Analysis of Non-tariff Measures in Aquatic Products Export Based on Gravity Model

Liu Chaojing

Tianjin Tianshi College, Tianjin 301700, China

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Abstract: Non-tariff measures, as an important form of barriers in the international trade environment, are constantly changing their forms of expression and playing their own unique role. However, in real international trade, most countries in the world generally adopt corresponding intervention trade policies for foreign trade activities based on their own interests. Trade gravity model is an important method to study international trade. This paper uses gravity model to analyze China's aquatic products exports to 25 major trading partners in 2019, and draws a conclusion that the total economic scale, per capita national income level and bilateral trade volume of the investing country and the host country are positively correlated with the international direct investment flows between the two countries. Based on the above analysis, this paper puts forward some policy suggestions to increase the export trade of aquatic products in China.

1. Introduction

Since the reform and opening up, driven by the country's export-oriented economic development mode, China's total exports and exports, which are an important part of total exports, have shown exponential rapid growth [1]. Among the developed economies, the European Union, the United States, Canada, Australia and Israel are the most prominent, and the coverage and intensity of the measures far exceed those of other countries [2]. New Zealand and Japan actively strengthened trade protection after the financial crisis. With the rapid promotion of China's foreign trade status, the export of aquatic products is increasingly concerned and restrained by other countries, and the poverty and friction are highlighted. In the process of liberalization of trade policies and measures in various countries, the implementation flexibility of tariff measures has obviously weakened, and non-tariff measures have gradually become one of the most effective tools for countries to implement trade strategies.

The concept of gravity in Newtonian mechanics in physics holds that there is gravity between two substances, and the magnitude of gravity is proportional to its mass and inversely proportional to the space distance between them [3]. Since its emergence, the trade gravity model has been widely used in the influence of FTA on bilateral trade flows, and has achieved considerable success in international trade research. This paper studies the methods and conclusions of domestic scholars using gravity model to study international trade in recent years. Based on the previous methods and conclusions, using the data of China's foreign trade, combining with China's actual situation and theoretical knowledge, it designs variables and establishes an econometric model, and analyzes the multiple factors affecting China's aquatic products export trade flow.

2. Model setting and data selection

2.1. Model setting

Gravity model widely used in international trade research originates from Newton's law of universal gravitation. Newton thought that the attraction between two objects is proportional to their mass and inversely proportional to their distance. Many economists believe that trade and

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investment are complementary rather than substitute [4]. Non-tariff barriers are not synonymous with non-tariff measures, the former should be included in the latter; Non-tariff measures are relatively neutral terms, while non-tariff barriers contain derogatory elements. Trade remedy measures are still a major trade barrier that affects aquatic products exports, and intellectual property rights have become a new constraint on aquatic products exports.

According to the construction of the basic gravity model, the expansion of the previous gravity model and the research purpose of this paper, the author compares the economic scale, per capita income, geographical distance with China, population scale, direct investment in China and trade dependence of trading partners; The absolute value of the difference with China's per capita income, the two-dimensional virtual variables "whether to face the sea" and "whether to sign a trade agreement with China", the three-dimensional virtual variable "whether the trading partner is a developed country, a developing country or a least developed country" and other explanatory variables are included in the human model, and the following extended gravity model is obtained [5]:

$$In\exp ort_i = \beta_0 + \beta_1 nY_i + \beta_2 InYBAR_i + \beta_3 InDIS_i + \beta_4 InFDI_i + \beta_5 InDEP_i + \beta_6 InYGAP_i + \beta_7 InPOP_i + \beta_8 InADJ_i + \beta_9 DL_i + \beta_1 ORTA_i + \mu_i$$

In which β_i represents the model parameter, $i = 1,2,\cdots,80$; μ_i represents random disturbance term.

There are many costs and obstacles in the trade process, and the types of trade protection measures are so numerous and complex that it is difficult to accurately reflect the effects of these factors by using simple summation or single trade protection measures. The forms of quantity restriction mainly include import and aquatic products export quota, export and import of aquatic products license, voluntary aquatic products export restraints and import prohibition. According to relevant information, France was the first country to adopt import quotas. Non-tariff measures can be used directly with tariff measures, and can also be used in conjunction with other more strengthened non-tariff measures.

2.2. Data selection

The model selects the cross-sectional data of China and 25 major trading partners in 2019. These 25 countries are scattered all over the world, and the total trade with China accounts for the vast majority of China's total foreign trade. China's accumulated aquatic products export share to other countries over the years is over 80%, so the selected market has certain representativeness. At the same time, for the convenience of data processing, this paper plans to merge the trade volume of countries with similar product transportation distance, and its per capita GDP takes the weighted average of the population and per capita GDP of each country.

3. Regression result analysis of gravity model

In view of the fact that the regression is carried out on samples in different years, the model should have no sequence-related problems, and at the same time, just like the logarithmic transformation mentioned above, it basically overcomes the heteroscedasticity problem of gravity equation. The factors affecting China's aquatic products export trade may be the economic scale, geographical distance, trade openness of partner countries, differences in economic development levels between the two countries and trade system, etc. These factors may have a significant impact on China's aquatic products export to one country [6].

In this paper, regression analysis is carried out from the basic gravity model, and then edge variables are introduced one by one according to the extended model, and whether the variables should be introduced into the model is judged according to the statistical significance and coefficient sign of the variables, until all core variables and introduced edge variables are basically statistically significant. The empirical results of this paper are uniformly made by measurement

software, and the regression results are shown in Table 1.

Table 1 Regression analysis results of gravity model

	Base-based formula	Expansion formula		
Constant term C	1	2	3	4
InY_i	5.0140 (2.1420)	2.0142 (3.0269)	4.4102** (1.3041)	5.66912*** (4.0215)
$InDIS_i$	0.4072*** (4.0256)	0.22742*** (0.3162)	0.7133 (5.1273)	-1.3624** (2.7741)
$InYBAR_i$	-0.36222*** (-2.5042)	-0.30422*** (-1.6014)		
$InFDI_i$		0.0367** (4.0271)	-3.72112*** (-1.3744)	0.27462*** (5.2140)
$InDEP_i$		0.3374 (4.2150)	0.3004 (6.2170)	0.6301** (2.3172)
$InYGAP_i$		0.1331** (2.0143)	0.7119 1.3369	
$InPOP_i$		0.3370 (4.0102)	0.41252*** (2.8743)	0.40172*** (4.6691)
ADJ_i		0.41072*** (1.0042)	0.3417**(3.3672)	0.2417 (1.7263)
DL_i		-0.30742*** (-2.4251)		
RTA_i		-0.3724 (-0.9617)		
Adjusted R^2	0.9320	1.7162	0.9610	0.7961
DW value	1.7025	1.5147	2.3744	3.0112
F statistics	124.5820	44.2301	59.8307	70.1290

Note: W_1 means significant at 10%, W_2 means significant at 5% and W_3 means significant at 1%. In brackets are the t values of the corresponding parameter estimators.

Anti-dumping is a trade protection measure recognized and licensed by WTO, an effective international means and a necessary tool to deal with unfair competition. When the government intervenes in foreign trade based on economic sovereignty, non-tariff measures are a very important means. The growth of fishery production has a positive pulling effect on the aquatic products export of Chinese products, while the economies of Japan and South Korea are making steady progress, and the national demand for products is rising steadily. It shows that the bilateral investment protection agreement and the double taxation avoidance agreement really help to increase the bilateral investment flow, but the two explanatory variables are not significant. It means whether to recognize each other's market economy status, which will affect the total trade volume between the two countries. Because a country with market economy status can impose punitive tariffs on related products for dumping in non-market economy countries.

OECD research shows that [7-8], in the trade between developing countries and developed countries, TBTs is the most important trade barrier faced by developing countries, accounting for almost half of the total number of notifications. In this field, about half of them are related to technical rules and standards, followed by testing and certification arrangements, and then marks, trademarks and packaging requirements. Other non-tariff barriers account for less than 5%, namely: quantitative restrictions, trade subsidies, participation in trade activities, import charges and other barriers (see Figure 1).

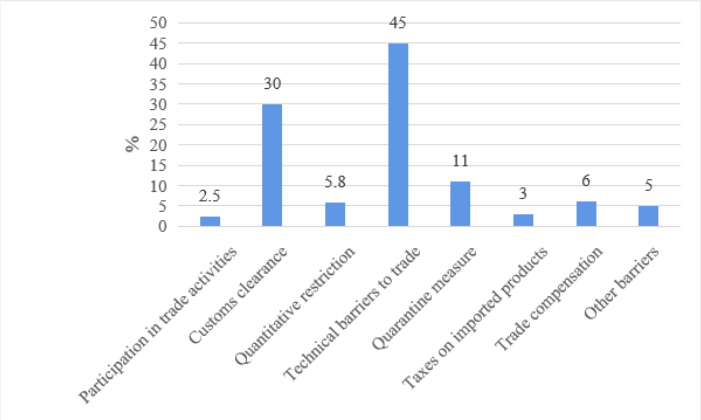

Figure 1 Frequency of various non-tariff barriers (as a percentage of the total number of notifications)

We add time dummy variables to the model to control the influence of price factors among trading partners. In order to reduce the endogeneity of GDP and trade volume, the GDP value of the current period is replaced by the GDP value of the lag period. Nevertheless, due to the lack of necessary codes of conduct, there is a risk that non-tariff measures, as trade protection tools, will be abused. At present, the biggest challenge to the development of world trade still comes from non-tariff barriers. In reality, concepts such as non-tariff measures, non-tariff barriers and non-tariff distortions are also confused [9]. Under the condition that the increase of the number of single trade products (marginal density) is limited, the types of trade products (marginal breadth) may increase. This connotation is worthy of further study by using the data at the product level.

4. Conclusion and suggestion

4.1. Conclusion

Non-tariff measures, as an important means for the government to manage foreign trade, have positive significance for maintaining normal economic order and overcoming the spontaneity of market economy. By using the logarithmic econometric model for linear regression, the results show that the higher the economic scale, the closer the geographical distance, the higher the trade openness of the partner countries, and the smaller the difference between the economic development levels of the two countries. Secondly, China's foreign direct investment should aim at American and European countries. Although there are great geographical and cultural differences between these countries and China, their economic development level and excellent investment environment can overcome the obstacles brought by geography and culture. Finally, the existence of excessive aquatic products exports to China does not mean that there is a trade surplus with China, so it is uncertain whether China's excessive imports to these countries will bring dynamic benefits.

4.2. Suggestion

(1) Further improve the construction of non-tariff barriers database

Many trade experts believe that in order to develop a more general database of non-tariff barriers that can be used by all stakeholders, it has become very important to set up a set of relevant classification systems that reflect the actual situation of current international trade. In the markets of the United States, Japan and the European Union, the emphasis of trade management is on environment, health and safety, and the requirements for product quality are very high. The restrictive trade measures implemented on this ground account for 70%-80% of the non-tariff measures used in these countries and regions. Price-cost non-tariff measures restrict imports by directly affecting the cost of import and aquatic products export commodities or domestic products, thereby weakening the competitiveness of foreign commodities; Therefore, China should actively

consult and cooperate with partner countries, and strive to eliminate trade barriers, so as to promote the development of bilateral trade and increase the amount of China's aquatic products exports to trading partner countries.

(2)Optimize the aquatic products export structure

HACCP quality management system has been widely used in Chinese enterprises aquatic products exported to the United States and the European Union. Instead of competing with many competitors in the low-end market, it is better to vigorously develop the high-end market with relatively weak competitiveness and relatively high market demand. On the one hand, in attracting foreign investment, we focus on introducing investment projects that can improve the level of China's industrial science and technology; On the other hand, China's R&D investment is still relatively low compared with developed countries, so the government and enterprises should increase investment in R&D and high-tech industries; We should not overreact to the trade protection contained in the non-tariff measures, and strengthen the regulation of the non-tariff measures of various countries in the multilateral trading system (such as WTO) or regional economic organizations, so as to minimize their adverse effects on international trade.

(3)Strictly standardize product safety standards and strengthen quality management

With the improvement of living standards, consumers have a high demand for quality of life, so they pay more and more attention to food safety, especially in Japan and South Korea, which pay special attention to the quality and safety of products because of their huge consumption. At present, the EU only grants aquatic products export rights to more than 120 Chinese product manufacturers (or ships). This severely limits the ability of Chinese aquatic enterprises to aquatic products export to EU, and deprives relevant qualified enterprises of the right to aquatic products export to EU, which is a typical technical barrier to trade. In the formulation of trade policies, enterprises are encouraged to innovate in technology, aquatic products export high-tech and high value-added products, and actively guide enterprises to participate in international competition with high-tech and high value-added products. So as to assess the impact of non-tariff measures on their aquatic products exports and improve their ability to deal with non-tariff barriers in multilateral and bilateral negotiations.

(4)Strengthen international economic cooperation

From the test results of the model, it can be found that active economic organizations can significantly promote China's aquatic products export trade. Therefore, China should strengthen international economic cooperation, actively participate in international economic organizations, and strive to promote the establishment and development of organizations beneficial to economic development. Taking advantage of the gaps and leeway of relevant WTO rules and clauses to protect their legitimate rights and interests through negotiation and consultation is also in line with international practice and actively exploring foreign trade of our products. Chinese enterprises must enhance their core competitiveness, produce and process products in strict accordance with specifications and requirements, increase investment in scientific research, develop high-tech products, and make the production of products more standardized, standardized and modernized, so as to enhance the soft power of enterprises. Only when the soft power is promoted first can the hard power be promoted.

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