

The Impact of Green Trade Barriers on Chinese Agricultural Products Export—an Empirical Study Based on Free Trade Zone

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Abstract. This paper has used the data of Chinese agricultural exports from Malaysia, Vietnam, Thailand, Germany, the United Kingdom, the Netherlands, the United States, Canada and Mexico from 2002 to 2016. These countries represented as the three major free trade zones to conduct empirical research. I am using the gravity model to carry out the regression analysis of variables. And then I test to examine the impact of green trade barriers on Chinese agricultural exports. The empirical results showed that green trade barriers do hinder agricultural exports in the short run, but green trade barriers have a positive effect on exports in the long run. Finally I based on the analysis of this paper to propose a series of countermeasures to deal with green trade barriers.

Keywords: Green Trade Barriers, Agricultural Products, Gravity Model, Impact Countermeasures

Introduction

Background.

With the development of industrial modernization and modern science and technology, the proportion of industrial products in physical trade continues to rise, while the proportion of agricultural trade in global trade declines. But the population of world is increasing nowadays. The upgrading of people's demand for food consumption proves that agricultural trade is still at an important position, and agriculture is one of the important industries in China. Chinese cultivated land area accounts for a large proportion of the country's land area and the peasant of China population accounts for a large proportion of the national population. Therefore, the rise and fall of agriculture is of vital importance to China. Some of Chinese agricultural products are used for domestic use, and some are used for export. The proportion of agricultural products in foreign trade is large, which can promote the development of Chinese agriculture to a certain extent.

Green trade barriers which is a new type of non-tariff trade barrier mainly mean that some countries through the establishment of statutes and other forms to restrict the entry of goods from other countries into the country in international trade, in accordance with their minimum environmental standards. The main form of product quality is not up to standard. It is an important tool for countries to conduct international trade now. Developed countries using the differences in science and technology between developing countries and implement strict green trade barriers for products of developing countries. It makes developing countries hindered and lost in the export of agricultural products, although most of Chinese agricultural exports are exported. It is on the rise, but the problem of excessive trade is more serious. This is related to green trade barriers to a certain extent. Therefore, analyzing the impact of green trade barriers on Chinese agricultural exports has certain practical significance.

Some developed countries are Chinese main sales regions for the export of agricultural products and their manufactured products. These countries have high demand, but at the same time they have more stringent agricultural product quarantine inspection systems which has improved China's inspection for China. The increased export costs have weakened Chinese competitiveness in the international market, but at the same time green trade barriers can promote the quality of China's agricultural products and can help China to protect natural environment and people's food safety. Therefore, in the face of green trade barriers, we should actively understand learning and use the favorable factors to promote the sustainable growth of China's agriculture.

Literature Review.

In the existing literatures, there are mainly three types of research. In the article of Wang Jingyan's green trade barriers on Chinese agricultural products export trade, the reasons for green trade barriers are analyzed and the reasons for Chinese green trade barriers are domestic export enterprises and farmers. The awareness is weak, the government's food certification system is not standardized, the domestic high-tech is lacking and the agricultural product export market structure is unbalanced. It is believed that the developed countries implement green trade barriers because they want to protect their related industries [1]. In Bian Jieying's article the empirical analysis of the impact of Japanese green trade barriers on Chinese agricultural exports. The paper studies the impact of green trade barriers on Chinese agricultural exports, and uses gravity model to analyze Chinese foreign trade situation of Japanese agricultural products and manufactured goods. Finally she obtains an increase in the number of pesticides detected in Japan. The geographical distance between Japan has a negative impact on exports, but the increase in GDP between China and Japan has a positive effect on agricultural exports [2]. This paper will learn the gravity model in this paper to modify some of the variables for analysis. Lin Yujie did a research to analyse green trade barrier's influence of agricultural products export and countermeasures. She describing the current situation of Chinese agricultural products being negatively affected by green trade barriers, studying the countermeasures of Chinese agricultural product export. She thought that China should improve agricultural science and technology innovation ability, optimize industrial structure, and use international rules to maintain the legal rights of Chinese enterprises to export [3]; By reading these three categories of literatures related to green trade barriers, this paper decided to use the gravity model to analyze the impact of green trade barriers on Chinese agricultural exports, and learn from the literature's analysis of the status of agricultural products. And countermeasure analysis.

Analysis of the Situation of Green Trade Barriers to China's Agricultural Products Export

From the statistics in the following table, it can be seen that the export value of China's agricultural products exports to countries is generally growing. The fastest growth is in Vietnam, from US\$192.823 million in 2002 to US\$387.653 million in 2016, but in 2008 to 2009, all countries have experienced a decline or remained stable. From 2011 to 2016, several countries have experienced a downward trend or a slower rate of increase. This indicates that Chinese agricultural exports were relatively good before 2008. And then China has experiences the green trade barrier in 2008. The reason for the barriers is that Chinese export growth rate of agricultural products to other countries has slowed down and even the export volume has declined for some time.

Table 1

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Canada	1.01	1.09	1.33	1.40	1.45	1.52	1.64	1.69	1.64	1.52	1.61	1.42	1.41	1.40	1.47
Germany	2.73	2.87	2.93	3.43	3.55	3.74	4.08	3.79	3.56	3.29	3.05	2.90	2.88	2.76	2.56
the UK	1.11	1.27	1.35	1.44	1.64	1.59	1.77	1.67	1.66	1.59	1.53	1.58	1.54	1.50	1.44
Mexico	0.23	0.39	0.85	0.79	0.90	0.84	0.98	0.88	0.91	1.03	0.80	0.91	0.85	0.89	0.93
Malaysia	3.16	3.15	2.30	2.55	2.72	2.88	2.95	3.13	3.43	3.53	3.46	3.94	3.90	3.75	3.61
Netherlan	1.67	1.70	1.78	1.98	2.47	2.70	2.48	2.34	2.43	2.89	1.89	1.87	1.88	1.88	1.92
Thailand	0.93	1.04	1.07	1.12	1.17	1.41	1.82	2.18	2.22	2.08	3.27	3.84	3.99	5.42	4.86
the US	9.03	9.66	10.04	10.44	12.17	11.97	12.72	11.99	11.83	11.14	11.48	10.86	10.40	10.47	10.14
Vietnam	1.06	1.49	1.04	1.12	1.13	1.29	1.77	2.41	2.76	3.46	3.11	3.49	4.19	4.89	5.33

From the trend of Chinese agricultural exports to countries' exports, which account for the proportion of China's total agricultural exports. It can be seen that from 2002 to 2008, the proportion of Chinese agricultural exports to countries has generally shown an upward trend. And the United States has a fastest growth from 9.03% increased to 12.72%, which indicates that Chinese agricultural exports from 2002 to 2008 are more optimistic. After 2008, the proportion of China's agricultural exports to most countries fluctuated greatly. The overall data showed a downward trend compared with 2008. The fastest is still the United States, which has decreased from 12.72% in

2008 to 10.14% in 2016. Mexico and the United Kingdom generally have the smallest proportion but have been in a relatively stable state, and the rise and fall are not obvious. This indicates that Chinese agricultural exports are not optimistic after 2008, and it can be concluded that green trade barriers have reduced the proportion of Chinese agricultural products exported to these countries to a certain extent[4, 5].

Theoretical Model and Data Sources

Theoretical Model.

The gravitational model originally originated from Newton's law of universal gravitation, which was first introduced by Tinbergen (1962) in the study of trade flows. Now the model is used as a research tool to link trade barriers with trade flows. The scale of trade is influenced by some measurable variables such as the GDP of the two countries and the distance between the two countries. It also includes some dummy variables that cannot be measured, such as whether they have a common boundary. The expression for a general gravity model is:

$$M_{ij} = a_0 Y_i^{a_1} Y_j^{a_2} D_{ij}^{a_3} A_{ij}^{a_4}$$

Among them, M_{ij} is the trade volume of country I to country j, Y_i and Y_j are the GDP of country I and country j, and D_{ij} is the linear distance between the capitals of the two countries. A_{ij} is other factors that promote or hinder trade between the two countries. Formula is converted to logarithmic form for the convenience of empirical analysis where ε_{ij} is the error term, a_0 is the constant term, and a_1 , a_2 , a_3 , and a_4 are the variable coefficients:

$$\ln M_{ij} = a_0 + a_1 \ln Y_i + a_2 \ln Y_j + a_3 \ln D_{ij} + a_4 \ln A_{ij} + \varepsilon_{ij}$$

This paper studies the impact of green trade barriers on Chinese agricultural exports. Therefore, the explanatory variable is set to the amount of Chinese agricultural exports to country j, and the explanatory variable is the GDP of country j, reflecting the demand of j countries for the international market. The value is larger means the economic aggregate of the country is larger and the potential import demand is greater, so the forecast symbol is positive. The exchange rate of the j country currency relative to the US dollar, the higher the exchange rate indicates the appreciation of the country of j. The relative currency of the country depreciation, the product has a price advantage and is favorable for export, so the forecast symbol is positive. The degree of openness of the country j is measured by the total import trade of goods as a percentage of GDP. The degree of openness of the country is higher, the international trade demand of the country is higher. It is good for export, so the forecast symbol is positive. The population size of country j, on the one hand, the population size is larger, the more agricultural products are consumed and the demand for international trade is greater. But on the other hand, the larger the population size means the better domestic division of labor, and then the demand is smaller. So the symbol prediction of this variable cannot be determined. The straight distance of Beijing of China from the capital of the country of j. If the straight line distance is too long, it means the transportation costs will increase. So the symbolic prediction of distance is negative. The green trade barrier is measured by the total number of TBT and SPS notifications submitted by the importing country to the WTO. If the number of submissions is large, the import requirements will be strictly. It is unfavorable for Chinese exports, so the symbolic prediction of this variable is negative.

Sample and Data Sources.

The data selected in this paper is the research volume of China's exports of agricultural products from ASEAN, EU and North American Free Trade Zone from 2002 to 2016. I studied the impact of the implementation of green trade barriers by China's member countries of the Free Trade Zone on the export of agricultural products. The selected countries are Malaysia, Vietnam and Thailand, which are the largest importers of China's exports to ASEAN, Germany, the United Kingdom and the Netherlands in the European Union, and the United States, Canada and Mexico in the North American Free Trade Area. The dependent variable is the amount of agricultural trade in China's exporting countries. The data comes from the monthly statistical report on China's agricultural products import and export in the special report on agricultural products export of the Ministry of Commerce of the People's

Republic of China. Data on GDP, exchange rate, trade volume of agricultural products in country j, and population size are all downloaded from the World Bank website. The distance from the capital of the j country to Beijing is obtained by using the “distance calculator” of the Bali website in Indonesia. SPS is a green health quarantine system, mainly to protect the health of people and animals and to avoid environmental pollution, and to conduct an all-round inspection of imported goods. Developed countries use advanced technology to greatly reduce the international competitiveness of developing countries. , mainly to detect whether the goods are toxic, the amount of additives and environmental pollution. TBT is a green technology standard system. It is a non-mandatory standard for a country's government or related institutions to formulate production methods and processes for products. Some countries not only require products to meet technical standards, but also include final recycling. Generally, they are all from the West. Developed by developed countries. In this paper, the sum of SPS and TBT is used to indicate the degree of green trade barriers in China. The number of TBT and SPS is derived from the notification data of WTO/TBT and WTO/SPS published by China Technical Trade Barrier Measures Network. ICS classifies agricultural and food technologies related to agricultural products.

Results of the Empirical Researches

Regression of Analysis.

In this paper, the model was analyzed by STATA, using mixed regression, fixed effect regression and random effect regression. The time span is 15 years and the country is 9 , which belongs to panel data regression analysis. Logarithm calculations are performed on some original data, such as GDP in J, population size, distance between the capitals of the two countries. And then I did the least squares, fixed effects models, and random effects model regression. The results are shown in the Table 2:

Table 2

OLS				Fixed effect				Random Effect			
variables	coefficient	deviation	P value	variables	coefficient	deviation	P value	variables	coefficient	deviation	P value
lnGDP	1.4121	0.0951	0.0000	lnGDP	1.7570	0.1386	0.0000	lnGDP	1.4121	0.0951	0.0000
RATE	0.0000	0.0000	0.2330	RATE	-0.0001	0.0003	0.0740	RATE	0.0001	0.0001	0.2330
OPEN	0.0173	0.0026	0.0000	OPEN	0.0128	0.0021	0.0000	OPEN	0.0173	0.0026	0.0000
lnPOP	-0.1543	0.1502	0.3040	lnPOP	4.1421	0.8329	0.0000	lnPOP	-0.1543	0.1502	0.3040
lnDIS	-1.8176	0.2779	0.0000	lnDIS	-1.8176	0.2779	0.0000	lnDIS	-1.8176	0.2779	0.0000
TBT-SPS	0.6405	0.2953	0.0270	TBT-SPS	0.7825	0.2531	0.0030	TBT-SPS	0.6403	0.2926	0.0270
R ²	0.7387			R ²	0.8802			R ²	0.7387		
F test	60.71(0.000)							Hausman	360.61(0.000)		

It can be seen from the table that through the F test and the Hausman test, we can conclude that we should adopt a fixed effect model, that is, the resulting expression is:

$$\text{Export} = 1.757\ln\text{GDP} - 0.0001\text{RATE} + 0.0128\text{OPEN} + 4.1421\ln\text{POP} - 1.8176\ln\text{DIS} + 0.7825\text{TBT_SPS}$$

From the table 2, it can be concluded that the variables are more significant for China's agricultural exports. The GDP symbol of the importing country is positive, which means that it has the larger the economy of the importing country, the higher the level of economic development. And the country's demand for agricultural products increases, the people's consumption levels increase accordingly. The data shows that when the logarithm of GDP increases by 1%, China's agricultural exports to the importing country will increase by 1.757%. The coefficient of RATE is negative, indicating that the higher the exchange rate of the Chinese currency, the higher the price of agricultural products priced in the national currency of the importing country. China's agricultural exports lost their price advantage, resulting in a decline in agricultural exports. The exchange rate has a negative correlation with China's agricultural exports. The coefficient of OPEN is positive, indicating that China's agricultural exports will increase accordingly when the total import trade of agricultural products accounts for the increase in the proportion of GDP. That is to say, when the degree of openness of importing countries increases, the demand for imports

increases, and the export volume of agricultural products in China will also increase. The degree of openness is positively related to the export volume of China's agricultural products. It can be seen from the regression coefficient that the coefficient of the variable indicating the size of the population is positive (4.1421). It indicates that when the logarithm of the population of the importing country increases by 1%, it will increase the export of China's agricultural products by 4.1421%. According to the predictions in the previous article, the impact of population size on agricultural exports is uncertain. However, according to the regression analysis currently done, it can be concluded that the population of the importing country increases, the demand of the importing country for agricultural products increases, and the human capital is attached to the sum of the physical and mental power of the human body, because human capital needs skills with a certain level of proficiency. Judging the strength of the ability, which will affect and restrict people's labor ability and level, but it takes time and tuition for the education and cultivation of human capital. It is not the population growth that can immediately bring about the growth of human capital, which also means the population. When the scale increases, the domestic division of labor of the importing country will not be improved immediately. On the contrary, the increase in the size of the population of the importing country will increase the demand for agricultural products. Therefore, the conclusion is that the population size of the importing country has a positive effect on China's agricultural exports. The coefficient of DIS is negative (1.8176), indicating that China's agricultural exports will decrease by 1.8176% when the logarithm of the distance between the capitals of the two countries increases by 1%. When the distance between the two countries is far away, it means that the transportation cost between the two countries increases, and the increase of transportation costs will naturally affect the trade between the two countries. Therefore, the distance between the two countries has a reverse impact on China's agricultural exports. The variable amount of SPS and TBT notified to the UN represents the number of countries implementing green trade barriers for China. The coefficient of regression results obtained is positive, indicating that green trade barriers have a positive effect on agricultural exports, which is The prediction of variables in front of the article is just the opposite. Many scholars study the impact of the virtual trade barrier on the export of agricultural products, and believe that green trade barriers will hinder China's agricultural exports. Because it will lead to more complicated procedures when exporting agricultural products, the inspection cost of products will increase. The price advantage disappears. But on the other hand, green trade barriers may optimize the industrial structure of China's agricultural products and promote innovation in agricultural products-related enterprises. Under the influence of the current innovation-driven development strategy, strengthening the company's concern for environmental protection and product quality awareness and promoting enterprise innovation is in line with the current development strategy of China. China's export standards can be improved for China in the face of green trade barriers, using various measures to promote the various aspects of products, such as research and development, production, packaging, sales, etc., and improve products. The recycling of packaging promotes the development of an environment-friendly economy and raises the level of China's agricultural export industry, which in turn increases the export value of agricultural products. Therefore, green trade barriers may inhibit exports in the short term, but will positively affect exports and promote China's agricultural products in the long run.

Robust Test.

Based on the consideration of the robustness of the empirical results, this paper attempts to test by another variable. Use the proportion of agricultural products exported by China as a proxy variable for the dependent variable. To study the situation of China's agricultural exporting countries affected by green trade barriers, and still carry out regression analysis, the regression results are shown in the following Table 3:

Table 3

OLS				Fixed effect				Random Effect			
variables	coefficient	deviation	P value	variables	coefficient	deviation	P value	variables	coefficient	deviation	P value
lnGDP	2.2530	0.1764	0.0000	lnGDP	1.7287	0.3100	0.0000	lnGDP	2.2529	0.1764	0.0000
RATE	0.0000	0.0000	0.6870	RATE	0.0030	0.0001	0.0000	RATE	-0.0001	0.0000	0.6870
OPEN	0.0442	0.0058	0.0000	OPEN	-0.0040	0.0048	0.4050	OPEN	0.0441	0.0058	0.0000
lnPOP	1.0438	0.2549	0.0000	lnPOP	-3.5326	1.8614	0.0600	lnPOP	1.0438	0.2549	0.0000
lnDIS	-1.9864	0.4400	0.0000	lnDIS	-1.9864	0.4400	0.0000	lnDIS	-1.9864	0.4400	0.0000
TBT-SPS	0.0584	0.0076	0.0000	TBT-SPS	0.0061	0.0045	0.1780	TBT-SPS	0.0584	0.0076	0.0000
R^2	0.2821			R^2	0.5434			R^2	0.2821		
F test	82.95 (0.0000)							Hausman	8.48 (0.08)		

It can be seen from the table that the random effect model should be adopted by the F test and the Hausman test, and the P value is relatively high for the RATE variable. It is considered that the exchange rate has a weak influence on China's agricultural exporting countries, and the correlation is poor. Therefore, the influencing factor of the exchange rate is removed from the model, and the equation for this model is:

$$\text{Export\%} = 2.2529\text{lnGDP} + 0.4410\text{OPEN} + 1.0438\text{lnPOP} - 1.9864\text{lnDIS} + 0.0584\text{TBT_SPS}$$

It can be found from the expression that compared with the previous model, except for the correlation of the exchange rate variable, the correlation of the other variables is increased, and the symbols of the remaining variables are also consistent with the symbols of the previous model, so the model is explained. It is more stable and the empirical results are relatively stable.

Conclusions

This paper analyzes the impact of green trade barriers on China's agricultural exports through the export of agricultural products to nine countries from 2002 to 2016. The empirical conclusion is that the GDP of importing countries, the degree of openness of importing countries and the size of population have promoted the export of agricultural products. However, the exchange rate and the distance between the two countries have hindered the export of agricultural products. And the regression analysis shows that although the green trade barriers may bring about an increase in the inspection cost in China and the increase in the price of agricultural products in the short term, thus weakening China's competitiveness in the international market, China's exports of agricultural products and manufactured goods have declined. However, in the long run, when other basic conditions remain unchanged, green trade barriers have a positive effect on China's agricultural exports. It can promote the quality improvement of China's export products, technological progress and promote environmentally friendly economic development. Therefore, the long-term green trade barriers have weakened the barriers to exports.

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