

# Analysis on Export Trade Potential of Agricultural Products between China and RCEP Member States

-- Based on Extended Trade Gravity Model

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**Abstract:** With the deepening of economic globalization, regional economic cooperation has become a key driving force to promote global economic growth. The entry into force of RCEP marks the birth of the largest free trade agreement in the world, and the agricultural products in the region can achieve zero-tariff trade in the future, which will also bring great growth to China's agricultural export trade. Therefore, based on the data of China's agricultural exports to RCEP member countries from 2014 to 2023, this paper makes an in-depth analysis of the influencing factors and trade potential of China's agricultural exports by using the extended trade gravity model. The results show that the per capita GDP of China, the per capita GDP of other RCEP member countries, the added value of agriculture and the openness of foreign trade have a significant positive impact on China's agricultural export trade; The common border between RCEP member countries and China trade parties will also have a significant positive effect on agricultural export trade; However, the distance variable, the per capita arable land area of RCEP countries and liner shipping index have a significant negative effect on China's agricultural exports. In terms of export trade potential, except for Malaysia, the Philippines, Thailand and Myanmar, all other RCEP countries are of "great trade potential". It is necessary to combine the characteristics of each country and adjust measures to local conditions to improve China's agricultural export trade strategy and strengthen agricultural trade with RCEP member countries.

**Keywords:** RCEP-member countries; Export trade of agricultural products; Trade potential; Expand trade gravity.

## 1. Introduction

In the "Opinions of the Central Committee of the Communist Party of China and the State Council on Implementing the Rural Revitalization Strategy" issued in 2018, it clearly stated the importance of creating a new trend of opening up in the agricultural sector, and promoted the enhancement plan for the export of characteristic and high-quality agricultural products to expand high value-added agricultural products. Export market [1]; Subsequently, the "14th Five-Year Plan for International Cooperation in Agriculture and Rural Areas" of the Ministry of Agriculture and Rural Affairs in 2022 pointed out that "international cooperation in agriculture and rural areas is an important part of my country's opening up to the outside world and agricultural and rural development" [2]. It is precisely under the strong influence of the national rural revitalization strategy and international economy and trade that China's agricultural trade volume has increased significantly, from US\$28 billion in 2001 to US\$333 billion in 2023, ranking from 11th to 1st., setting a record high, occupying an important seat in the international agricultural trade market. Correspondingly, correspondingly, China's share in international agricultural trade continues to grow, from only 3% of world trade in 2001 to 14.2% of global trade in 2023 [3]. With the official entry into force of the Regional Comprehensive Economic Partnership (RCEP), the regional economy has recovered, driving the continuous growth of international trade. According to a research report released by the United Nations Conference on Trade and Development (UNCTAD), the entry into force of RCEP will increase intra-regional exports by US\$41.8 billion [4]. The agreement has also become an "accelerator" for agricultural product export trade between China and RCEP member states. At present,

although my country's agricultural product export trade volume is as high as US\$98.93 billion, it only ranks fifth in the world. The main importing countries are concentrated in most RCEP member countries such as Vietnam, Thailand, Indonesia, and Japan. RCEP member countries and China have close cooperation in agricultural product trade, and the closeness and linkage of the RCEP agricultural product trade network are constantly improving, with a good tendency for trade evolution [5].

For China and most developing countries, agricultural development plays a relatively important role in national economic construction. With the deepening of the RCEP Agreement, how to carry out more extensive agricultural product export trade cooperation between China and RCEP member states is also an important issue for the sustainable development of China's agricultural product trade. Therefore, continuously improving the advantages of agricultural product export trade, planning and implementing targeted agricultural product trade promotion strategies, continuously enhancing participation in global value chains, and expanding the scope of national markets for agricultural product export trade are important for future agricultural development regulation.

## 2. Literature Review

Agriculture is a basic industry of our country's economy, and the research on agricultural product export trade has always been a hot issue discussed by scholars at home and abroad. Since entering the new era, China's agriculture has been open to the outside world in an all-round and high-level manner. The scale of international trade in agricultural products has also grown rapidly. International competitiveness and core status of international agricultural

products have also been continuously improved [6]. From the overall perspective of exports, the scale of agricultural product export trade continues to expand, and the export market is obviously diversified. The main export targets are Japan, South Korea, Vietnam, Indonesia, India, the United States and other countries [7]. However, there are still some heterogeneity. For example, from the perspective of spatio-temporal evolution pattern, there is extremely obvious imbalance in the export trade of agricultural products among various provinces in China. The eastern provinces have obvious export advantages and a highly concentrated spatial pattern [8]; while the western region has great internal differences, showing an "M"-shaped fluctuation trend [9]. At the same time, Liao Chengsheng and others (2016) calculated the export competitiveness of various agricultural products in my country through various international competitiveness indicators, and found that aquatic products, fruits and vegetables are my country's advantageous agricultural products [10], and their export trade has strong international competitiveness [11].

Because RCEP member countries are close to China, they are the most affected by China's import and export trade, which is more conducive to achieving regional economic integration growth [12]. Therefore, the research results on the import and export trade of agricultural products between China and RCEP member states are quite rich, mainly from two aspects. First, an analysis of the agricultural product trade relationship between China and RCEP member countries. Based on the RCEP background, the major agricultural products exported by China and RCEP member countries are relatively stable and highly concentrated, and their trade relations are both competitive and complementary [13]. Sun Lifang and others (2018) and Lin Qingquan and others (2021) conducted comparative research using indicators such as explicit comparative advantage, revealing that China's agricultural products have competitive advantages compared with Japan and South Korea in the RCEP region, but compared with Australia, New Zealand and ASEAN countries, their competitiveness is slightly inferior. At the same time, it was pointed out that China and RCEP member countries are highly complementary in agricultural product trade, and emphasized that the degree of openness in economic and trade has a significant impact on the competitiveness of China's agricultural products [14-15]. Ge Ming et al.(2021) used a constant market share (CMS) model to find that the import demand effect is very obvious as the driving force for the growth of China's agricultural product exports, while the export competitiveness effect plays a restraining role [16]. From the same perspective, they decomposed the influencing factors of China's agricultural product exports to RCEP countries, including overall import scale, industrial competitiveness and country demand structure [17]. Second, analyze the influencing factors and trade potential of China's agricultural product exports to RCEP member countries. General research has widely adopted the trade gravity model, believing that agricultural trade is mainly affected by factors such as bilateral economic aggregate, population base, and geographical distance between the capitals of the two countries [18]. It has also found that the bilateral economic

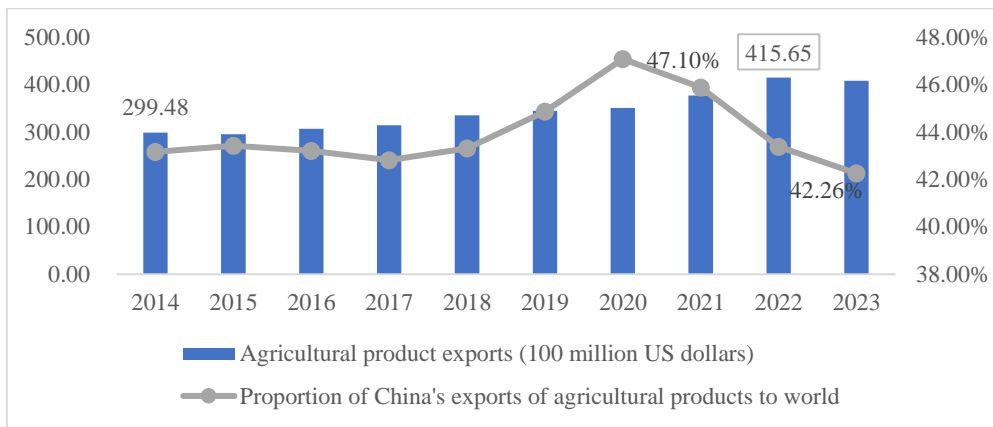
scale and the population size of the importing country have a positive relationship with China's agricultural product export trade volume, while geographical distance is negatively correlated with agricultural product exports [19]. Some scholars also consider the influence of factors such as terms of trade index, trade barriers and per capita cultivated land endowment [20-21] to comprehensively analyze the current situation of China's agricultural export trade. Li Yue'e et al. (2021) classified China's agricultural product exporting countries into "potential development type" and "potential huge type" by using trade efficiency [22], and found that the trade potential of each region is significantly different.

To sum up, existing research focuses on considering only the exporting country's own conditions and is lighter than the demand factors for agricultural products of the importing country; the variables selected in the research are relatively single and similar, but lighter than including factors such as liner connectivity index and agricultural added value. Including into the research, it is not enough to comprehensively summarize the agricultural product export trade situation between China and RCEP member countries; the emphasis is on the research on factors influencing agricultural product export trade, rather than a detailed study that combines the factors influencing agricultural product export trade with trade potential. Moreover, although China's agricultural product trade is in a surplus position, the gap between imports and exports is getting wider and wider, and imports are far greater than exports, indicating that agricultural product export trade has huge potential. Therefore, it is necessary to further explore the trade potential of China's agricultural product export trade with RCEP member countries based on the factors affecting its agricultural product export trade, in order to tap the greatest potential for high-quality development of China's agricultural product export trade.

### **3. Development Status of Agricultural Product Export Trade Between China and RCEP Member Countries**

#### **3.1. Scale of Agricultural Product Export Trade**

In the past ten years, as China's pace of opening up to the outside world continues to accelerate, China has concluded free trade agreements with many international partners including ASEAN, Australia, and Singapore, significantly reducing tariff barriers in bilateral trade and building a solid foundation for China's agricultural product export trade. It can be seen from the figure that the scale of China's agricultural product exports to other RCEP member countries continued to expand from 2014 to 2023, with only a slight decline in 2023. The export volume of agricultural products increased from US\$29.948 billion in 2014 to US\$41.565 billion in 2022, with a growth rate of 28%. However, affected by intensified competition in the international agricultural product market, China's agricultural product exports to RCEP countries will decline in 2023, falling to US\$40.889 billion.



Data source: Calculated and plotted based on statistical information from the United Nations Commodity Trade Statistics Database (UN Comtrade)

**Figure 3-1.** 2014-2023 China's agricultural product exports to RCEP countries and their growth rate in 2001

At the same time, the proportion of China's agricultural product exports to RCEP countries in China's total agricultural product exports fluctuated and steadily increased from 2014 to 2021. The agricultural product export trade with RCEP countries has almost stabilized at more than 42% of China's agricultural product export market, demonstrating its role in China's agricultural product export market.

classified by HS code in the UN Comtrade database into animal, fruit and vegetable, and food processing products. It can be seen that the export value of various agricultural products accounts for the total export value of agricultural products. There is a large gap in the proportion of agricultural products. Among them, the proportion of food processing remains at around 40%, reaching 51.63% in 2023, showing a clear growth trend; while animals only account for 13.5%.

### 3.2. Product Structure of China's Agricultural Exports to RCEP Countries

This paper classifies the products 01-05, 06-15, and 16-24

**Table 3-1.** 2014-2023 Structure and proportion of China's agricultural product exports to RCEP countries in 2000 (US\$100 million)

year	animal	Proportion of agricultural products (%)	Fruits and vegetables	Proportion of agricultural products (%)	food processing	Proportion of agricultural products (%)
2014	66.12	22.08%	104.69	34.96%	128.68	42.97%
2015	63.16	21.33%	113.59	38.36%	119.33	40.30%
2016	65.90	21.44%	119.21	38.79%	122.25	39.77%
2017	66.17	21.00%	122.88	39.00%	126.01	40.00%
2018	69.10	20.56%	129.82	38.63%	137.11	40.80%
2019	66.28	19.19%	140.03	40.55%	139.02	40.26%
2020	60.38	17.20%	147.54	42.03%	143.08	40.76%
2021	62.00	16.40%	141.39	37.41%	174.59	46.19%
2022	66.15	15.91%	145.74	35.06%	203.76	49.02%
2023	55.19	13.50%	142.57	34.87%	211.13	51.63%

Data source: Calculated based on United Nations Commodity Trade Statistics Database (UN Comtrade) data

Although there is a large gap in the export volume of various agricultural products exported by China to RCEP countries, the change trend of the export volume of various types of agricultural products and the changes in their proportions fluctuate slightly. It can be seen from the table that the export of agricultural products in the food processing category is much higher than the export volume of the other two types of agricultural products, increasing from US\$11.933 billion in 2015 to US\$21.113 billion in 2023, which is the fastest growing among the three types of agricultural product exports. Fruits and vegetables come second, and exports have continued to rise between 2014 and 2020. It is possible that agricultural product exports to RCEP countries will be partially replaced by other countries, so they will start to decline slightly in 2021. Among them, the HS code is 07 (Edible vegetables, roots and tubers), 08 (Skin of edible fruits and nuts, melons or citrus fruits) and 12 (Oil

kernels and fruits, miscellaneous kernels and fruits, industrial or medicinal plants, straw, straw and feed) account for the largest proportion of fruits and vegetables, about 42% and 24% respectively; animal agricultural products account for the smallest proportion, and it contains few agricultural product categories, among which HS Code 03 (aquatic and marine products) has the largest export volume, reaching US\$5.613 billion, accounting for about 85% of animals, and has great export trade potential.

### 3.3. Market Structure of China's Agricultural Product Exports to RCEP Countries

The export volume of agricultural products between China and Brunei and Laos has shown a relatively stable trend, remaining below US\$20 million for a long time; China's exports to ASEAN countries such as Australia, Japan, South Korea and Vietnam have shown a fluctuating upward trend, among which exports to South Korea The growth rate is relatively moderate. Exports to ASEAN countries such as

Vietnam, Thailand, and Malaysia have increased significantly between 2014 and 2019, but have shown a downward trend after 2019. As Japan, as one of China's maritime neighbors, has a prominent geographical location, developed economy, and high demand for agricultural products, China's

agricultural products exports to Japan are much higher than other RCEP countries. From 2014 to 2023, the export volume will remain almost at around US\$10 billion, with a maximum of US\$10.964 billion. (As shown in Figure 3-2)

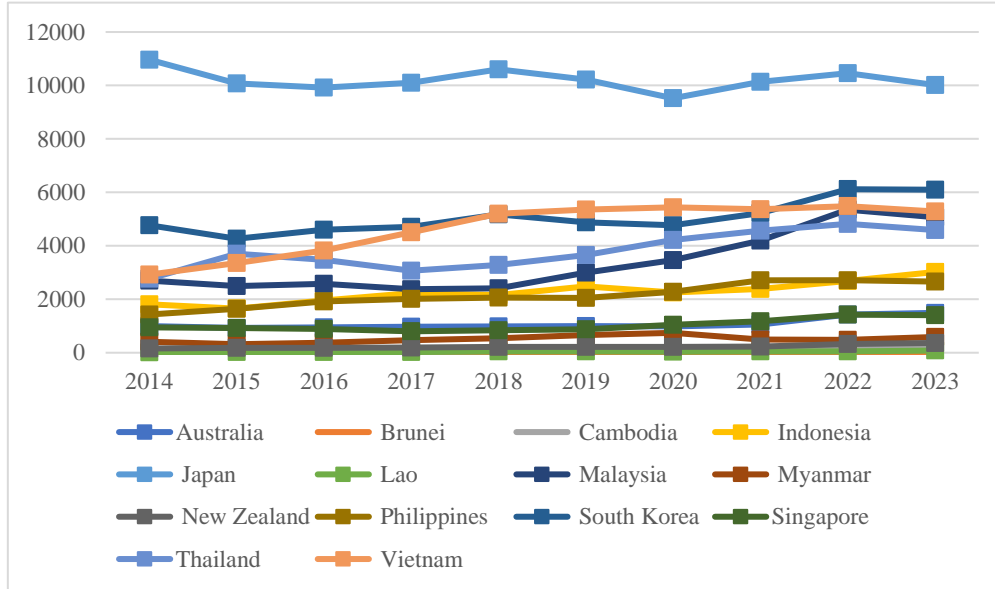


Figure 3-2. 2014-2023 China's agricultural products exports to RCEP member states in 2001 (millions of US dollars)

Although China and Japan have large agricultural product exports, it can be seen from the figure below that the proportion of China's agricultural product exports to Japan in the total agricultural product exports to RCEP countries has shown a sharp downward trend year by year; South Korea and Japan are both developed countries, and their proportion has stabilized at around 14%. For Australia and New Zealand, the developed animal husbandry industry within their countries is enough to meet people's consumption needs. Therefore, China's agricultural products exports to the two countries are relatively small, accounting for 3% and less than 1% respectively. The export trade volume of China's agricultural products is significantly concentrated in ASEAN countries, especially Malaysia, Thailand, Vietnam, Indonesia and the Philippines, which constitute the main recipient group of China's agricultural product exports, occupying a significant market share. However, Singapore's share only fluctuates around 3%, Myanmar and Cambodia account for very small shares, and Laos and Brunei's exports are almost negligible. It can be seen that China's agricultural product export market distribution to RCEP member states has significant unbalanced characteristics.

#### 4. Model Construction and Data Sources

The idea arising from the trade gravity model can be traced back to the law of universal gravity proposed by Newton. It is mainly used to explain the impact of factors such as economic scale and geographical distance on bilateral trade between different countries and regions. Tinbergen and Poyhonen, as pioneers, took the lead in introducing gravity models into the field of international trade research, and revealed that there is a positive relationship between the trade volume between the two countries and the respective economic sizes of the two countries, while showing a negative relationship with the geographical distance between the two countries. The original formula for universal gravitation is as

follows:

$$Y = A(Y_{it} * Y_{jt})/D_{ij} \quad (1)$$

Where, A is a constant term,  $Y_{it}$  and  $Y_{jt}$  represent the economic scale of country i and country j in year t,  $D_{ij}$  represents the geographical distance between country i and country j. In order to reduce the relative error, both sides of (1) are subjected to logarithmic processing to obtain the equation:

$$\ln Y = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln D_{ij} + \mu_{ij} \quad (2)$$

$\beta_0$  is a constant term,  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  are regression coefficients corresponding to explanatory variables, and  $\mu_{ij}$  is a random disturbance term.

This paper builds an expanded trade gravity model based on the traditional gravity model and integrates relevant literature on the mechanism analysis of the factors influencing agricultural product export trade, adding agricultural added value, population size, per capita cultivated land area, foreign trade openness, liner shipping related index and virtual variables to analyze the trade potential of agricultural product exports between China and RCEP member countries. In order to narrow the absolute differences between the data and make the research results more accurate, this paper uses logarithm processing for all except virtual variables. The extended trade gravity model constructed is as follows:

$$\ln Y_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln DIST_{ij} + \beta_4 \ln AVA_{jt} + \beta_5 \ln POP_{jt} + \beta_6 \ln PGD_{jt} + \beta_7 \ln SHP_{jt} + \beta_8 \ln BOR_{ij} + \varepsilon_{ij} \quad (3)$$

In the above formula, i denotes the exporting country, namely China, j denotes the importing country, namely the members of RCEP, t denotes the year,  $Y_{ijt}$  denotes the export trade volume of agricultural products from China to country j in the t year,  $GDP_{it}$  denotes the per capita GDP of China in the t year,  $GDP_{jt}$  denotes the per capita GDP of country j in

the  $t$  year,  $DIST_{ij}$  denotes the geographical distance between China and the capital of country  $j$ ,  $AVA_{jt}$  denotes the agricultural added value of country  $j$  in the  $t$  year,  $POP_{jt}$  denotes the population size of country  $j$  in the  $t$  year, and  $PGD_{jt}$  denotes the per capita cultivated land area of country  $j$  in the  $t$  year,  $OPEN_{jt}$  denotes the openness of country  $j$  to foreign trade in year  $t$ ,  $SHP_{jt}$  denotes the liner shipping related index of country  $j$  to year  $t$ ,  $BOR_{ij}$  denotes whether country  $j$  is bordering on China, and  $\varepsilon_{ij}$  denotes the random error term.

RCEP covers the ten ASEAN countries, China, Japan, South Korea, Australia and New Zealand. In view of the problem of incomplete data in Brunei and Laos, in order to ensure the consistency of panel data, this study excluded data from these two countries. Therefore, this paper selects trade data from 13 countries including China, Japan, South Korea,

Australia, New Zealand, Singapore, Indonesia, Thailand, Myanmar, Malaysia, Vietnam, Cambodia and the Philippines from 2014 to 2023 as analysis samples.

## 5. Empirical Analysis of China's Agricultural Product Export Potential to RCEP Member Countries

### 5.1. Descriptive Statistics

The data interval selected in this paper is 2014-2023. Due to the serious missing of some data in Brunei and Laos, only the 13 member states of RCEP are involved in the actual value. To sum up, there are 120 sample observations in this paper, and the descriptive statistical results of each variable obtained according to Stata.18 are shown in Table 5-1.

Table 5-1. Descriptive statistics

variables	sample size	average standard	deviation	minimum	maximum
LnYijt	120	21.13	1.370	17.47	23.12
LnGDPit	120	11.84	0.196	11.56	12.09
LnGDPjt	120	8.337	1.378	5.118	10.84
LnDISTij	120	12.37	0.691	10.60	13.92
LnAVAjt	120	23.63	1.715	18.43	25.87
LnPOPjt	120	17.54	1.178	15.32	19.44
LnPGDjt	120	-2.851	2.207	-9.229	0.309
LnOPENjt	120	4.395	0.656	3.444	5.887
LnSHPjt	120	3.703	0.856	1.906	4.767
BORij	120	0.167	0.374	0	1

### 5.2. Model Estimation Test

#### (1) Correlation analysis

It can be seen from the correlation test results that China's per capita GDP, RCEP member countries 'per capita GDP, importing country's population size, per capita cultivated land

area, foreign trade openness and liner shipping related index have a certain positive correlation with China's agricultural product export trade volume. Geographical distance and whether they have a common border have a certain negative correlation with China's agricultural product exports.

Table 5-2. Correlation analysis

	LnYijt	LnGDPit	LnGDPjt	LnAVAjt	LnDISTij	LnPOPjt	LnPGDjt	BORij	LnOPENjt	LnSHPjt
LnYijt	1									
LnGDPit	0.138	1								
LnGDPjt	0.790***	0.0740	1							
LnAVAjt	0.425***	0.0430	0.359***	1						
LnDISTij	-0.437***	0.152*	-0.152*	-0.117	1					
LnPOPjt	0.638***	0.020	0.403***	0.766***	-0.424***	1				
LnPGDjt	-0.180**	-0.007	-0.117	0.726***	0.171*	0.316***	1			
BORij	-0.001	-0.000	0.345***	0.0820	-0.177*	0.206**	0.152*	1		
LnOPENjt	-0.040	0.034	0.328***	0.669***	-0.105	0.416***	0.625***	0.024	1	
LnSHPjt	0.747***	0.065	0.708***	-0.059	0.243***	0.064	0.556***	0.277***	0.355***	1

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

#### (2) Stationarity test

In order to avoid "pseudo-regression" phenomenon when data is regressed, it is necessary to conduct a stationarity test on the data. Since  $BOR_{ij}$  is a dummy variable, and China's per capita GDP does not change with the intercept term, no unit root test will be performed on the above two variables.

Now, the ADF test and LLC test are performed on the eight variables LnYijt, LnGDPjt, LnDISTij, LnAVAjt, LnPOPjt, LnPGDjt, LnOPENjt, and LnSHPjt. The results can be seen from the following table: LnGDPjt, LnPGDjt and LnAVAjt failed the 5% significance level test. Therefore, first-order differences were performed on LnGDPjt, LnPGDjt and LnAVAjt, and the data after the differences were tested for

stationarity again. LnGDP<sub>jt</sub>, LnPGD<sub>jt</sub> and LnAVA<sub>jt</sub> all passed the significance level test of 5%. At this time, the above sets of data are all stable and can be subjected to regression analysis.

### (3) Cointegration test

After performing the unit root test, it was found that the variables LnGDP<sub>jt</sub>, LnPGD<sub>jt</sub> and LnAVA<sub>jt</sub> are all first-order single integrated columns, so a cointegration test needs to be performed to determine whether there is a long-term stable relationship between the variables. This study uses Kao panel cointegration test to test its cointegration relationship. At the significance level of 5%, each variable has a cointegration relationship, which meets the basic conditions for panel data processing, and subsequent model construction can be continued.

## 5.3. Model Regression Analysis

The regression analysis models for panel data include mixed regression, fixed effect regression and random effect regression. In order to determine the optimal regression model, this paper uses F-test and Hausman test methods to judge the regression analysis model applicable to the data. The results of testing using Stata.18 are as follows (Table 5-5 shows).

**Table 5-3.** Analysis of model selection results

	purpose of examination	inspection value	conclusion
F-test	Fixed and mixed options	F (9, 110)=193.19 P=0.0000	mixed model
Hausman-test	Random and fixed options	P=0.1502	Random model

It can be seen from the above table that the F test showed a significance of 5% F (9, 110)=193.19, P=0.0000<0.05, indicating that the fixed effect model is better than the mixed model; the Hausman test showed significance, P=0.1502>0.05, indicating that the random effect model is better than the fixed effect model. Therefore, the regression equation of the model can be obtained as follows:

$$\begin{aligned} LnY_{ijt} = & 0.418LnGDP_{it} + 0.723LnGDP_{jt} - \\ & 0.064LnDIST_{ij} + 0.333LnAVA_{jt} + 0.242LnPOP_{jt} - \\ & 0.222LnPGD_{jt} + 0.484LnOPEN_{jt} - 0.071LnSHP_{jt} + \\ & 0.746BOR_{ij} - 3.8 \quad (4) \end{aligned}$$

## 5.4. Robust Test

In this paper, the robustness test is carried out on the above extended gravity model. Comparing Table 5-8 and Table 5-7, it can be seen that the coefficients estimated by the two models do not fluctuate significantly, indicating that the model has good robustness. It also reflects that the economic development of both trading countries has a significant positive impact on the export trade of agricultural products. This also reflects that it is imperative to improve China's economic development level in order to promote the export efficiency of both countries.

**Table 5-4.** Robust test

	(1)
	F.LnY <sub>ijt</sub>
LnGDP <sub>it</sub>	0.566***
	(0.118)
LnGDP <sub>jt</sub>	0.692***
	(0.154)
LnAVA <sub>jt</sub>	0.298
	(0.188)
LnDIST <sub>ij</sub>	-0.119
	(0.078)
LnPOP <sub>jt</sub>	0.238
	(0.206)
LnPGD <sub>jt</sub>	-0.227*
	(0.120)
LnOPEN <sub>jt</sub>	0.318
	(0.219)
LnSHP <sub>jt</sub>	-0.091
	(0.177)
BOR <sub>ij</sub>	0.711
	(0.441)
_cons	-2.846
	(3.195)
N	108
adj. R <sup>2</sup>	

Standard errors in parentheses \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01

## 5.5. Analysis of Trade Potential

Based on the random effects regression results of the above-mentioned extended trade gravity model, this paper will further measure China's agricultural product export trade potential to RCEP member countries. First, we predict my country's theoretical exports to RCEP member countries based on the extended trade gravity model, and then calculate the ratio of the actual export volume to the theoretical export volume, which is the export trade potential of my country's agricultural products. The smaller the value, the insufficient trade between the two countries. The greater the trade space, the greater the trade potential, and vice versa. The formula is:

$$T_{ijt} = \frac{AV_{ijt}}{SV_{ijt}} \quad (5)$$

Among them,  $T_{ijt}$  represents the agricultural product export trade potential index between China and country j in year t;  $AV_{ijt}$  represents the actual value of China's agricultural product export trade volume to country j in year t;  $SV_{ijt}$  represents the theoretical estimate of the agricultural product export trade volume of China to country j in year t.

By collecting agricultural product trade export data between China and RCEP member countries from 2014 to 2023, and using the trade potential model to calculate, the calculated trade potential results are shown in Table 5-5:

**Table 5-5.** Trade potential calculation results

countries	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Mean value
Japan	1.006	1.005	0.999	0.998	0.997	0.995	0.993	0.991	0.996	0.993	0.997
South Korea	1.003	0.999	1.003	0.998	0.998	0.998	0.997	0.990	1.000	1.000	0.998
Malaysia	1.026	1.028	1.029	1.019	1.015	1.025	1.033	1.028	1.035	1.038	1.028
Philippines	1.006	1.009	1.014	1.011	1.007	1.004	1.010	1.009	1.006	1.003	1.008
Singapore	1.008	1.008	1.005	0.995	0.991	0.991	1.000	0.995	1.000	0.998	0.999
Vietnam	0.999	1.002	1.004	1.005	1.005	1.002	0.999	0.991	0.989	0.991	0.999
Thailand	1.028	1.043	1.039	1.027	1.023	1.027	1.038	1.035	1.037	1.033	1.033
Australia	0.998	0.995	1.000	0.993	0.989	0.991	0.992	0.985	0.991	0.992	0.993
Cambodia	0.998	0.987	0.967	0.963	0.975	0.995	1.006	1.026	1.030	1.028	0.998
Myanmar	1.000	0.988	0.996	1.009	1.007	1.010	1.011	0.998	0.996	1.008	1.002
Indonesia	0.965	0.962	0.968	0.969	0.963	0.968	0.965	0.957	0.957	0.962	0.964
New Zealand	0.985	0.992	0.989	0.982	0.984	0.984	0.988	0.979	0.994	0.997	0.987

This paper takes the average of the trade potential values of RCEP member states from 2014 to 2023 as the criterion for judging the country's overall potential level, and classifies the trade potential of RCEP member states according to the following classification criteria.

**Table 5-6.** Classification of trade potential types

type with huge potential	Potential development	Potential reshaping
T<1	T=1	T>1

According to China's calculation of the export trade potential of agricultural products of RCEP member countries, it can be seen that eight countries, namely Japan, South Korea, Singapore, Australia, Cambodia, Indonesia and New Zealand, have huge trade potential values, with trade potential values of 0.997, 0.998, 0.999, 0.999, 0.993, 0.998, 0.964, and 0.987 respectively, indicating that China has insufficient trade with the above countries. There is still a large room for trade improvement, and there is broad space for future trade cooperation. Among them, China has the lowest trade potential with Indonesia and the largest room for improvement. Therefore, China's agricultural product exporting enterprises should increase their exploration of the markets of these countries and become an important cooperation partner for China in agricultural product export trade in the future. They should increase trade communication through trade agreements such as the RCEP Agreement, strengthen bilateral exchanges and cooperation between the two countries, and deeply tap the potential of agricultural product export trade. Among them, China's trade potential with Singapore and Vietnam is close to 1, both of which are 0.999, indicating that China's agricultural product export trade volume to Singapore and Vietnam has stabilized and has stable development potential. Therefore, effective measures should be taken to strengthen and deepen the agricultural product trade exchanges between the two sides to further expand China's agricultural product export trade volume to Singapore and Vietnam. In addition, the trade potential values of Malaysia, the Philippines, Thailand and Myanmar are all greater than 1, which belongs to potential reshaping. The trade potential values are 1.028, 1.008, 1.033 and 1.002 respectively. Among them, the trade potential value with Thailand is the highest, indicating that China has its agricultural product export trade potential. It has been fully exerted, which also requires China to explore new trade growth points in the future and promote China-Thailand agricultural product trade cooperation.

## 6. Conclusions and Recommendations

### 6.1. Conclusion

Using the expanded trade gravity model, this paper analyzes the multiple influencing factors of agricultural product export trade between China and RCEP member countries, and further quantifies the trade potential contained in the growth of agricultural product exports by China to RCEP countries. The following conclusions are drawn: First, China's total exports of agricultural products to RCEP countries from 2014 to 2022 showed a steady growth trend; the export market distribution was mainly concentrated in Japan and ASEAN, but the proportion of Japan's agricultural product exports showed a downward trend year by year; The main export varieties of agricultural products are food processing, followed by fruits and vegetables. There is large room for growth in future exports of the above two types of agricultural products. Second, geographical distance, per capita cultivated land area of RCEP countries and liner shipping related index have significant negative impacts on agricultural product export trade. Other factors such as the per capita GDP of the two countries and the population size of RCEP countries have significant positive impacts on agricultural product export trade. Third, from 2014 to 2023, China's trade potential with Cambodia and Indonesia is relatively low, and both have large expandable trade development space, indicating that China's agricultural product export potential to these two countries needs to be further explored.

### 6.2. Recommendations

#### 6.2.1. Optimize the structure of export products and improve the quality of China's advantageous products

On the basis of fully understanding the preferences and needs of RCEP countries for different agricultural products, we should adjust the structure of export products in a timely manner. For example, fruits and vegetables, food processing agricultural products and aquatic products have comparative advantages and strong demand, and the demand is expanding year by year. Increase investment in the production of such advantageous agricultural products. Secondly, explore agricultural products with China characteristics, such as tea, Chinese medicinal materials, specialty fruits, etc., to increase the added value of exported agricultural products; adjust the varieties and specifications of exported agricultural products according to the needs of various countries to meet their

diversified needs.

At the same time, there are still problems in the quality of my country's agricultural product exports, which has also become an important factor restricting the growth of my country's agricultural product exports[23]. Therefore, China should invest more resources to upgrade product quality, strengthen quality and safety supervision of exported agricultural products, and actively Establish and improve the agricultural product quality supervision system in line with RCEP member countries [24] to improve the quality of agricultural products and promote the high-quality development of China's agricultural products.

### **6.2.2. Increase investment in agricultural science and technology and improve the export competitiveness of agricultural products**

With the full implementation of RCEP, the tariff concessions stipulated therein have also had a certain impact on China's agricultural product exports to a certain extent, increasing fierce competition for agricultural product exports. In order to solve this problem, China should continue to increase the cost of agricultural science and technology investment and strengthen technical exchanges and cooperation, promote the comprehensive development of smart agriculture, comprehensively improve the production efficiency of agricultural products, and further promote the comprehensive coverage of rural revitalization strategies. In addition to improving its own scientific and technological conditions, it is also necessary to focus on brand building, extensively learn from the branding operation strategies of developed countries, establish its own brand effect, and enhance export competitiveness.

### **6.2.3. Strengthen strategies based on local conditions and deeply tap the trade potential of various countries**

Based on the differences of RCEP countries, it is very necessary to carry out agricultural cooperation according to local conditions. Formulate differentiated export strategies based on the market characteristics and supply and demand differences of different RCEP member countries. For the markets of Cambodia and Indonesia with large export potential, we should break down trade barriers, expand trade scale, and fully tap the export trade potential of China's agricultural products; Strengthen agricultural cooperation with markets such as Singapore, South Korea, New Zealand, and Australia with relatively weak export potential of agricultural products, make full use of signed free trade agreements (China-Singapore Free Trade Agreement, China-New Zealand Free Trade Agreement, etc.) to further reduce tariff barriers. Especially for ASEAN countries, my country should build a solid win-win cooperative relationship with them, innovate cooperation methods, optimize trade structures, and explore new trade growth points[25]. At the same time, on the basis of traditionally occupied markets, we actively explore emerging markets of RCEP member countries and enhance the popularity and influence of China's agricultural products through international agricultural product exhibitions and promotion meetings.

## **References**

- [1] Dang Linjing, Zhao Jingfeng. China's trade efficiency and potential forecast for agricultural product exports from countries along the Belt and Road Initiative [J]. Journal of Northwest A & F University (Social Science Edition), 2020, 20 (1):128-136.
- [2] Dong Siyan. Opportunities, challenges and path choices for international cooperation in agriculture in my country in the context of RCEP [J]. Agricultural Economics, 2024, (04):127-129.
- [3] Li Tingting, Chen Jueying, Wu Shunchen, Liu Huguang. Analysis of factors and trade potential of China's agricultural products exports to major countries and regions on the 20th anniversary of China's accession to WTO [J]. Agricultural Economics and Management, 2023 (3):102-114.
- [4] Fan Jinghui, Zhu Fanglin, Zhu Dawei. Impact and potential analysis of RCEP on China's agricultural products export to Japan [J]. Jiangxi Agricultural Journal, 2023, 35 (3):179-184195.
- [5] Chen Yeting, He Siyuan. Research on the impact of global value chain embedding on China's agricultural product export trade [J]. Price Monthly, 2023 (4):56-62.
- [6] Li Guoxiang, Cheng Xiujian, Zhu Wenbo. New Era and New Journey: Development of international trade in China's agricultural products and improvement of domestic food security capabilities [J]. Rural Economy, 2024 (1):1-9.
- [7] Ma Hongtao. Outlook on the development and trend of China's agricultural product trade in the 20 years since China's accession to WTO [J]. Agricultural Economic Issues, 2021, (12):50-54.
- [8] Tang Xin, He Canfei, Wang Wenyu. Dynamic study on China's agricultural product exports based on binary margins and trade relations [J]. Agricultural Resources and Regionalization of China, 2022, 43 (11):178-189.
- [9] Meng Yanchun, Wang Mengxue, Zheng Dan. Study on spatio-temporal evolution and regional differences of agricultural product export trade in provinces of China [J]. Agricultural Resources and Regionalization of China, 2024, 45 (2):84-93.
- [10] Liao Chengsheng, Liao Liangmei. Empirical analysis and countermeasure research on the export competitiveness of my country's agricultural products [J]. Northern Horticulture, 2016 (16):182-187.
- [11] Willow. Structural characteristics and optimization paths of China's agricultural product trade [J]. Statistics and Decision Making, 2019, 35 (24):119-123.
- [12] Wang Houshuang, Wang Haifeng, Zhang Qian. Research on the impact of China's imports and exports on the trade of 14 RCEP countries [J]. Technology Economics and Management Research, 2023 (5):78-84.
- [13] Du Yunxiang. Structural characteristics of China's agricultural product trade in the context of RCEP [J]. Business Economics Research, 2024 (8):143-146.
- [14] Sun Lifang, Chen Zhao. How economic openness affects the international competitiveness of agricultural products in the context of the Belt and Road Initiative: Evidence from RCEP member states [J]. World Economic Research, 2018 (3):81-94.
- [15] Lin Qingquan, Zheng Yi, Yu Jianhui. Research on the competitiveness and complementarity of agricultural product trade between China and other RCEP member countries [J]. Asia-Pacific Economy, 2021 (1):75-81151.
- [16] Feng Zongxian, Li Cheng. Analysis of the competitive advantages and motivations of China's agricultural product exports in the context of RCEP [J]. Journal of Xi'an Jiaotong University (Social Science Edition), 2021 (03):1-17.
- [17] Ge Ming, Gao Yuandong. Research on fluctuations in China's agricultural product exports to RCEP [J]. Statistics and Information Forum, 2021, 36 (07):41-51.
- [18] Shen Fei. Influencing factors and development potential of economic cooperation in the "Silk Road Economic Belt"-

- Analysis based on gravity model [J]. *Rural Economy and Technology*, 2015, 26(9): 171-174.
- [19] Li Junru, Shi Zizhong, Hu Xiangdong. The impact of U.S. trade policy uncertainty on China's agricultural trade [J]. *World Agriculture*, 2020(10): 36-46, 90.
- [20] Zhang Xindan. Research on the influencing factors and potential of export trade between China and other RCEP member countries [J]. *Journal of Dalian University for Nationalities*, 2023, 25 (4):355-360.
- [21] Sun Qihang, Wu Lanyu. Research on the potential of China's agricultural product export trade to RCEP member countries [J]. *Northern Economy and Trade*, 2024 (3):46-49.
- [22] Li Yue 'e, Zhang Jiguo. Research on the Trade Efficiency and Potential of China's Agricultural Products [J]. *Statistics and Decision Making*, 2021 (11):112-116.
- [23] Li Kunwang, Cong. The impact of RCEP entry into force on the export effect of China's agricultural products--Based on the perspective of new margins [J]. *Journal of Shanxi University (Philosophy and Social Sciences Edition)*, 2024, 47 (03):115-122.
- [24] Ye Yichen, Xie Ying, Deng Min, Guan Wanying, Yu Meici. Research on the efficiency and potential of China's agricultural products exports to RCEP member countries [J]. *Xinjiang Agricultural Reclamation Economy*, 2024 (1):47-57.
- [25] Minghong, Zhu Zaiqing. Can developing digital trade improve the efficiency of China's agricultural product exports?--Empirical evidence based on agricultural importing countries [J]. *Journal of Sichuan Agricultural University*, 2023, 41 (05):945-951.