An Empirical Study on the Influencing Factors of China's Maritime Transportation Service Competitiveness

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Abstract. Based on the theory of the influencing factors of competitiveness in the diamond model, this paper selects the foreign trade cargo throughput, the transportation industry gross output value, the cargo trade export volume, the ocean transportation volume and the maritime service trade opening of China's coastal ports above 2008~2017. An empirical analysis of the factors affecting the competitiveness of China's maritime service trade by five indicators. Studies have shown that the increase in demand in the domestic market and the increase in the degree of openness of shipping can increase the export value of China's shipping services trade. Based on the empirical results, this paper proposes countermeasures such as increasing the proportion of self-owned ships, adjusting the sea opening strategy, and improving the competitiveness of the shipping industry.

Introduction

As China joins the World Trade Organization (WTO), China's foreign trade volume has increased year by year. As a derivative demand for trade in goods, the volume of trade in transport services is also on the rise. As of 2017, China's shipping service trade exports increased from US$2.012 billion to US$25.451 billion, an increase of 12 times. It can be said that China's shipping service trade has achieved rapid development, but there is a huge deficit behind the rapidly growing trade volume. Relevant data show that the import volume of China's maritime service trade has been higher than the export volume. From the deficit of 4.883 billion US dollars in 2008 to 26.36 billion US dollars in 2017, the deficit has also shown a trend of increasing year by year. Therefore, analyzing the deep-seated reasons for the formation of China's maritime transport trade deficit, and improving the competitiveness of maritime service trade is an urgent problem to be solved.

The continuous deficit in China's maritime service trade has triggered many reflections from domestic scholars. Some scholars regard China's transportation service trade as the whole research object, and believe that the trade deficit of transportation service trade is because the competitiveness of China's transportation service trade is weak, which leads to more imports than exports. For example, Xiaodong Wang (2006) [1] Hongxian Wan (2006) [2], through the use of comparative advantage theory, display comparative advantage index, trade competitiveness index and other statistical analysis to illustrate China's transport service trade competitiveness is less, trade disadvantage Larger status quo. Jiangming Sun (2006) [3] and Shuhua Zhao (2007) [4] specially selected a number of international transportation service powers, and made comparative analysis of the corresponding indicators with China, which also concluded that China's transportation service trade is weaker than The conclusions of other countries. There are also scholars Wei He and Zhongwei He (2008) [5] mainly explained the trade deficit of transportation services from the perspective of insufficient supply of transportation services caused by the rapid growth of China's goods trade. Yijun Leng and Ping Xuan (2011) [6] and Shuangxi Chen and Yu Song (2011) [7], which have great significance for this paper, analyze the international competitiveness of China's transportation service trade and the influencing factors of China's shipping service trade deficit through empirical research on econometric models.

The study of foreign scholars also has important reference significance for this paper. Sapir (1981) [8] demonstrated that traditional trade theory is equally applicable to service trade and proposes a dynamic view of the comparative advantage of service trade, which reasonably explains

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the conditions for developing countries to conduct trade in services. Deardorff (1985) pioneered the use of H-O models to explore the comparative advantages of trade in services. In addition, Ryan (1987) analyzed the liberalization of transport trade through the Ricardo model to increase the welfare of both parties. [9] Francois and Wooton (2001) [10] studied the impact of market structure on the distribution of trade benefits in the transport industry, and proposed that trade liberalization and increased competition can effectively increase trade flows and promote the distribution of trade benefits. It provides a theoretical reference for China's openness to shipping services.

Based on the above literature review, it can be concluded that most of the existing literatures are based on statistical analysis indicators, and there are not many studies to analyze the factors affecting competitiveness by establishing an econometric model. Therefore, based on the summary of previous research results, this paper establishes an econometric model for the factors affecting the competitiveness of China's maritime service trade.

Empirical Analysis of the Factors Affecting the Competitiveness of Shipping Service Trade

Based on Porter's diamond model, this paper selects the cargo throughput of China's coastal ports above sea level, the gross domestic product of China's transportation industry, and China's goods, mainly from the four aspects of production factors, demand factors, related supporting industries and government. Five variables, trade export volume, ocean transportation volume and China's maritime trade openness, were analyzed by R software for multiple regression analysis.

Variable Interpretation.

Exports of Maritime Services Trade (Y): Since the competitiveness of maritime transport trade is difficult to measure accurately, the export value of maritime transport trade is selected as a substitution variable as a dependent variable. The choice of independent variables is as follows:

(1) Foreign trade cargo throughput (X1) of ports above designated size in China's coastal areas. Considering that the data of special production factors that have important work in the maritime industry are difficult to obtain, the foreign trade cargo throughput of ports above designated size is used as an independent variable to explain the factors of production.

(2) Gross domestic product (X2) of China's transportation industry. Porter's "Diamond Model" pointed out that domestic demand is irreplaceable in overseas markets. With the in-depth development of China's foreign trade, seaborne trade, which is a derivative of goods trade, will inevitably be further developed. Taking into account the availability of data, the gross domestic product of China's transportation industry is selected to represent the demand of China's domestic shipping market.

(3) Exports of China's goods trade (X3). As the derivative demand of goods trade, the demand for maritime trade is affected to some extent by the trade of goods. Therefore, the export value of goods trade is used as an independent variable to explain related industries.

(4) China's ocean transportation volume (X4). In the maritime service trade, ocean transportation is the most important form. The ocean transportation volume in China can show the tonnage of own ships in the maritime foreign trade, which reflects the degree of support for China's maritime service trade to a certain extent. Therefore, the ocean transportation is selected. The quantity serves as an independent variable to explain the supporting industry.

(5) Openness of shipping service trade (X5). The impact of the government's macroeconomic regulation on the development of the market economy to promote its development is also very obvious in the maritime industry.

Model Establishment and Regression Test.

This paper uses the method of multiple regression to construct the following model to analyze the influencing factors of China's shipping service trade deficit:

$$Ln(Y_t)=\beta_0+\beta_1 Ln(X_{1t})+\beta_2 Ln(X_{2t})+\beta_3 Ln(X_{3t})+\beta_4 Ln(X_{4t})+\beta_5 Ln(X_{5t})+\mu_t \quad (1)$$

Data source: Calculated according to UN Service trade statistics database, China National Statistical Yearbook, and historical statistical bulletin.

Where t=1, 2, ..., 10, β_0 is a constant term, and β_1, β_2, β_3, β4, and β_5 are respectively measured for the competitiveness of shipping service trade, the foreign trade cargo throughput of ports above designated size, and the total production of China's transportation industry. Value, export value of goods trade, China's ocean transportation volume and the coefficient of seaborne openness, μ_t is a random disturbance term.

Table 1 ReGression result

Variable	*Coefficient*	*P- value*
Ln (X1t)	-0.571745	0.0041
Ln (X2t)	0.384813	0.0548
Ln (X3t)	1.488808	0.0012
Ln (X4t)	-0.224624	0.0081
Ln (X5t)	0.481931	0.0084
R2 0.999908	Adjusted R2 0.9997993	Prob(F-statistics) 0

Regression tests were performed on each explanatory variable using R software. The regression results are shown in Table 1. The adjusted R2=0.9997993, close to 1, indicating that the model has a high degree of fit to the sample; the probability value of the F test is less than 1% of the significance level, indicating that the regression equation is significant; all variables pass the 10% significance level. t test.

However, the variable *Ln* (X1) - the foreign trade cargo throughput and *Ln* (X4) of China's coastal ports above the scale - is a negative coefficient of China's ocean transportation, which is not economically significant. Therefore, it is preliminarily judged that there is collinearity in the regression model. By observing the correlation coefficient matrix between the explanatory variables, it is found that there is indeed multiple collinearity in the model. Therefore, the stepwise regression method is adopted to eliminate the collinearity and make the model achieve the expected effect. The final regression model equation is as follows:

$$Ln(Yt)=-2.561063+1.420716Ln(X2t)+1.188205Ln(X5t)+\varepsilon_t \quad (2)$$

The R2=0.997248 adjusted after the quadratic regression indicates that the model has a high degree of fit; each variable passes the 1% significance level test and the elastic coefficient is significant; the regression equation passes the F test and there is no autocorrelation.

Table 2 Stepwise regression result

Variable	*Coefficient*	*P- value*
Ln (X2t)	1.420716	0
Ln (X5t)	1.188205	0
R2 0.99786	Adjusted R2 0.997248	Prob(F-statistics) 0

Stationarity Test.

On the basis of quadratic regression, the unit root test is performed on each variable. All sequences are second-order single-integral sequences. The unit root test is performed on the residual sequence. The results of ADF test are shown in Table 3. The ADF test statistic of the residual sequence is -3.439024, which is less than the critical value of -25.259808 at the 5% significance level. The residual sequence is a stationary sequence, indicating that there is a cointegration relationship between the variables in the model.

Table 3 Residual test result

ADF Statistics		*t- Statistics*	*P- value*
		-3.439024	0.0388
Significant level	1% level	-4.420595	
	5% level	-3.259808	
	10% level	-2.771129	

The Analysis of Regression Results

The empirical test results show that there is no obvious linear relationship between the foreign trade cargo throughput of China's coastal ports above sea level and China's ocean transportation volume and China's shipping service trade export volume, and the negative regression coefficient is not in line with economic significance, so it is gradually The above variables are eliminated in the regression. Since the export volume of China's goods trade and other variables have serious collinearity problems, the regression model has also been eliminated. In the final regression results, only China's maritime openness and the total production value of China's transportation industry have passed the test and the coefficient is significant, showing a strong linear correlation with China's maritime transport trade exports. It should be noted that due to the problems of variable selection and time span, the establishment of the regression model is only a method related to the measurement variable. It needs to be combined with the theory to better explain the content of the project under study.

(1) About the gross domestic product of China's transportation industry. It can be seen from the quadratic regression model that it has the most obvious ability to explain the export value of China's maritime service trade, and it shows a strong positive correlation, which also confirms Porter's diamond model. Domestic demand is irreplaceable in foreign markets. . Therefore, paying attention to domestic market demand, expanding domestic demand, and realizing “national cargo national transport” will help increase the competitiveness of China's shipping service trade and reduce China's shipping service trade deficit.

(2) About China's maritime openness. The regression model shows that there is a positive correlation between the degree of maritime openness and the export volume of China's maritime service trade, indicating that the deeper the degree of openness, the greater the export value of maritime transport services. Judging from the actual situation in China, China's maritime industry is one of the most open and open-minded industries in the field of service trade. When joining the WTO, they promised to implement MFN status and national treatment. Therefore, many international shipping giants have established wholly foreign-owned shipping companies in China. [10] Higher openness is conducive to increasing competition in the shipping market, improving the overall level of the industry, and thus enhancing the competitiveness of China's shipping service trade.

(3) About the export value of China's goods trade. In the regression results, there is no significant correlation between the export value of China's goods trade and the export volume of sea transport services. As a derivative of goods trade, the maritime service trade is affected by the trade of goods to a certain extent. However, there is no obvious linear relationship between the trade volume of the two, and it needs to be further derived from the cargo export structure and the maritime ship structure. Factor analysis.

(4) About China's ocean transportation volume. Similar to the export volume of China's goods trade, there is no significant explanation for the export volume of ocean shipping services to China's shipping service trade. The increase in ocean transportation volume in China indicates that the degree of participation of China's own ships in maritime transport services has increased, but the increase in pure ocean shipping volume has not significantly increased the export volume of maritime transport services.

(5) Foreign trade cargo throughput of ports above designated size on the coast. The regression results show that the port's foreign trade cargo throughput does not have a certain explanatory power for China's maritime service trade export volume, indicating that the port's foreign trade cargo throughput has no substantial impact on the maritime transport trade export volume, and the port's foreign trade cargo throughput The excessive growth of quantity has not improved the competitiveness of China's shipping service trade.

Conclusions and Recommendations

The empirical analysis above shows that the competitiveness of China's maritime service trade is affected by the demand of the domestic market and the degree of maritime openness. Therefore, the corresponding countermeasures are proposed from the following two aspects.

Adjusting the Maritime Opening Strategy to Make the Policy Advantages Benefit Domestic Enterprises.

In the empirical analysis above, we conclude that the deeper the maritime industry is open, the greater the export volume of China's maritime services trade. Combined with the actual situation analysis, the impact of openness on maritime transport trade should be based on the development of mature maritime market and government policy support. China can purchase military transport materials, strategic materials, etc., and retain the transport rights of goods in the form of state purchase services. To China's own ships, and strive to create opportunities for the development of domestic shipping companies under the existing openness. [11]

Focus on Domestic Demand and Increase the Proportion of Self-Owned Ships

It can be seen from the above empirical model analysis that domestic market demand has a strong interpretation of the export volume of maritime transport services. The greater the domestic market demand, the higher the export value of maritime service trade. But the actual situation in our country is not the case. With the substantial increase in the total import and export volume of China's goods, China's foreign trade enterprises should respond to the principles and policies of the "national cargo", select appropriate trade methods, increase the proportion of China's own ships in the import and export of goods, and reduce China's shipping. Service trade deficit, improve the competitiveness of China's shipping service trade.

Adjusting the Structure of the Maritime Industry and Improving the Competitiveness of the Maritime Industry.

It can be seen from the data in Table 1 that China's ocean-going traffic volume has increased in different degrees every year, but the increase in ocean-going traffic volume has not significantly led to an increase in the export volume of maritime transport services, because the ship types of our own ships are mainly concentrated. In bulk carriers, oil tankers and general cargo ships, the number of special vessels such as super-large oil tankers and large bulk carriers and LNG is relatively small, and the proportion of iron ore that requires large bulk carriers to transport in China's main import and export goods is increasing year by year.

In the face of serious situations, the government should actively guide international shipping companies to speed up the dismantling of old ships with high energy consumption and heavy pollution; capable enterprises can carry out mergers, reorganizations and joint ventures, complement each other's advantages, and bring economies of scale to improve China's shipping industry. Overall competitiveness level.

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