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## Study on dynamic effect mechanism between service trade fluctuation and the growth of service industry

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### ABSTRACT

This study explains the theory of the service trade and service industry economic growth briefly, and makes relevant reasonable assumptions, and applies econometric methods to carry out case study. The selected data includes economic growth data of service industry and import and export data of service trade, and the time node is from 1985 to 2006. The econometric methods used include co-integration theory and Granger causality relationship test, and the results of co-integration analysis shows that the variable value of each group is non-stationary, but they are all a single whole sequence. The results of co-integration test show that there has a long-term stable equilibrium relationship between variables. From a long-term perspective, encouraging measures should be taken for the export of service trade, thus widening the economic growth of the service industry. The results of Granger causality test show that, from the policy we should give full play to the role of service trade export, and encourage imports to promote the economic growth of the service industry; For the economic growth of service industry, service trade import sometimes has lag effect, focusing on the future, the policy formulation shall be prudent. The import and export of service trade influence each other, and one-way causal relationship exists between the two in different period. Finally, this study puts forward the development path of service trade and service economy, and the cooperation of three can improve current situation of China's service trade, promoting the international competitiveness in the end.

### KEYWORDS

Service trade; Service economy; Co-integration analysis; Granger causality relationship test.



## INTRODUCTION

Since the reform and opening-up, China's economy has entered a stage of rapid development, especially after the 1990s, the economy has been continuously growing<sup>[1]</sup>. With the development of economy, trade in services industry has been booming in China. And with the expansion of China's service trade, the international status of China has promoted significantly. In 1985, China's trade in services reaches \$7.601 billion, and in the year 2006, China's trade in services has reached \$192.83 billion, increasing at the annual rate of 16.2%. and in the year 1985, the added economy value of China's service industry has reached \$88.805 billion, and in the year 2006, the added economy value of China's service industry has increased to \$1.037449 trillion, increasing at the rate of 13.7% year by year<sup>[2]</sup>. The total volume of China's trade in goods was just \$69.6 billion in 1985, and in the year 2006, the total has increased to \$1.76069 trillion, increasing at the rate of 15.7% year by year. It is not hard to see from the above figures, the rate of economic value added in service industry is relatively low compared with the total volume of service trade and the total volume of trade in goods. Within the range of comparison, the growth rate of the total volume of service trade is the highest of the three.

For a long time, the scholars have been studying the relationship between service trade and economic growth of service industry, attempting to prove what kind of relationship existing in the service trade and economic growth of service industry<sup>[3]</sup>, and whether the economic growth stimulates the development of the trade or the development of service trade promotes the economic growth of the service industry? If there are equilibrium relationship existed in the import of service trade, the export of service trade and the economy of services industry, and whether this relationship is a long-term stable development. The analysis of these doubts has very important practical significance. In theory, the empirical analysis of the research has tested the correctness of the theory. In practical sense, not only sums up the experience of China's services trade industry, but also provides a scientific basis for the relevant policy making of China's service trade, raising the curtain for preliminary exploration of the strategy.

So far, the study in service trade and economic development is relatively limited. In the existing research, the study is mostly from the promotion of service trade on economic growth, the research methods usually add the service trade parameters on the basis of theory. A more traditional goods trade theory model is commonly used and then proving service trade can promote economic growth. Ricard and other people used the H-O-S model by introducing the parameters into it, getting the applicability of the comparative advantage theory in service trade. Alan and other people believe that service trade not only stimulate the development of service industry, but also promote economic growth through the promotion of trade in goods. Cheng Dazhong and other people thought that the status of service industry has risen to the core areas of economy, and also showed the "binder" function. Bai Zhongyao and other people put forward that the era of service economy has come, and the rich cultural connotation in the service industry shall not be ignored. In the aspect of quantitative analysis, Wei Xufang and other people used the method of the least squares to analyze the relationship between the import and export volume of China's service trade and GDP. Hu Ridong and other people selected variables to carry out ADF test, and established model to correct the error in order to get the causal relationship of the selection variables.

In the aspect of study on the relationship between the service trade and the economic growth of the service, domestic scholars still have the problem of insufficient empirical study<sup>[5]</sup>. In order to solve this problem, econometric method is used for empirical study on the above problem, when implementing stationary test of variables, the ADF method has been adopted; Johansen test method has been used to verify the co-integration relationship of the selected variables. Finally when verifying whether there is a causal relationship existing between the service trade and service economic growth, the Granger causality test method has been selected. And at last finishing the verification whether there is a co-integration relationship existing between China's service trade and service economic growth, and whether the relationship of the variables keep steady for a long time, and what kind of causal relationship between the variables.

## ASSUMPTIONS ANALYSIS

The study of the relationship between service trade and economic growth of service industry, not only involves the theory of the service trade theory, but also the economic growth theory of service industry. When studying the relationship between the two, the theoretical basis of the two aspects shall be considered comprehensively and combined together.

In economic growth theory, the factor growth and productivity growth determines the economic growth [6]. The commonly used Solow economic growth models in the theory of economic growth can be only divided into two kinds, one is the factor growth inducing economic growth, and all the factors outside the first kind are classified as productivity growth. Obviously such classification method is not comprehensive. In the actual economic growth of service industry, the compositions of factors inducing its growth are very complex, besides the factor growth and productivity growth, the following such as the composition of labor input, the capital, human resources and so on are also included.

The theories of service trade promoting economic growth include the classical trade theory, neoclassical trade theory, ne growth theory, new classical economics and so on<sup>[7]</sup>. The Smith and Ricardo were the representatives of the classical trade theory; Heckscher and Ohlin supported the development of neoclassical trade theory; new trade theory was represented by Krugman; The representatives of new growth theory were Lucas and Romer, and technology of neoclassical growth theory has been sublimated and remedied by the new growth theory. And Robertson has put forward that in the economic growth the theory of foreign trade is the "engine". In domestic, Yang Xiaokai and Huang Youguang have developed new classical economics, and modern analysis tools have been used in the study. The inframarginal analysis has resurrected the ideas of classical economics, mainly involving the thought of labor division and specialization. The above theories have discussed the relationship between services trade and economic growth. From the current research results, in the economic growth of service industry, the economic growth of service industry can't do without the development of the

service trade. And then the effect of service trade reflects in which aspects, and how it affects the economic growth of the service industry? The aspects of the effect undoubtedly have two: the influence of total supply and the influence of total demand. In economic growth, the effect can be conducted by aggregate supply from the three aspects: technology spillover effect, system innovation effect, and human capital accumulation effect, and the three aspects can promote factor accumulation and improve the total factor productivity. The influence of total output can be carried out through the two methods, ultimately promoting the economic growth. See the changes of the three major industries in Figure 1. From the perspective of total demand, the service market has opened since the reform and opening-up policy. And the service trade has a variety of ways to influence aggregate demand. For example, the import of service can promote investment and consumption to influence. The influence of aggregate demand can be also carried out through the export of relevant goods and services, finally achieving the purpose of economic growth.

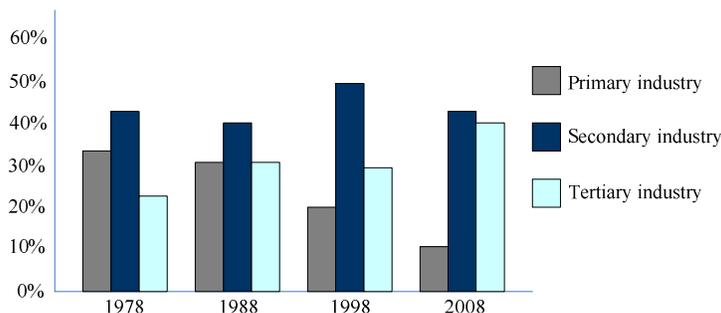


Figure 1 : The proportion changes of China's three industries

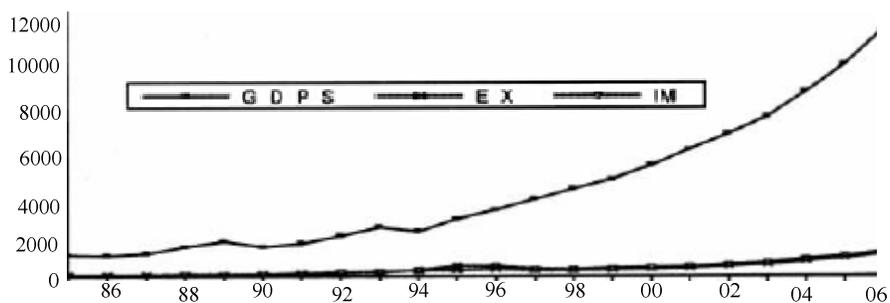
After the briefly explanation of the service trade and economic growth of service theories, and in order to carry out empirical study featuring integrity and logicality, this research makes some reasonable assumptions on the basis of the service trade and economic growth of service theories. Firstly, in the theory of economic growth of service industry, we know there are many factors that can affect the economic growth of service, but in this premise, this study assumes that only the service trade growth is changing, and all the rest of factors are stable, only the role of trade in services is considered. Secondly, in the empirical research, the specific influence ways of trade in services shall not be fully struggled in the process of economic growth in service industry, that is to say, only focus on the change of the trade in services, whether the way belongs to the total supply or the total demand, this study makes little analysis.

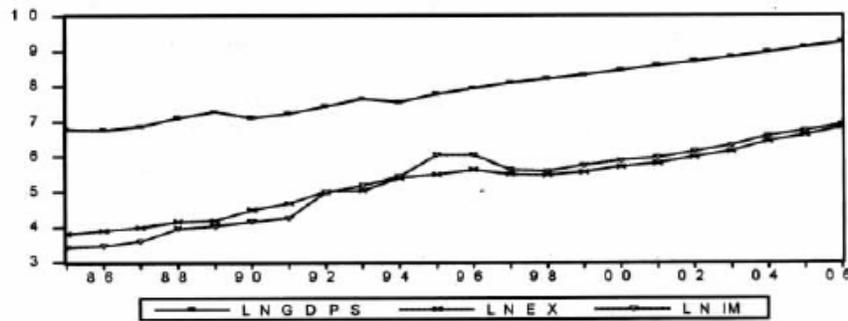
EXAMPLE ANALYSES

In the above, the relevant theories of the service trade and economic growth of service have been briefly explained, and reasonable assumptions related have been made on empirical study. On the basis of the above content, this paper uses econometric methods for empirical study, and mainly studies the relationship between service trade and economic growth of service industry in China, the methods adopted including co-integration theory and Granger causality test, with the hope of solving the problem put forward in the above and verify the rationality of the related theory through the study.

Data declaration

This study has selected economic growth of service industry in China, which is usually called GDPS value as well as the import and export volume of trade in services, the time node is 1985-2006. The added value of the tertiary industry has been chosen from China statistical yearbook as the added economic value of trade in services. When carrying out the statistical analysis, the monetary unit is unified into dollars. According to the data of state administration of foreign exchange, the data from 1985 to 2006 in the China's balance of international payments has been disposed in order to calculate, obtaining the service trade data at last. And the monetary unit is unified into dollars. After finishing all the variables, the variables have been taken natural logarithm, getting the change trend of sequence listed in Figure 2 and Figure 3. According to the relevant theories, besides the economy in service industry has been promoted by service trade, there are many other factors can have an impact on it, so in this study the measurement model is also introduced.



**Figure 2 : The change trend of the variables of time sequence (1985-2006)****Figure 3 : The change trend of the variables of time sequence after natural logarithm**

### Variables test

When carrying out the statistics of econometric methods, the first request is that the variables do not change in time trends, and then regression analysis can be processed. If the variables haven't carried out stationary test, there may be misleading regression results, influencing conventional inferences of analysis result. After the stationary test of the variable, if the variables are stationary, the regression analysis can be carried out and if the variables are non-stationary, the variables shall be integrated in order sheet and among them there is the co-integration relationship. In econometrics, the traditional and the modern approaches can be used to stationary test of time series, and this study has selected unit root method. In unit root method test, there are three kinds of testing method which has been widely used, and this study has adopted the ADF method. The test results are listed in TABLE 1. As it can be seen from the table, the original data of the variables has passed 0.05 significance test, which illustrates the variables in the three groups are non-stationary; The variables passed first order difference have passed the 0.05 significance test all, which shows that there is no unit root existing after the sequence of unit root. The three sets of variables are integrated of order sequence.

**TABLE 1 : ADF test results of the variables**

Variable	Test form (c,t,n)	Adf statistic	The critical value of adf statistics(5% significance level)	Conclusion
LNGDPS	(c,t,3)	-1.533828	-3.690814	Non-stationary
$\Delta$ LNGDPS	(c,N,0)	-5.303233	-3.020686	Stationary
LNEX	(c,t,2)	-3.084638	-3.673616	Non-stationary
$\Delta$ LNEX	(c,N,0)	-4.172079	-3.020686	Stationary
LNIM	(c,t,1)	-2.062110	-3.658446	Non-stationary
$\Delta$ LNIM	(c,N,0)	-3.693820	-3.020686	Stationary

### Co-integration test

In the study of non-stationary variables, although the time series is non-stationary, the combination between the two sets or more sequences can be stationary, so the co-integration method has mostly been used to study the long-term equilibrium relationship between sequences. And the above has tested that the variables selected in the three sets are stationary, and the three sets of variables are integrated of order sequence, therefore there may be existing co-integration relationship. Figure 2 is the time change trend diagram of the variables after natural logarithm. The figure shows that each variable has the trend of increasing year by year, and the rise of closing to each other; But in different time stage, the trend is also different, so whether there is co-integration relationship existing needs to be tested. Johansen test method has been selected in this study to check the analysis, the test results are listed in TABLE 2. The table shows that three sets of variables have passed the 0.05 and 0.01 significance tests, that is to say, there is a co-integration relationship, and this also shows that the three sets of variables have the long-term stable equilibrium relationship. When the service trade export increases, the economy of the service industry has increased. When trade in services import increases, the economy of the service industry has decreased. So currently china's encouragement of the service trade export has conformed to the reality.

**TABLE 2 : Johansen test results**

Eigenvalue	Trace statistics	5% significance level	1% significance level	Original hypothesis	Alternative hypothesis	The result
0.967541	93.37199	29.68	35.65	K=0	$k \leq 1$	co-integration
0.676760	31.67178	15.41	20.04	$k \leq 1$	$k \geq 2$	relationship is

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0.467505	11.34329	3.76	6.65	$k \leq 2$	K=3	existed
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**Granger causality relationship test**

In 3.3, only the co-integration relationship between the variables is tested, but the long-term stable relationship can't explain the causal relationship. In this study the Granger causality test method has adopted to analyze each variable. The test results are listed in TABLE 3. It can be concluded from the table that the export of trade in services is the Granger reason of economic growth of the service industry, but the economic growth of service industry is not always the Granger reason of the export of trade in services, and not the reason of the import of trade in services all the time. Service trade import has time lag effect on the economic growth of the service industry. In different periods, there is a single causal relationship between the trade in services imports and trade in services exports.

**TABLE 3 : The results of Granger causality relationship test**

Relationship	Original hypothesis h0	The lagged differences	F statistics	Probability value p	Conclusion
LNEX and LNGDPS	LNEX is not the Granger reason of LNGDPS	1	5.70327	0.02810	reject H0
		3	5.48777	0.01315	reject H0
	LNGDPS is not the Granger reason of LNEX	1	1.33247	0.26346	accept H0
		3	5.05465	0.01717	reject H0
LNIM and LNGDPS	LNIM is not the Granger reason of LNGDPS	1	1.56811	0.22651	accept H0
		4	3.13855	0.07113	accept H0
		5	28.0070	0.00043	reject H0
	LNGDPS is not the Granger reason of LNIM	1	0.29587	0.59316	accept H0
		4	1.56533	0.26436	accept H0
LNIM and LNEX	LNIM is not the Granger reason of LNEX	5	0.81519	0.57952	accept H0
		1	7.64948	0.01274	reject H0
	LNEX is not the Granger reason of LNIM	5	1.41603	0.33879	accept H0
		1	2.22550	0.15307	accept H0
		5	9.89635	0.00731	reject H0

**CONCLUSIONS**

This study explains the theory of the service trade and service industry economic growth briefly, and makes relevant reasonable assumptions, and applies econometric methods to carry out case study. The selected data includes economic growth data of service industry and import and export data of service trade, and the time node is from 1985 to 2006. The econometric methods used include co-integration theory and Granger causality relationship test, the conclusion are as follows:

The variable value of each group is non-stationary, but they are all a single whole sequence. The results of co-integration test show that there has a long-term stable equilibrium relationship between variables. From a long-term perspective, encouraging measures should be taken for the export of service trade, thus widening the economic growth of the service industry.

The results of Granger causality test show that, from the policy we should give full play to the role of service trade export, and encourage imports to promote the economic growth of the service industry; For the economic growth of service industry, service trade import sometimes has lag effect, focusing on the future, the policy formulation shall be prudent. The import and export of service trade influence each other, and one-way causal relationship exists between the two in different period.

Taken together, the service trade exports can significantly promote the economic growth of the service industry significantly. Therefore, when formulating the development strategies, the export-oriented strategy can be considered. However, in the economic growth of the service industry, the imports role of trade in services shall also not be ignored. And in the long run, the time lag effect of import of trade in services can give full play in a long period, thus developing the service economy fully in order to promote the export of service trade, enhancing the international competitiveness.

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