Analysis and Application of International Trade Income Model

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Abstract: Based on the theory of Western economics, this paper uses empirical analysis method to analyze the distribution of international trade income and the domestic and international revenue. In this paper, support vector machine (SVM) model is introduced into the analysis of international trade revenue model, and the comparative advantages of countries in international trade are analyzed by econometrics, in order to promote the coordination of the interests of all participants in international trade.

1. Introduction

Western trade theory believes that the distribution of trade income is a balanced allocation of the benefits of various trading countries. Under the conditions of trade, the distribution of consumer utility contracts in various countries is a static process and the result of market exchange. Because the foundation of Western trade theory is the principle of comparative advantage and price mechanism, the conclusion that trade income originates from the improvement of the allocation efficiency of various countries. The income derived by foreign trade companies using e-commerce to conduct international trade can be divided into direct income and indirect income. The former mainly refers to the cost savings that can be roughly quantified through e-commerce. The latter mainly refers to the benefits in the broader sense or reduce the unfavorable factors (Almeida, 1995). Combining the current developed producer service industry in the United States with the present situation in China, especially the problems existing in China's international trade, such as repeated anti-dumping complaints. The lack of independent intellectual property rights of export products, mainly in high-quality low-cost low-yield processed products exports. The level of customer satisfaction is, to a certain extent, a measure of the success of a company's sales. It is also the basis on which the company depends (Kemfert, 2004). As a new type of trade barrier, standard barriers have developed rapidly in recent years. This paper analyzes the balance mechanism of the standard barriers and gives corresponding suggestions for China to deal with the standard barriers. With the development of economy and the improvement of consumer awareness, the establishment of product standards by various countries is necessary and reasonable. In order to explore the causes of the rapid development of trade standard barriers, this paper uses the game theory method to analyze the balance mechanism of standard barriers. We use the well-known Prisoner's Dilemma model as a starting point to analyze the intrinsic motivation of the establishment of standard barriers in trading countries (Shinkuma & Huong, 2009). Here, we build a complete information static game model between two mutually exporting commodity countries, in which the establishment and non-setting of standard barriers are respectively the two strategies of the two countries.

Assume that there are only countries A and B in the world, and both countries only produce two products C and B. Both countries carry out international trade in accordance with their comparative advantages. Country C has comparative advantages in C products, and country B has comparative advantages in B products. Both countries need to choose between free trade and trade protection that can only adopt standard barriers. Through the above analysis, it can be concluded that both parties in trade tend to adopt standard barrier measures in order to avoid the unilateral loss of their own interests. This is also the internal reason why standard barriers can be generated and developed

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(Liua & Wynter, 2010). However, in real trade, there is often one party that adopts standard barriers, while the other party does not take further retaliatory measures for some reason. For this situation, we will analyze the following by establishing a three-country model. The simple two-nation trade model can only solve the intrinsic cause of the standard barrier, and cannot fully explain the real trade phenomenon. To this end, we further illustrate the checks and balances of the standard barriers by establishing a three-nation trade model. In the actual international trade, due to the different status of the developed countries and the developing countries in trade, the developing countries are at a disadvantage in the trade of developed countries. Therefore, in the face of standard barriers in developed countries, more can only take negative acceptance (Rosillo, 1997). In order to obtain trade benefits, this also encourages developed countries to abuse standard barriers without fear, so as to obtain more trade benefits or to control the international market. For developed countries or within the developing countries, due to the low dependence on trade, traders have to consider the resulting losses when they formulate and implement standard barriers. Therefore, the reduction of trade frictions and trade barriers between developed countries or developing countries is reduced. This can also explain, to a certain extent, the intrinsic motives that arise from regional economic integration such as the EU and ASEAN.

2. Distribution of international trade income

2.1. Comparison of sources of international trade revenue

Western trade theory holds that the benefits of international trade are divided into two parts. For countries participating in trade as a whole, more goods can be produced. For each participating country, it is possible to obtain a combination of goods other than its production possibility curve, that is, higher utility. The direct cause of these benefits is the higher labor productivity brought about by the division of labor in each country. Essentially, under the effect of the price mechanism, the efficiency of resource allocation throughout the world has increased. If manufacturers expect that the market incompatibility will bring fierce standards competition, there is an incentive to coordinate and achieve compatibility (Soete, 2006). However, because the vendor's R&D strategy is generally not disclosed as a trade secret, and geographical, cultural, linguistic, institutional, and other differences, the coordination of the standards of different manufacturers is often difficult to start, resulting in manufacturers making erroneous compatibility decisions. Under such circumstances, it is extremely important for governments or industry organizations to come forward to build an international cooperation platform. The development of each country can achieve Pareto improvement of interests only if it achieves cooperation and interaction. In other words, the welfare of both parties can be improved without reducing the interest of any other relevant region.

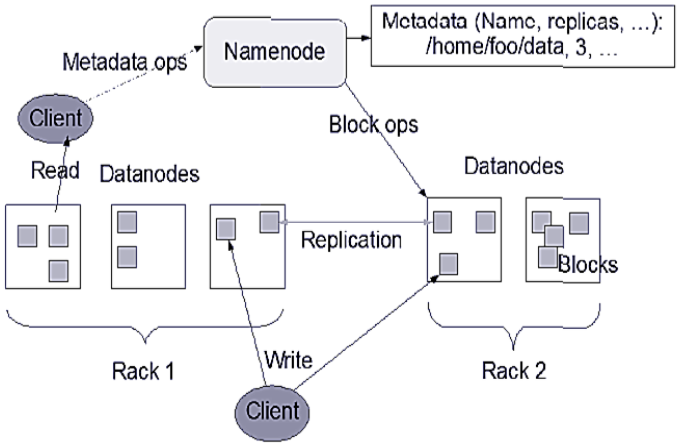

Figure 1. Strengthen the distribution of interests in international economic cooperation

2.2. The balancing mechanism of trade standard barriers between two countries

Since the accession to the WTO in 2001, the scale of China’s trade has expanded rapidly, and the

types and frequency of trade frictions have also increased. Since 1995, China has maintained the world's largest anti-dumping respondent, traded respondent countries, and countries suffering the most trade frictions in the world. Statistics from the Ministry of Commerce show that in 2014, a total of 22 countries and regions initiated 97 trade remedy investigations on Chinese exports. Frequent trade frictions not only affect the sTable development of China's economy and trade, but also weaken the competitiveness and enthusiasm of import and export companies. The process of constructing a trade friction coordination mechanism is a process in which the trade friction parties conduct a game of interests. All parties need to analyse the game to establish a common game rules to make creative adjustments to the trade friction coordination mechanism. Trade frictions started earlier between European and American countries. Foreign scholars began to study the international trade friction coordination mechanism as early as the 1960s. With regard to the causes of trade friction, the change in the balance of power between countries is an important cause of trade friction.

With the slow development of economically developed countries and the rapid rise of emerging countries, there will be competition between the countries in terms of markets and resources, which will be represented by trade frictions. The purpose of the coordination mechanism for trade frictions is to avoid the “Prisoner's Dilemma” when trading countries unilaterally improve their terms of trade. When foreign scholars study the trade friction coordination mechanism, they focus more on case studies and country studies to ensure that they are more practical. For example, through an empirical study of the US anti-dumping investigation, it is concluded that the weaker a country's economic strength is, the greater the possibility of encountering trade friction.

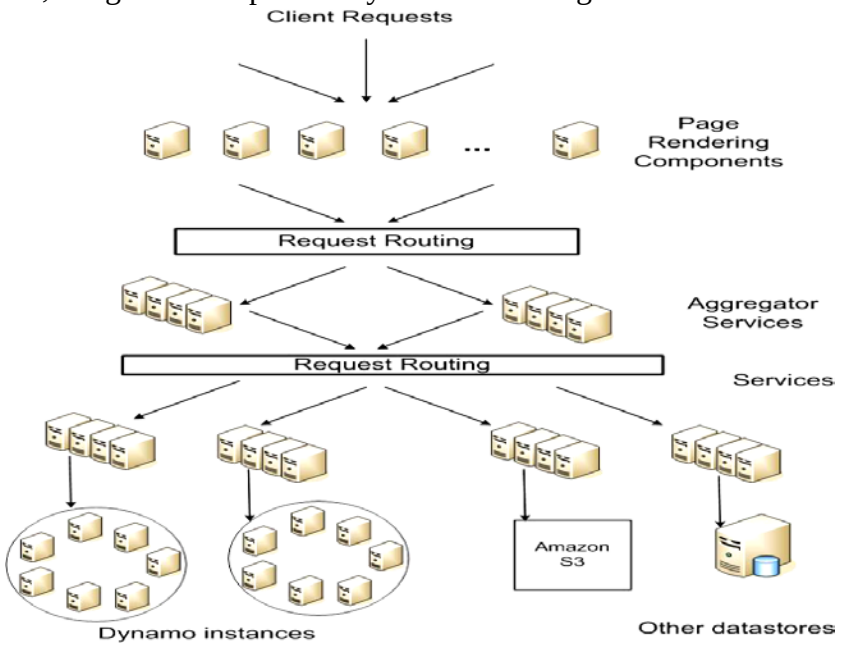

Figure 2. Two-State Static Game Model

3. Domestic and international revenue

3.1. The balancing mechanism of standard barriers to trade among three countries

The cooperation of domestic relevant parties is the foundation for establishing and improving the international trade friction coordination mechanism. Only when the relevant parties give full play to their advantages can a trade friction coordination and linkage mechanism be formed. The legislature plays a role in the trade friction coordination mechanism mainly by formulating trade-related laws, harmonizing legal differences between trading nations, and ensuring that trade coordination laws are compatible with WTO rules. Enterprises are the main parties and parties to trade frictions, and on the basis of ensuring that product quality and prices are in line with trade requirements, trade frictions are handled in advance warning, in-flight response and after-event prevention, and actively

cooperate with governments and business associations. Industry associations should coordinate the actions of various companies, especially similar companies, and actively play a collective public relations function to improve the efficiency of trade friction coordination. Social media plays a powerful role in intervening in trade negotiations and government actions. The government is the core of the domestic system. On the one hand, it coordinates the behavior of the other five major entities. On the other hand, it is crucial for guiding enterprises, guiding public opinions, and improving the efficiency of the legislative and judicial system.

So for the solution in the optimal interval:

$$X = (b_1 + \theta b_1^*, b_2 + \theta b_2^*, \cdots, b_m + \theta b_m^*)^T \quad (1)$$

The maximum value of the objective function at this time is:

$$f = f_0 + \theta f_0^* \quad (2)$$

Among them:

$$f_0^* = C_B B^{-1} b^* \quad (3)$$

Now we examine other values outside the optimal interval:

$$\theta_B^{"} = -\frac{b_r}{b_r^*}(b_r^* < 0) \quad (4)$$

To make the optimal solution constant, let linear programming be:

$$\begin{aligned} &\max Z = CX \\ &\begin{cases} AX = b \\ X \geq 0 \end{cases} \end{aligned} \quad (5)$$

The optimal base matrix is:

$$B^{-1} = (\beta_1, \beta_2, \cdots, \beta_m), \beta_i = (\beta_{1i}, \beta_{2i}, \cdots, \beta_{mi}) \quad (6)$$

The number of inspections is:

$$\begin{aligned} \lambda_j^{'} &= c_j^{'} - C_B B^{-1} P_j = c_j + \Delta c_j - C_B B^{-1} P_j \\ &= c_j - C_B B^{-1} P_j + \Delta c_j = \lambda_j + \Delta c_j \leq 0 \end{aligned} \quad (7)$$

The number of checks is still less than zero:

$$\lambda_j^{'} = c_j^{'} - C_B B^{-1} P_j \leq 0 \quad (8)$$

Two cases of non-base variable and base variable coefficients are discussed:

$$\lambda_j = c_j - C_B B^{-1} P, j = 1, 2, \cdots, n \quad (9)$$

Linear programming is:

$$\begin{aligned} \lambda_j^{'} &= c_j - C_B^{'} B^{-1} P_j \\ &= c_j - (C_B + \Delta C_B) B^{-1} P_j \\ &= c_j - C_B B^{-1} P_j - \Delta C_B B^{-1} P_j \\ &= \lambda_j - \Delta C_B B^{-1} P_j \\ &= \lambda_j - (0, \cdots, 0, \Delta c_i, 0, \cdots, 0)(\bar{a}_{1j}, \bar{a}_{2j}, \cdots, \bar{a}_{mj})^T \\ &= \lambda_j - \Delta c_i \bar{a}_{ij} \leq 0 \end{aligned} \quad (10)$$

1) Symmetrical evolutionary game model: due to multiple trade frictions between China and developed countries in recent years, and multiple factors such as the imbalance in economic development level and trade status, China’s losses in trade frictions are increasing. According to the actual situation, this paper adopts an asymmetric evolutionary game model to analyze the process of the production of trade friction between the two countries. An asymmetric evolutionary game is a random pairing game between members of different groups of two or more types of individuals. This article first discusses the dynamics of the gamer's dynamics in different locations, and then determines the evolutionary stability and evolutionary stability of the entire system. At present, China has formed a trade friction coordination mechanism that focuses on the trade coordination mechanism of the main interest countries and bilateral coordination as the key countries. Among them, the key countries mainly refer to the countries of trade friction that can or have had a significant impact on China's trade. However, whether it is at the international or domestic level, the implementation efficiency of the international trade coordination mechanism needs to be improved.

2) Learning evaluation of physical education: from the analysis of the model in the previous section, it can be seen that the coordination and cooperation among relevant domestic entities depends on the expected income distribution, the cost of cooperation and non-cooperation, and the degree of non-cooperative punishment. The benefits of collaborators, the penalties for uncooperative punishment, and the hidden costs of opportunism depend on the setting of the coordination system. The cost of cooperation depends on the efficiency of cooperation, and the efficiency of cooperation depends on the speed and effectiveness of information transmission. Fundamentally, it also depends on the setting of the coordination system. Therefore, establishing a domestic coordination mechanism for effective trade friction is the key to shifting income distribution from a low-level equilibrium to a high-level equilibrium. By comparison with the above analysis results, China's domestic friction coordination mechanism mainly faces the following problems.

3.2. Research tools and methods

The WTO trade coordination mechanism is based on the principles of fairness, impartiality, and openness. In reality, although developing countries can benefit from a series of ways such as using developed country markets to expand exports, absorbing developed country funds to expand and accumulate, and obtaining economic assistance from developed countries, the distribution of benefits from trade is uneven. In the countries where trade frictions have been reported, the proportion of developing countries like China has remained high. In addition, the success rate of developing countries is very low for international trade litigation. The developed countries, by virtue of their own economic and political power, successfully escaped trade sanctions and even controlled the coordination mechanism of trade friction. The above situations all indicate that the profit distribution mechanism of international trade friction coordination is tilted to developed countries, and the interest distribution mechanism is obviously unfair.

In the practice of constantly responding to trade frictions, China has gradually established a preliminary framework for a trade friction coordination mechanism. Avoiding discrimination in developed countries and establishing a middleman coordination mechanism can effectively coordinate the country’s previous trade frictions. The establishment of an integrated trading friction management system centered on the Trade Friction Coordination Supervision Committee. The committee is responsible for detailing the functions of the various entities, supervising the behavior, and striving to form complementary effects of each main strategy on the institutional arrangements so as to avoid efficiency loss. Improve the system of rewards and penalties within the mechanism, to punish individuals who “free rider”, increase the government’s rent-seeking and corporate non-due punishment, increase the non-cooperative costs, and then promote the friction coordination efficiency to break through the low-efficiency equilibrium. Establishing mutual trust and enhancing prospective mechanisms can improve the coordination of the game, reduce transaction costs and monitor costs. The communication of each subject before the decision is very important. The main reason for poor coordination in reality is that information is insecure and not delivered properly.

3.3. The imperfect benefit allocation coordination mechanism

At present, the most authoritative trade coordination mechanism in the world is the WTO Trade Friction Coordination Committee and the corresponding WTO dispute settlement mechanism. It mainly includes coordination of tariff policies, coordination of non-tariff policies and management measures for transaction activities. For intraregional organizations, such as the European Union, there are relevant regional trade agreements and trade practices to regulate trade behaviors. If the member states in the organization violate relevant rules, they may face related punishments of the organization and retaliatory sanctions by other members. Due to the similarity of customs and other policies in the region, the formulation and implementation of trade agreements is relatively easy. However, looking at the world, there is still no unified and effective trade friction coordination mechanism under the WTO framework. Some big countries with powerful economic strength use other means to evade sanctions, while some small trading countries have frequently become targets of trade sanctions. In addition, trade agreements in some regions may have a negative impact on third countries, resulting in a “cost of third countries.”

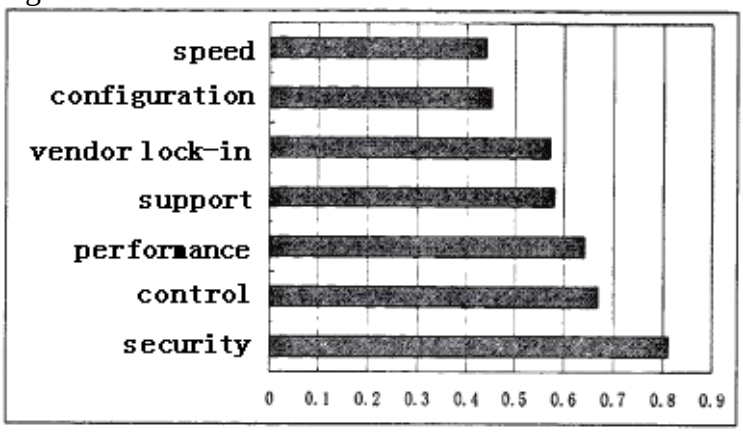

Figure 3. Support vector machine model

Therefore, the establishment of information sharing platform, with the trade friction coordination committee as the core, establishes a statistical reporting system for all parties, shares data and information, avoids duplication of information and loopholes, and ensures timely and effective information. It highlights the institutional formulation, coordination, and guidance of industry associations, coordinates corporate behaviors in the same industry, and forms a consistent line of defense against trade friction, providing legal and financial assistance for enterprises, and avoiding the occurrence of similar trade frictions frequently in the same industry. The establishment of a sound information sharing platform and authoritative trade coordination intermediary mechanism will prompt all parties to comply with trade rules more smoothly. This is the key to achieving trade friction coordination. China's economic system, economic policy, trade policy, etc. differ from international practices and the requirements of the WTO's system. Therefore, while strengthening the trade friction coordination mechanism at the international level and at the domestic level, efforts should also be made to strengthen coordination and linkage at both levels.

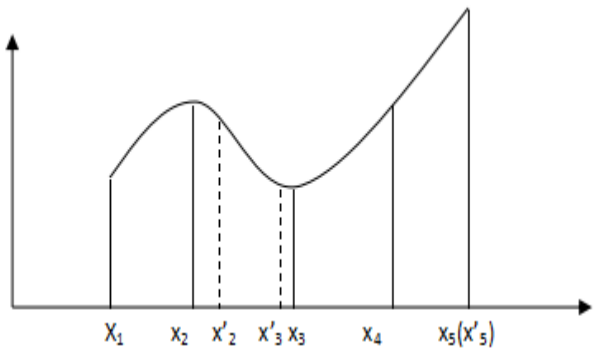

Figure 4. Coordination of the six major domestic entities

Since their own international trade activities, economists in various countries have attempted to reveal the motives, causes, and short-term and long-term effects of international trade and related trade policies through the understanding of the history and reality of international trade. With the large-scale development of various modes of transportation such as shipping, railways, and air transportation, international trade has undergone profound changes in scale, form, and content. Trade liberalization has, to a certain extent, deprived the enthusiasm of backward countries for products with advanced production technology, thereby selecting products with simple and inexpensive production techniques. As long as prices do not change, this mode of division of work is beneficial to both rich and poor countries. In the long run, the division of labor model based on the comparative cost theory will inflict harm on backward countries. Although the price increase will not change the division of labor model, it will cause substantial harm to poor countries. The price change will not change the quantity of the two countries' production of their products, but it will change the number of divisions of labor in both countries and change the welfare level of the two countries. Technological progress is the only way for backward countries to change the division of labor model and gain more trade benefits.

4. Empirical analysis

4.1. International trade model under fixed assumption of factor input ratio

Since the reform and opening up, with the full economic globalization, international trade has become an important factor for the growth of our country's economy. Not only that, the international trade also has a very big impact on a series of major economic issues such as technological advancement in China and a share of wages. The general rules of international trade are revealed by the theory of international trade. The construction of theory is not only a question of economic logic but also includes other issues. Of particular importance is the establishment of hypothetical conditions, which are directly related to the final conclusions. Pen writers believe that the purpose of setting up assumptions in theoretical studies is to first grasp the main contradiction, and secondly to make the analysis simple and easy to draw clear conclusions. However, these two goals are by no means flat. The key is to seize the former. Grasping the main contradiction naturally excludes minor contradictions, and it also realizes the simplicity of the analysis. Such a theory tends to be more realistic than it actually is. The question has often appeared: When the hypothetical condition was established, only the analysis was simplified, but the main contradiction was not captured, and even the main contradiction was concealed. This kind of theory is often difficult to conform to reality. Therefore, the hypothetical conditions established by a theory are worth studying.

Table 1. International trade surplus

Company	Sensor	FAR	FRR
BiolinkijSA	Optics	0.000001	0.01
BiometriCD	Optics	0.01	0.01
Startek	Optics	0.001	3.3
IOSoftware	Optics	0.1	1
Identix	Optics	0.0001	1
NEC	Semiconductor	0.0002	0.05
BiometnxInt	Semiconductor	0.0001	0.0001
Pollex	Semiconductor	0.0001	1
Sony	Semiconductor	0.0001	1

4.2. Theoretical assumptions about factor input

In recent years, the process of world economic integration has accelerated. In the process of actively carrying out economic construction, China must take effective measures to achieve economic growth and make full use of the advantages of international trade. In the process, it is

necessary to realize diversified product categories so as to enhance the attractiveness of commodities and to promote the competitiveness of China's comprehensive economy. Under such circumstances, it is of great significance to actively strengthen the analysis of product diversification and the benefits of international trade. Since the day of its creation, international trade has been defined as optimizing the allocation of related resources, and this is based on division of labor and specialization. With the development of economy, relevant researchers have increased the content of economies of scale and monopoly competition in international trade. This measure has greatly expanded the scope of the source of international trade revenue. Product diversification is one of them. In the process of enhancing consumer welfare, the function of product diversification cannot be ignored. The emergence of this view has greatly compensated for the defects in the traditional trade theory. Firstly, this article gives a brief overview of product diversification, and on this basis, discusses the benefits and growth effects of diversification of export products and economic growth and diversification of imported products.

Table 2. International trade friction coordination mechanism.

Images	Neighborhood interpolation algorithm	Bilinear Interpolation Algorithm	Convolution
1.png	2677.03399306023	2197.5126848325585	2165.1163940998645
2.png	1672.9665268617898	955.6228335488851	956.063805402129
3.png	3692.79744908924	2451.916189432257	2462.785414931638
4.png	6297.635667454891	3561.221279280466	3415.30540362059
5.png	3048.6784021933177	1739.9387920268919	1640.6852227042211
6.png	23.52784288632655	25.242292791324207	25.371295634953775
7.png	29.977930880927314	34.84194554868663	34.83793837215397
8.png	23.788654232607087	27.345651551494914	27.307232516257738
9.png	26.38377414616317	31.33534559341381	31.6987338830763
10.png	32.54938938396627	37.420942249062264	37.931116335519526

4.3. The scale effect of international trade income

The promotion mechanism of diversification of export products during economic growth has played an important role. Many uncertainties exist in the international market economy. The main export products are primary products. This phenomenon has made it vulnerable to the influence of the international market. Once the prices of primary products fall in the international market, China will suffer serious economic losses. In this process, the greater fluctuations in export earnings will follow, leading to fluctuations in the domestic economic development. Severe ones will have an impact on the exchange rate, leading to a reduction in the country’s import capacity. At the same time, if high concentration exists in the export products, and these products generally have higher prices, it will result in greater variability arising from the terms of trade.

5. Conclusion

In summary, the diversification of products in international trade has contributed to the enrichment of trade interests. At present, different measurement methods exist in product diversification. It is of great significance to actively strengthen the study of these measurement methods to promote China's economic growth. Under the background of the accelerating world economic integration process, China should actively strengthen research on the diversification of export products and economic growth as well as diversification of imported products, so as to lay a good foundation for the long-term sustainable development of China's economy. If we use the ever-changing level of product diversification in the process of researching the replacement of total factor productivity index, it is necessary to fully understand imported intermediate input products. In order to effectively analyze the impact that these products will have on domestic companies and the economy during the import process. According to valid data, if the country increases the import

of intermediate input products in the daily business process, then the domestic related enterprises will generate certain technological and product innovation capabilities in the course of their operations. For China, if the manufacturing industry imports a large number of intermediate inputs, diversified intermediate inputs will encourage companies to improve their technological innovation capabilities and promote the quality of related products.

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