industries are More Heavily Affected

In order to further explore what kind of industries in China are most affected by the EU carbon border adjustment mechanism, many scholars have used the carbon emission calculation model to calculate the carbon border adjustment tax rate to be imposed by the EU on various industries in China and analyzed the impact on the exports of various industries in China [5]. After analyzing the impact on China's exports by industry [5], it is concluded that the five industries with the highest carbon dioxide emissions have a higher carbon emission intensity, according to the carbon intensity factor. A targeted assessment study conducted by Tsinghua University also shows that the implementation of CBAM will particularly affect the exports of China's iron and steel industry [6]. The total carbon emissions of the iron and steel industry are so large mainly because of its energy consumption and raw material preparation. Iron and steel production is a high energy- and emission-intensive process, with large amounts of thermal energy being used to heat and smelt iron ore in conventional smelting processes such as blast furnaces and converters. These processes typically use fossil fuels, such as coal and coke, as the main source of energy. However, burning fossil fuels generates large amounts of greenhouse gas emissions such as carbon dioxide, which have a serious impact on global climate change. Steel production not only requires large amounts of iron ore but also produces carbon dioxide during reduction reactions. The process of heating and reducing iron ore requires high temperatures and often relies on fossil fuels, such as coal and coke, to provide the heat. This combustion process produces significant CO2 emissions. In addition, the handling of raw materials in the steel production process also consumes large amounts of energy and generates emissions. For example, the crushing and grinding of ore requires large amounts of electricity and fuel and also generates waste and tailings. Therefore, the production of iron and steel industry will inevitably emit a large amount of carbon dioxide, which will increase China's carbon emissions. In 2021 China's carbon dioxide emission intensity is 1.7 tons of carbon dioxide per ton of product, which is 0.5 tons of carbon dioxide per ton of product higher than the carbon dioxide emission intensity of the European Union countries. Based on the different carbon emission amounts between China and the EU, the iron and steel industry products exported to the EU will pay high carbon tax. Therefore, the introduction of the EU carbon border adjustment mechanism will inevitably have an impact on the export of China's steel industry, high taxes and fees make the cost of exports increase, greatly reducing the price advantage of China's steel, further reducing the volume of exports, so that the un-exported steel in the circulation of the domestic market, increasing the difficulty of the domestic carbon emission reduction, is not conducive to the development of China's iron and steel industry in the export market [3,7].

DOI: 10.54254/2753-7048/39/20240669

3.2. Increased Compliance Costs for the Export of China's Relevant Products

The introduction of the EU Carbon Border Adjustment Mechanism (CBAM) is likely to increase the compliance costs of China's exports of relevant products. The mechanism also establishes new barriers to industrial and technological competition for China, especially the inclusion of all industries under the EU ETS (European Union Carbon Emissions Trading Market) into the CBAM by 2030, which increases China's trade challenges in the European market [3].

The EU's Carbon Border Adjustment Mechanism (CBAM) covers China's main exports, i.e., the steel and aluminum sectors. When carbon tariffs are imposed on them, there will be direct economic and operational impacts on Chinese companies. First, as a large carbon emitter, China's main exports cover high-carbon-intensity industries such as steel and aluminum, which makes these products the direct target of the CBRM. The mechanism will directly lead to higher selling prices for Chinese products in the EU market, and companies will be forced to consider and pass on these additional carbon costs. As a result, Chinese exporters will face the challenge of reduced price competitiveness in the European market, which could hurt their market share and profitability. Second, to comply with EU carbon standards, Chinese firms may need to make improvements in their production processes and technologies to reduce the carbon emissions of their products. This involves technological innovations and equipment upgrades, and these initiatives will require huge capital investment, leading to an increase in production costs for enterprises. The carbon price in the carbon emissions trading market of China and the EU will be quite different for quite a long time in the future, and Chinese enterprises will also have to bear the additional transaction costs and export costs brought about by the carbon border adjustment tax, in addition to the original costs [8].

At the same time, companies incur significant costs in their supply chains. To reduce the carbon footprint of their products, companies need to make significant adjustments to their supply chains to adopt greener raw materials and production processes. This strategic supply chain restructuring means not only re-evaluating the existing supply chain structure but also further searching for new, greener suppliers and partners. This process not only requires time and resources but may also introduce new costs and management challenges. Therefore, to adapt to the EU's Carbon Border Adjustment Mechanism (CBAM), companies need to focus not only on the carbon emissions of the product itself but also consider the carbon footprint of the supply chain holistically. This strategic realignment of the supply chain not only confronts companies with the challenge of rising costs but also with the managerial complexity of new partnerships and technology implementations.

4. Recommendations for Countermeasures

Under the principle of common but differentiated responsibilities, society should emphasize both joint efforts and differentiated implementation [4]. This means that the international community should work together to address the global challenge of climate change, but this concerted effort includes also providing the necessary support and assistance to developing countries to ensure that they have sufficient resources and technological capabilities to achieve sustainable development [9]. As a developing country, China should also take practical and effective low-carbon development measures to comply with the provisions of the Paris Agreement fulfill the corresponding emission reduction commitments, and actively respond to the impact of the EU carbon border adjustment mechanism.

4.1. Improve the International Discourse

The implementation of the EU's carbon border adjustment mechanism has had great influence on our country. As one of the top three exporters of the EU, China should pay attention to the exchanges and communications with the EU on coping with climate change, and continuously improve our

DOI: 10.54254/2753-7048/39/20240669

international discourse. At the same time, China should make good use of the WTO and other international platforms and organizations to protect its legitimate interests. If the EU implements carbon tariffs on the products of a certain country or region, but exempts other countries, it may violate the WTO's most-favored-nation principle. According to WTO rules, member states should give the same treatment to all member states' products when imposing tariffs on one country's products. At the same time, based on the additional reporting obligations of exporting countries, the accounting of the EU Carbon Border Adjustment Mechanism (CBAM) involves a lot of information about the emission reduction intensity of Chinese domestic enterprises as well as the detailed production process of the whole industrial chain, which also threatens the commercial secrets and information technology security of Chinese enterprises [4]. Based on this, China can actively use the WTO dispute settlement mechanism, according to the WTO rules and the Climate Act, to resolutely defend the legitimate rights and interests of Chinese enterprises. This move can not only emphasize the fairness of the international trade system but also help to promote a more comprehensive and fair consideration of the carbon border regulation mechanism by the international community. Under the principle of common but differentiated responsibilities, society should emphasize both joint efforts and differentiated implementation. This means that the right to development of developing countries must be respected and safeguarded, but in the process of development, they must adhere to low-carbon development, fulfill their obligations under the Paris Agreement, and achieve the emission reduction targets they have set for themselves.

4.2. Enterprises Strengthen Technological Innovation and R&D

To combat this problem, the steel industry should gradually move towards more environmentally friendly and sustainable production methods. The introduction of innovative technologies and processes can reduce carbon emissions during steel production. For example, the adoption of Direct Reduction of Iron Ore (DRI) technology can significantly reduce CO2 emissions by using hydrogen or natural gas instead of traditional coal and coke. At the same time, companies can recycle waste gases in the steel and ironmaking process. Exhaust gas recovery technologies can capture and utilize the heat energy in the high-temperature exhaust gases emitted from furnaces and grate furnaces for use in power generation or heating of other processes, thereby improving energy efficiency. In addition, the development of new smelting technologies and processes, such as direct reduction technology and hydrogen reduction technology, is also an important way to reduce carbon dioxide emissions from steel production. These new technologies can replace traditional combustion reactions, reducing the use of fossil fuels and lowering carbon emissions. In addition to technological improvements, promoting the transformation of the energy structure is also key to reducing carbon emissions from the steel industry. Enterprises can gradually introduce renewable and clean energy sources, such as wind and solar energy, as energy sources in the steel production process, which can significantly reduce carbon emissions [10]. At the same time, improving energy efficiency, optimizing production processes, and adopting more environmentally friendly raw material handling methods, such as waste recycling, are also important ways to reduce carbon emissions.

In conclusion, to effectively mitigate the harmful effects of the EU carbon border adjustment mechanism on the iron and steel industry, enterprises should actively explore and apply various types of technologies and innovations to minimize their negative impacts on climate change. By adopting more environmentally friendly processes, improving the energy structure, increasing energy efficiency, and other measures, steel companies will be able to gradually realize low-carbon production and make a positive contribution to sustainable development.

DOI: 10.54254/2753-7048/39/20240669

4.3. Adjusting the Export Structure of Steel Products and Accelerating the Construction of a National Carbon Market

China should accelerate the construction of its carbon market in response to the EU's carbon border adjustment mechanism. First, establish and improve the product carbon footprint traceability system to provide Chinese enterprises with trustworthy data on product carbon emissions. This will help companies better meet the requirements of the carbon border adjustment mechanism and also provide specific environmental information for exported products. The establishment of the system can help companies quantify and record carbon emissions throughout the product's life cycle, from raw material procurement, manufacturing, and transportation to the use and disposal of the final product, resulting in comprehensive carbon emissions data. Such a full-chain record helps companies to fully understand the environmental impact of their products and provides data support for corporate management to optimize production processes and select more environmentally friendly supply chain partners, and the traceability system provides Chinese companies with concrete and credible data on the carbon emissions of their products.

Second, adjusting the export structure of steel products can also effectively reduce the impact of carbon tariffs on the steel industry to increase the proportion of low-carbon products exported [10]. This initiative can be achieved by adopting more environmentally friendly and low-carbon production technologies to produce products that meet international environmental standards. At the same time, it strengthens cooperation with the international market to understand and meet the needs of foreign consumers for low-carbon products. This strategic adjustment will help drive the entire steel industry in a more sustainable and low-carbon direction. According to the analysis, China's steel industry is one of the industries most significantly affected by the EU's carbon border adjustment mechanism. Scholars Liu Bin and Zhao Fei point out that when building a carbon emissions trading market in China, the experience of the EU should be taken into account to mitigate the negative impacts of those industries that are more affected by trade shocks [5]. In addition to gradually increasing the auction ratio, consideration can also be given to gradually providing free allocation of carbon emission allowances for industries such as chemicals, iron and steel, and glass. This will help to balance the impacts on the more trade-impacted industries in the process of carbon market construction and promote a smoother transition to a low-carbon economic model.

5. Conclusion

The EU Carbon Border Adjustment Mechanism (CBAM) will have a serious impact on the Chinese steel industry. As steel production involves high energy consumption and emission-intensive processes, its carbon emissions are large. The implementation of the EU's Carbon Border Adjustment Mechanism (CBAM) will result in China's steel products being subject to high carbon taxes when exported to the EU, increasing the cost of exports and reducing China's price competitiveness in the international market. This could lead to increased supply in the domestic market, making domestic carbon emissions more difficult. The EU Carbon Border Adjustment Mechanism (CBAM) will also increase compliance costs for Chinese exports of relevant products. To comply with EU standards, Chinese companies may need to make improvements in production processes and technology, increasing production costs. In addition, there will be increased monitoring and record-keeping costs based on regular reporting by exporters. Taken together, this mechanism could have negative economic and operational impacts on Chinese companies. The EU Carbon Border Adjustment Mechanism (CBAM) has just been implemented and is still in a transitional period, and exporters are not yet required to pay the relevant fees. Enterprises should make efforts in technological innovation and R&D, introducing innovative technologies, recycling exhaust gases, improving energy structure, and other ways to reduce carbon emissions and realize low-carbon production. At the same time,

DOI: 10.54254/2753-7048/39/20240669

society should also focus on adjusting the export structure and carbon market construction, accelerate the construction of the carbon market, and introduce the carbon emissions trading market to promote the development of the industry in the direction of sustainable and low-carbon. As one of the three major exporting countries of the EU, China should seize this time to make positive adjustments and continuously seek solutions to better cope with the impact of the mechanism.

References

[1] *Xu, H.F., Yi, L. (2022) Cooperation and competition between China, Russia and the United States: an analysis based on the perspectives of global climate governance, low carbon and green development. Russian East European Central Asian Studies, (03), 103-126+173.*

[2] *Lan, Q.X., Duan, Y.P. (2022) The Substance, Impact and Countermeasures of Carbon Tariffs in China. Administrative reform, (01), 37-44.*

[3] *Tian, J., Shi, X.Y. (2023) Carbon Border Adjustment Mechanism: New Options for the European Union to Cope with Climate Change and China's Response. China Environmental Management, 15(01), 28-35.*

[4] *Yan, Y.F., Yang, L.Y., Zhang, Y. (2023) A Study of the Impact of the EU Carbon Border Adjustment Mechanism on China's Economy and Carbon Emissions. Journal of Shanghai Lixin College of Accounting and Finance, 35(04), 88-107..*

[5] *Liu, B., Zhao, F. (2021) The Impact of the EU Carbon Border Adjustment Mechanism on China's Exports and Suggestions for Countermeasures. Journal of Tsinghua University (Philosophy and Social Science Edition), 36(06), 185-194+210.*

[6] *Zeng, A., Tan, X.C., Wang,Y., Gao, J.X. (2022) Impact of EU Carbon Border Adjustment Mechanism on China and Countermeasures Analysis under the Background of Carbon Neutrality. China Environmental Management, 14(01), 35.*

[7] *Yang, R. (2022) Study on the Potential Impact of Carbon Border Adjustment Tax on China's Steel Product Exports to EU Member States. Institute of International Trade and Economic Cooperation, Ministry of Commerce.*

[8] *Ye, D.C. (2023) A Study on the Impact of the EU Carbon Border Adjustment Mechanism on Carbon Emissions and Welfare in China . Jiangxi University of Finance and Economics.*

[9] *Jin, Y. (2023) EU Carbon Border Adjustment Mechanism and China's Response. Journal of Chifeng College (Chinese Philosophy and Social Science Edition), 44(01), 56-63.*

[10] *Liu, X.Q., Zhao, L.H., (2023) Impact of the EU carbon border adjustment mechanism on China's iron and steel industry--Based on the perspective of product carbon footprint. China Metallurgy, 33(02):135-140.*