

Analysis of the impact of green trade barriers on the trade of industrial products between China and five Central Asian countries based on Lanczos-model reduced-order algorithm

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Abstract. With the development of economic globalization, the proportion of export trade in China is gradually increasing, and there has been a relatively close connection between the economies and trade of the five Central Asian countries and China, and because of their special geographical location, the connection between China and the five Central Asian countries is more frequent and there are certain connections in different industries. Different countries will certainly have different industrial priorities, so they need to be linked with each other. In the process of trade export, there will also be relevant policies appear, and green trade barriers are one of the policies that are closely linked with trade as one of them. Under the influence of green trade barriers, the trade of industrial goods between China and five Central Asian countries is also greatly affected, and this paper mainly uses Lanczos-model descending order algorithm to analyze its influence.

Keywords: Lanczos-model reduced-order algorithm, green barriers to trade, industrial goods trade.

1. Introduction

With China's accession to the World Trade Organization, its export trade has gradually increased, and the continuous development of economic globalization, the world economy is gradually integrated, which is a great platform for export trade. Nowadays, environmental protection has become an issue of great concern all over the world. Under such a trend, green trade barriers are gradually introduced, which will have a certain impact on export trade, especially in recent years, China has suffered from the green trade barriers of other countries, which is obvious. In such a situation, for its impact China needs to continuously study new countermeasures to give new vitality to the export trade [1].

While designing and studying a control system, it is necessary to build a dynamic mathematical model for it so that its dynamics can be better described, but in the process of design, its dynamic mathematical model is not simply a specified system, it can be expressed in many different ways, so that for the system together, it can be designed from different theories and perspectives [2].

In the process of using the model for calculation, there are many algorithms, and in the process of this study, the Lanczos-model reduced-order algorithm is used, whose specific algorithms are mainly shown in Table 1 below.

Table 1. Lanczos-model reduced-order algorithm based on orthogonality

Algorithm 1: Computation of approximate solutions with respect to multiple frequency points: $E = -i\omega(A + i\omega I)^{-1}X = f(A)X$
Input: finite element discrete matrices C and M, source term $X=M^{-1}b$, dimension m of rational Krylov subspace, and real poles $\xi_1, \dots, \xi_l$
Output: Approximate solution for all frequency points $E \approx \ X\ _M V_{m+1} f(A_{m+1}) e_1$

2. The connotation and characteristics of green trade barriers

2.1. The connotation of green trade barriers

For the existence of green trade barriers, mainly refers to the international trade, which is mainly based on a series of settings established on the basis of environmental protection, many importing countries will set some non-tariff trade barriers for the protection of ecosystems and other requirements, so that the import and export of goods to improve its inspection standards, and make the goods safer, its main purpose is to limit the import of some goods. Based on the previous trade barriers, more technologies are combined so that they can be better protected.

In the process of implementation, green trade barriers have often evolved, which can be divided into five types, respectively, green tariffs, green health and quarantine system, green technical standards, green environmental labeling system and green packaging system. There are many industries involved, and almost every industry receives the restrictions of green trade barriers, and industrial products become more slow in their development under such restrictions [3].

Green tariffs: its mainly refers to the process of trade exports, developed countries in order to can more accurately practice environmental protection policies, in the process of trade import and export, developed countries will develop relevant policies for products from developing countries. When the appearance of goods that do not meet the requirements of environmental protection, government departments need to increase their appropriate taxes, or to limit their imports of goods.

Green technology standards: the developed countries' science and technology level is higher than that of developing countries, and there will be a certain monopoly phenomenon in the technology level, therefore, it will often restrict the technical standards of developing countries in the name of its environmental protection, but such technical standards are very unfavorable to developing countries.

Green environmental labeling system. This is issued to manufacturers by government departments and civil society in accordance with strict environmental standards and procedures, a graphic on the packaging, as a way to prove to importing countries and consumers that the product from raw materials to production and processing, to packaging and distribution, as well as recycling and the entire production and distribution process is in line with ecological and environmental protection standards.

2.2. Characteristics of Green Trade Barriers

2.2.1 High standard of technology

When green trade barriers first appeared, they originated from developed countries in the West, and because these countries have strong economic and scientific research strength, they were given high technical standards for green trade barriers when they were formulated. Such technical standards are difficult to reach for many developing countries, but they are constantly refining their technology so that they can reach a better level.

2.2.2 Formal Legality

Many non-tariff barriers to trade do not appear in the form of formal legislation, so this type of trade barriers in the international are subject to a certain degree of rejection, but green barriers to trade has a series of legal legislation, which exists as public legislation, and there are even a series of explicit provisions. The high standard green barriers set by developed countries have international legitimacy [4].

2.2.3 Extensiveness of protection content

After the implementation of green barriers to trade, its protection content is very extensive, which is not only limited to green agricultural products at the beginning, but also involves related industrial products and service industries afterwards. a means of constraining economic development [5].

2.2.4 The concealment of protection

In the process of export trade, there will be related trade barriers, but green trade barriers are not like traditional non-tariff trade barriers, its implementation process has a very strong target, the number of exports and rules are very clear. Its main purpose is to protect the environment designated, but its methods need to be carried out on the basis of international regulations, the requirements for testing technology is also very high, will not discriminate against a country or enterprise, reducing disputes between countries.

3. The current situation of industrial goods trade in five Central Asian countries

The current situation of industrial goods trade between China and the five Central Asian countries is analyzed, and from its trade scale, its entire trend shows an upward to downward trend, and gradually tends to be stable, and its specific trade volume is mainly shown in Table 2 below.

Table 2. Data of industrial goods trade between China and five Central Asian countries from 2018 to 2022

Year	Import and Export	Export	Import	Surplus	Share of
2018	387.34	183.55	203.79	-20.23	97.69
2019	447.29	209.75	237.53	-27.78	97.35
2020	491.50	228.46	263.04	-34.58	97.76
2021	439.25	235.69	203.55	32.14	97.58
2022	283.74	147.36	136.38	10.98	86.99

From the above table, it can be seen that between 2018 and 2022, the data of industrial goods trade transactions between China and five Central Asian countries are consistently in a more volatile state, and in 2022 their transaction amounts reach the lowest valley. Although the data amount has been in a fluctuating state, its share has been relatively stable between 2018 and 2021, but in 2022 its share directly decreases by about 10%.

In the process of trade transactions between China and the five Central Asian countries, we can see that there are more transactions of industrial products, and in recent years, with the continuous improvement of China's industrial technology, the added value of its products in the export process is increasing, for example, in the process of conducting transactions, its power machines, machinery and equipment, office equipment, communication equipment and other tools. In the process of analysis of imported products, it can be found that its imports are mainly some primary products, that is, raw materials will be more, such as natural gas, is there and chemical raw materials, etc.. After importing these, China will process them twice to generate other products.

After observing and summarizing the structure of export trade using the Lanczos-model descending algorithm, it is clear that China needs more raw materials from the five Central Asian countries and is more dependent on them, especially on oil and gas imports from Kazakhstan and Turkmenistan, for which it imports more. But for the five Central Asian countries, their own technology level is limited, and they also face financial problems, so their dependence on some high-tech products exported by China will be stronger, and they pay more attention to added value. In the process of trade transactions, it can be found that such characteristics can help promote trade exchanges between the two sides, and when they carry out foreign trade cooperation, it can promote China's overseas industrial transfer to the five Central Asian countries, which can reduce the transportation costs and losses of raw materials imported by China from the five Central Asian countries and also help the industrial undertaking countries to improve their own technology level and reduce the cost of products imported by the industrial undertaking countries from China.

4. The impact of green trade barriers on the trade of industrial products between China and the five Central Asian countries

4.1. Negative impact

4.1.1 The five Central Asian countries protect their own products

Under the influence of green trade barriers, the import and export business of many countries will receive a certain impact, in order to be able to ensure the domestic business production, many countries have begun to protect their own trade, and for the five Central Asian countries, their economic strength and many developed countries and even developing countries are relatively weak, so in order to prevent their products from being more affected, a greater degree of The green trade barriers of higher technical level are used to suppress the products of other countries and prevent the import of foreign products [6]. The Lanczos-model reduced-order algorithm shows that it is more difficult to carry out export trade because countries are protected for their own products.

4.1.2 Impact on the process of "One Belt, One Road"

China's "One Belt, One Road" policy is to facilitate trade between countries, and the five Central Asian countries belong to the core of the region, which can be said to be the key to the overall economic development. However, the emergence of green trade barriers has brought a bad impact on the whole trade, increasing the difficulty of China's foreign exports and even raising the cost of goods, which is under greater pressure for many operators [7]. And some trade frictions can occur during the implementation period, which will affect the construction and development of the whole "One Belt, One Road". The Lanczos-model reduced-order algorithm shows that the green trade barriers have brought losses to the whole Belt and Road economy in recent years, and there is a continuous upward trend.

4.1.3 Disadvantageous to the development of domestic enterprises

After the implementation of green trade barriers, the trade exports of Chinese enterprises will become more difficult, China has always been a large producer, so after the implementation of the policy, many enterprises' products are facing the phenomenon of stagnation, in recent years, many private enterprises want to expand overseas markets, but under such a policy, it will lead to a gradual increase in the production costs of enterprises, the profits obtained by enterprises will gradually decrease, and when the export The risks encountered when exporting will also be greater for the development of domestic enterprises have played a certain restriction, resulting in domestic enterprises can not better carry out overseas markets.

4.2. Positive impact

4.2.1 Improve environmental standards

With the development of the economy and society, people's attention to environmental protection is also gradually strengthening, green awareness needs to take root in the hearts of everyone, for enterprises, in the process of production, they need to pay attention to the environmental problems that arise in the production process, so that the production of products more environmentally friendly, consumers more at ease. After the emergence of green trade barriers policy, it can help China's enterprises pay more attention to its environmental standards and enhance its environmental protection capabilities, so that the export trade of industrial products can be developed better.

4.2.2 Product safety can be better practiced

After the implementation of green trade barriers, many products in China will encounter some export problems, when these enterprises encounter export bottlenecks, they will continue to summarize their own shortcomings, began to reflect on themselves, gradually summarize their experience, will gradually and the same industry between the enterprises began to contact each other to summarize and supervise each other, so that the safety index of the products continue to improve,

after the safety system is perfected After the safety system is perfected, the product can gradually reach the standard of environmental protection technology, so that their own environmental protection technology will gradually be improved, which has a very good role for the whole society.

5. Measures taken to address its impact

5.1. Cultivate green concept

Under such circumstances, if China's industrial products want to break through the green trade barriers and continuously enter the international market, they need to make more efforts to continuously improve their international competitiveness, and they need to keep pace with the times, gradually cultivate the green thinking and awareness of enterprises, enhance the green concept of enterprises, continuously implement scientific and technological innovation and technological innovation, introduce advanced technologies from abroad, and reduce as much as possible the pollutant content [8]. When my goods are exported, I need to understand and master some foreign green inspection standards in advance, make full use of the domestic advantageous resources and characteristic resources, and develop industrial products with local characteristics that meet international inspection standards.

5.2. Optimize product structure

China belongs to a large production country, and there are more production units of industrial products, but they belong to processing, in this process many raw materials need to be purchased from abroad, and also need to transport the production of products to foreign countries for sales, after the implementation of green trade, China's international trade has a large trade deficit, import and export imbalance phenomenon, in order to change the status quo, it is necessary to continuously optimize the product structure. Increase the creativity of China's products, the original low-tech products gradually to high-tech transformation, and improve the product development and design capabilities of enterprises, so that enterprises to improve the awareness of green thinking, in this process, in order to make the transformation of enterprises more thorough, the government needs to have relevant policies introduced, can allow enterprises to have more room for development, to give more policy compensation.

In the process of product structure optimization, science and technology is a very important link, which has the core competitiveness in product design and can help enterprises to obtain a corresponding position in the market, therefore, after the implementation of green trade barriers, enterprises can achieve their development by improving their level of science and technology in order to increase their market competitiveness. In the process of development, in order to encourage each enterprise in China to increase innovation, appropriate financial compensation can be given to enterprises, so that they can continue to experiment, but also from the failure to sum up the experience, to facilitate subsequent improvements.

In order to better develop science and technology, enterprises need to introduce some high-end technical personnel, to give better welfare policy, so that they can provide more advanced technical guidance and give some management experience to the whole process of production, which can help enterprises better through the green trade barrier policy, to help enterprises obtain more benefits. The change of industrial structure is not just an overnight thing, it takes a lot of time and energy to invest in the whole production, so as to get better products.

5.3. Strengthen the construction of basic settings and make better use of international rules

For many countries in Central Asia, their development is relatively backward and their transportation facilities will be relatively backward and not as smooth as those in mainland China, so in this process, it is necessary to strengthen the improvement of their transportation facilities, and the inconvenient transportation facilities invariably increase the transportation cost of products, resulting in less profit gained by the enterprises. After the improvement of its transportation infrastructure

settings, it can reduce the generation of transportation costs and also allow for better development between the two countries. Therefore, it is especially important to strengthen the connectivity and infrastructure construction between China and Central Asian countries.

After the emergence of green trade barriers, the country should establish a trade early warning mechanism in the first instance, so that more effective information can be improved, and when our country encounters its malicious strikes in trade exports, it can use a lot of international rules against them not to fight back, and in serious cases can apply for international arbitration institutions fair arbitration.

For those countries that abuse the rules and apply discriminatory principles under the guise of "legality", China should actively seek help from international organizations and seek international arbitration.

6. Conclusion

As the economy continues to develop, more similar policies may emerge in the future to restrict trade exports, but no matter what environmental constraints are encountered, China needs to gradually keep pace with the times, so as to ensure continuous economic development. Although the emergence of green trade barriers will bring some negative impact on trade import and export, but it will also have certain benefits, and the continuous correction policy will appear better results

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