The Structural Analysis of Import and Export Trade of China's Agriculture Products

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Abstract: Agriculture, as an important part of global trade, is experiencing a rapid growth along with some new challenges driven by economic globalization and trade integration. The status of agriculture has a gradual decreasing in foreign trade. The trade deficit occurred for the first time in 2004 and this gap become broader and wider while its competitive power is gradually weakening on the world markets. Therefore, it has a certain theoretical and practical significance to optimize and adjust trade structure through analyzing Chinese agricultural product trade situation to facilitate and strengthen China's foreign trade of agricultural products, while we could correctly view the development trend of the agricultural trade. This paper introduces principal factors influencing the export and import structure of agricultural products through the research of theories and current situation of trade structure. In analyzing, paper adopts three indexes as the main factors including Revealed Comparative Advantage Index (RCA), Trade Competitive Power Index (TC) and gross output of primary industry that have close relations with farm products trade. The paper establishes a multiple linear regression model choosing index factors as structural variables and draws conclusions from the regression analysis of foreign trade structure of agricultural products. Finally, some policy suggestions are put forward to raise China's competitiveness in agricultural trade and improve the structure of foreign trade of agricultural products.

Keywords: Agricultural products, Trade structure, Influential factors, Regression analysis

INTRODUCTION

China is a major agriculture country. Reform and opening- up policy has driven the repaid growth in China's agricultural trade. With the development of economic globalization and trade liberalization, especially after China joined in WTO at the end of 2001, China's agricultural product trade has gained unprecedented development. The gross output of agricultural products has reached 186.69 billion dollars, while the export was 67.83 billion dollars and the import was 118.87 billion dollars. China has become the world's third-largest trading power, the fourth-largest export market and the second-largest importing nation of agricultural trade[1].

Nevertheless, the trade deficit occurred for the first time in 2004 and this gap has become broader and wider. China's import of agricultural products grows more quickly than that of export, while the proportion of agricultural trade has been reducing in our total external trade, representing a diminution of its status. The export competitiveness and the added value of Chinese agricultural products are dropping constantly on world markets. Moreover, the Green and Technological Trade Barriers between China and other countries often occur, too [2]. Therefore, how to optimize the trade structure of agricultural products is always one of the most important problems that China has to address in the future. This paper will focus on this topic.

A theoretical review

Driven by economic globalization and trade integration, it is an important thing for any countries to make a decision about their exporter and export commodities considering their domestic environment, for it influences their economic development and international status. We could find different origins of the trade structures of countries in different periods from Adam Smith's absolute advantage theory to Paul R. Krugman's new trade theory.

Orthodox trade theory

Adam Smith's political economics performed a detailed analysis on the benefit of the division of labor theories to demonstrate that the international division of labor is the important base to cause the international trade and put forward the absolute advantage theory in

The Wealth of Nations wrote in 1776. He thought countries produced nothing but the products they could do best and control the cost below other countries to exchange the goods of others expertise. Hence, the cost of products should be absolutely the lowest one to make full use of the counties' resources, labor force and capital to greatly promote the productivity.

On the basis of absolute advantage theory, David Ricardo presented the comparative advantage theory in *On the Principles of Political Economy and Taxation* wrote in 1871. He stressed that the basis of international trade is the relative difference of production technology and resultant cost. Hence, when a nation produces two kinds of goods, it must be at absolute priority or absolute inferiority compared with other country [3]. The trade occurs as the country has different levels of advantage or disadvantage at the moment.

Heckscher-Ohlin proposed factor endowment theory called H-O theory based on the theory of comparative advantage which makes explanation to the production and trade of the goods in the same industry relying on the vertical difference. He combined H-O model embodying the factor endowment and intensity with distinction in products and intra-industry trade and concluded that countries should export the goods intensively produced by their relatively abundant production factors and import the goods with the scarce factors at home.

NEW TRADE THEORY

Since 1960s, with the fast development of science and technology, the intra-industry trade emerged at that time. The theory is applied in import and export between developed countries and explains the homogeneity and heterogeneity of products and intra-industry trade. Krugman synthesized various new trade theories with economies of scale, product differences and traditional comparative advantage theory, which make intra-industry trade become more general and convincible [4].

When Krugman's theory came out, Michael Porter put forward the competitive advantages theory in his famous book named *The National Competition Advantage* wrote in 1980 at the same time. He tried to explain the method to maintain the relative advantage and thought the competitive advantages theory mainly covers two micro and middle aspects of industry and enterprise, while competence theory focuses on the analysis on competitive strategy and advantages into certain industrial structure and environment.

The restricted factors of import and export trade structure for China's agricultural products

At present, Chinese agricultural products get fast development and its structure has been changed because of restricted factors, too. The trade structure of a country reflects its own current situation and trends of trade. The factors of affecting agricultural trade structure are the same as that of the trade itself. The factors of affecting agricultural trade structure have changed due to the development of economic globalization and trade liberalization. Here, paper only focuses on the major factors influencing the import and export trade structure of agriculture in China.

Market demand

In short, market demand is decided by the quantity of the goods that consumers need and are capable to buy. And it is mainly decided by the amount and the quality of population, income levels and the price of products.

Population

Population is the major factor affecting the scale of agriculture product import and export trade. An increase in population leads to the growth in the demand of agriculture product trade. According to the statistics, the world's population has increased from 6.088 billion in 2000 to 7.056 billion in 2013. For owning the large population in the world, Chinese population has grown from 1.262 billion in 2000 to 1.354 billion in 2013. And the growth rate of population has been curbed between 5% and 6%. China should meet the increasing demand at home and abroad. To expand China's import and export trade scales is no time to delay.

The structure of agricultural product import and export trade is mainly influenced by the quality of population. The transformation from village to city results in the change of people consumption structure with the improving of urbanization. It is time to transform from the low added value products like grain to high added value products like animal products. The ratio of Chinese urbanization had increased from 26.41% in 1990 to 53.37% in 2013. The demand for agricultural products such as meat, fruit and aquatic products is increasing constantly. At the same time, the growth of education level promotes the higher demand for agricultural products. More and more people tend to buy high value-added products.

Income level

With economic development, people's income has been raised and their consumption patterns have also changed. It has much difference on the demand of agricultural products in some countries on different economic development levels. A high-income country has a higher demand for high value-added foods than that of low-income country. Hence, the high-income

country will keen to import more processing and high value-added foods, while the low- income country is prone to import the products such as meat, aquatic products, vegetable oil and fruit.

Price

The supply and demand theory suggests that the lower the price of a product, the higher its demands. It is necessary for us to boost market demands by controlling the price. The price competition means the cost competition. From price and comparative advantage, in China, the abundant labor resource and scarce land resource make contribution to the labor-intensive products' price advantage. However, the price of the land-intensive products has its own inferiority. Recently, the labor cost accounts for 35% to 53% and the average is 45% of the price of main crops in China including paddy, wheat, maize, soybeans, rapeseed and cotton, while the labor costs of agricultural products in developed country occupy less than 10% of the total costs [5].

Factor endowment

The resources endowment, also known as factor endowment, indicates the countries' possession of the factors of production such as labor, land and capitals, reflecting the structure of agricultural product import and export trade in China. The resources endowment makes great contribution to the manufacturing structure of the products. Based on the condition of China, China has rich labor forces and scarce land resources. China exports labor-intensive products and imports land-intensive products in the field of import and export trade of agricultural products.

Trade competition

Trade competition index is used to analyze agriculture product competition and study the structure of agricultural product import and export trade.

Trade competition index is the ratio of net import and export of some industries and products. It may be expressed as:

$$TC = \frac{X - M}{X + M} \qquad (1)$$

Where, X is export, M is import.

The TC value is between -1 and 1. When TC is less than 0, it is net importer and lack of competitive power. Form Table1, we can see that the trade competition index of agricultural products of China is more inferior than that of countries such as Japan, Hong Kong and Germany through the Trade Competitive Index, while it is more competitive than that of countries such as U.S., Canada, Brazil and Malaysia. Hence, it is a practical way to adjust the structure of agricultural product import and export trade in China by analyzing the Trade Competitive Index of agricultural products.

Table-1: Trade competitive index for agricultural products between China and foreign countries

Country	2000	2005	2010
Japan	—0.87	—0.83	—0.81
Hong Kong	—0.35	—0.44	—0.42
Malaysia	0.27	0.3	0.35
U.S.	0.02	—0.07	0.09
Canada	0.56	0.31	0.28
Brazil	0.5	0.76	0.73
Mexico	—0.09	—0.13	—0.21
Germany	—0.21	—0.14	—0.1
U.K.	—0.32	—0.39	—0.38
Netherlands	0.23	0.25	0.2
Australia	0.59	0.53	0.43
China	—0.59	—0.22	—0.35

Source: Calculation with the data from International Trade Statistics.

Trade barriers

After joining the WTO in 2001, China enjoys the most-favored nation treatment entrusted by WTO and faces the most sever trade barrier, too. On the one hand, China's export product and market run into powerful obstacles because of its quality and security problems of agricultural products such as high fertilizer and pesticide residues and epidemic and pestilence of agricultural products so that it is difficult to export the low-quality products to meet foreign demand. On the other hand, countries adopt some measures to protect out of their economic interests and great political benefits such as American HACCPR certification, "Clause 727" to restrain the poultry products trade and

"EU Regulation 911" to restrain the aquatic product trade. Most of developing countries are compelled to accept the present conservation standards. In general, trade barrier is an essential factor to reducing market shares [6].

Location advantage

As the major factor of influencing the regional industrial structure of agricultural product import and export trade, the location advantage refers to the objective existence of advantages and superior position composed of natural resources and geographic location and other factors. In China, the center of the foreign agricultural trade is in the eastern part than in central and western regions. On the one hand, the east part is near the sea and is a convenient place to take responsibility for import and export transportation. On the other hand, processing industries develop at high level and the coefficient of quality and security is pretty high in the east with the development of the open and reform policy.

In addition, natural resources are another important factor. Main citrus producing areas has been forming in the area of middle and upper reaches of Yangtze River, south of Jiangxi, Hunan, Zhejiang and Fujian province as well as Guangdong Province and the dominant beef cattle areas in Northeast China. The development of regional economy such as the foundation of Shanghai Free Trade Zone has produced a profound influence on the structure of agricultural product import and export trade.

The empirical analysis of import and export trade of China's agricultural products
Variable selection

There are many factors and indexes to measure the structure of import and export trade. Trade data reveals the structure of import and export trade, market and other parts. The volume of international agricultural trade is made as a dependent variable in the regression equation, while the indexes showing comparative advantage, trade competitiveness and primary industry output are made as independent variables.

As the rate of the share of certain export commodity in export output of a country and in total export value of the whole world, the revealed comparative advantage index analyzes if certain products from a country or region have comparative advantage. Comparing the revealed comparative advantage index with value 1, the product has comparative advantage when RCA exceeds 1, and otherwise, it doesn't. The formula to evaluate the structure is:

$$RCA = (X_i / X_t)/(W_i / W_t) \qquad (2)$$

Where, X_t represents the export output of a country.

W_i represents the product export value in whole world.

W_t represents the export output in whole world.

Trade competitive power index

It is the ratio of the net import amount and net export amount of some industries or products in a country. The formula is:

$$TC = \frac{X - M}{X + M} \qquad (3)$$

Where, X is import, M is export and the value is hovering between -1 and 1. When TC exceeds 0, it is the net exporting nation of the industry or product and has strong international competitiveness; otherwise, it is the net importing nation with less competitiveness. This index is used to analyze a certain product of a country.

DATA RESOURCES

The data of international trade volume and the total output of agricultural products between 2000 and 2012 come from the information of Statistic Review provided by Ministry of Commerce of the People's Republic of China accordingly. The trade competitive power indexes between 2000 and 2012 are calculated by the formula (3) according to the data in the table 2. The data of primary industry output between 2000 and 2012 come from the information of Statistic Review accordingly. The revealed comparative advantage index between 2000 and 2012 are calculated by the formula (2) according to the data in the table 2.

Table-2: The volume of Chinese agricultural products' international trade (hundred million dollars)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total amount	268.2	279.1	305.8	403.6	514.2	558.3	630.2	775.9	985.5	913.8	1207.6	1540.3	1739.5
Export	156.2	160.7	181.4	214.3	233.9	271.8	310.3	366.2	402.2	392.1	488.8	601.3	625.8
Import	112.0	118.3	124.4	189.3	280.3	286.5	319.9	409.7	583.2	521.7	781.8	939	1114.4

Table-3: Three main indexes between 2000 and 2012

Year	Total import and export volume of agricultural products (hundred million dollars)	Revealed comparative advantage index of agricultural products	Trade competitive power index of agricultural products	Primary industry output (hundred million dollars)	Real outlays of FDI in agriculture (hundred million dollars)
2000	268.2	0.82	0.165	3009.88	6.67
2001	279.1	0.68	0.152	3162.93	8.98
2002	305.8	0.65	0.186	3309.27	10.28
2003	403.6	0.56	0.058	3587.27	10.01
2004	514.2	0.52	—0.1	4378.81	5.37
2005	558.3	0.50	—0.026	4815.67	7.18
2006	630.2	0.45	—0.015	5119.17	5.99
2007	775.9	0.42	—0.056	6429.91	9.24
2008	985.5	0.38	—0.184	8351.62	11.91
2009	913.8	0.45	—0.142	8836.33	14.29
2010	1207.6	0.4	—0.19	10239.26	19.12
2011	1540.3	0.41	—0.216	12587.69	20.09
2012	1739.5	0.37	—0.28	14169.65	20.62

Resources: these data are calculated according to the data in Statistic Year Book and the information offered by Ministry of Commerce of the People's Republic of China.

The construction of model

There are many ways to analyze the relationship between the variables. Among them, multiple regression analysis is mostly applied for total factor and the single. The paper establishes a regression model to analyze the relationship between the structure of agricultural import and export trade and indicators.

The choice of independent variables

For the simplicity, firstly paper defines several variables. For example, y is the value of agricultural import and export trade, x_1 is linear comparative advantage index, x_2 is trade competitiveness index and x_3 is the primary industry output. As shown in table 4, table 5 and table 6 that, all data indicate that the revealed comparative advantage index, the trade competitiveness index and the primary industry output has a significant influence on the agricultural import and export, respectively.

Table 4 The foreign trade of agricultural products and the revealed comparative advantage regression analysis

Factor (X)	coefficient	Std.Error	t-Statistic	Prob.
X_1	-2768.331	662.662	-4.178	0.0015
C	2186.205	347.848	6.285	0.0001

Table-5: The foreign trade of agricultural products and the trade competition index regression analysis

Factor (X)	coefficient	Std.Error	t-Statistic	Prob.
X_2	-2831.796	389.617	-7.268	0.000
C	6301.053	762.001	8.269	0.000

Table-6: The foreign trade of agricultural products and the primary industry output regression analysis

Factor (X)	coefficient	Std.Error	t-Statistic	Prob.
X_3	0.127	0.004	31.770	0.0000
C	-82.160	30.698	-2.676	0.0215

Model

The result of the calculation is unsatisfactory on the basis of regression model of the total volume of import and export trade of China's agricultural product with dominate comparative advantage index, trade competitiveness index and primary industry output. The reason is that the linear relationship utmost simplifies the complex relation between the dependent and

independent variable and is not convincing. Therefore, paper uses logarithmic form of two variables to create multi-regression model for its extensive application. The equation is as follows:

$$Iny_t = \beta_0 + \beta_1 Inx_{1t} + \beta_2 Inx_{2t} + \beta_3 Inx_{3t} + \varepsilon_t \quad (4)$$

Where, ε_t is white noise series. β_0, β_1, β_2 and β_3 are regression coefficients, respectively. x_1 is linear comparative advantage index. x_2 is trade competitiveness index and x_3 is the primary industry output.

RESULTS

According to Table 5-3, carrying out the analysis by the total volume of agricultural import and export trade between 2000 and 2012, revealed comparative advantage index, trade competitiveness index and primary industry index while the trade competitiveness index has been the negative amount since 2004. Here, x and x+b in which b is the constant will change the intercept not the indexes of the equation. Adding 2 to yearly trade competitiveness index for the analysis and we can see the results shown in table 7.

Table-7: Regression empirical analysis

Variables	Coefficient	Std.Error	t-Statistic	Prob.
lnX$_1$	-0.548	0.166	-3.297	0.0093
lnX$_2$	-1.109	0.764	-1.452	0.1805
lnX$_3$	0.781	0.099	7.867	0.0000
C	0.022	0.564	0.039	0.9697

The equation is:

$$Iny_t = 0.022 - 0.548 Inx_{1t} - 1.101 Inx_{2t} + 0.781 Inx_{3t} \quad (5)$$

$$R^2 = 0.9938 \quad \overline{R^2} = 0.9917 \quad F = 481.3532$$

a. Comparing the value P with the given value of significance level that is $\alpha = 0.05$. The test indicated that the total volume of import and export trade of China's agricultural product has a outstanding linear relationship with the revealed comparative advantage index, the trade competitiveness index and the primary industry output.

b. On the basis of the single element, through value P test, the values of the dominate comparative advantage index and the primary industry output are 0.00093 and 0.0000 less than 0.05 and the trade competitiveness index is 0.1805 more than 0.05. It's concluded that the total volume of agricultural import and export trade is obviously affected by the dominate comparative advantage and the primary industry output than by the trade competitiveness.

c. Through the result, we can see from β_1 = -0.548 that the resources of China are gradually reducing. β_2 =-1.108 indicates that comparing with other countries, the China's agricultural competition is weakening. And β_3 =0.781 shows that readjusting industrial structure through the primary industry output could certainly promote the agricultural foreign trade.

CONCLUSIONS

This paper classifies the structure of agricultural foreign trade into the structures of product, market and domestic region as well as trade's body and method. The conclusion in this paper is as follows.

The product structure of China's agricultural trade is determined by its resources endowment conditions to a great extent. Because China has more people and less cultivated land, China exports the labor intensive products of vegetable, fruit and aquaculture and import the land extensive products of oil seeds and vegetable oil.

The market structure of China's agricultural trade influenced by the trade competitiveness is at a low concentration level and the market has developed from the text-text unitary model to the poly-system model with a high concentration ratio focusing on Asia. On the aspect of the import market, China's agricultural trade shows a higher concentration in Latin America and mainly focuses on America and Canada.

The location advantage determines the regional structure of agricultural import and export trade in China. The foreign trade of agricultural products has focused almost entirely on the east part of China and is seen to spread to China's central and western regions.

The trade's principal part together with its methods mirror the influence that the international division and industry chain exert over the structure of foreign agricultural trade in China. Agricultural products are still imported and exported primarily through general trade where the monopoly is being broken. State-owned enterprise's principle status is out of existence, and collective enterprises have developed steadily. At the same time, foreign-invested enterprises enjoy the fast

development, while the private enterprises are become the dominant force as their rapid progress.

Overall, paper suggests that, the revealed comparative advantage index and the primary output have remarkable influence on the structure of agricultural products trade, while the comparative advantage of China has been weakened according to regression coefficients. Therefore, it is necessary to adjust the industrial structure in accordance with primary output to optimize the structure of China's foreign agricultural product trade.

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