Study on the relationship between Shanghai air logistics and International trade

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Abstract: In recent years, there has been a rapid growth in Shanghai's air logistics. The interaction between air logistics and international trade is paid more attention. In order to evaluate whether there is a positive causality between them, this paper has tested the Co-integration and Granger causality between Shanghai's air logistics and international trade using relevant data from 1985 to 2009.And the result shows that there is a steady long-term relationship and obvious causality between them. Based on the result, the paper also gives some suggestions on how to develop Shanghai's air logistics rapidly.

Keywords: Air Logistics, International Trade, Shanghai, Granger Causal Relationship Test

1. Introduction

There has been a rapid growth in Shanghai's economy since the reform and opening policy. It has formed a comprehensive, multi-level and wide-ranging opening economy pattern. With the rapid growth of the whole economy and international trade, air logistics has been progressing apparently. Air logistics, as an important component of modern logistics, has played an important role in the economy and trade. The air logistics, relative to the port transportation, is still a very small percentage in the whole cargo, but it plays an irreplaceable role in international trade because air logistics has some absolute advantages such as huge efficiency, small but high added valued transport object. On the one hand, air Logistics develops accompanied with the development of international trade; on the other hand, air logistics' level of development would directly influence and restrict the growth of international trade or even the whole economy.

In order to evaluate whether there is a positive causality between Shanghai's air logistics and international trade, an empirical research should be done. The result will benefit to government decision-making in the policy of air logistics' development and investment to air transportation infrastructure. Therefore, this article uses time series model based on the data of Shanghai's air cargo and international trade from 1985 to 2009 to analyze the dynamic relationship between Shanghai air logistics and international trade.

2. Article Review

Recently, the researches on the relationship between modern logistics, international trade and economic growth are as follows:

Wang Ling (2010) uses co-integration theory and Granger causality test methods to empirically analyze the relationship between foreign trade and modern logistics of Shanghai based on the data of Shanghai traffic and port throughput and import & export in1978-2008. And some suggestions for developing modern logistics and promoting foreign trade of Shanghai are put forward. Zhang Bao-you (2009) makes relative analysis and flexibility analysis between the logistic and China's import and export trade and concludes that the development of logistic positively promotes the import and export trade. Hou Fang-miao (2008) conducts an empirical analysis of the relationship between China's foreign trade and logistics, and concludes that there is reciprocal cause-effects relation, and that the acceleration effects of logistics to foreign trade seem more obvious than that of foreign trade to logistics.

Yang Chang-chun (2008) makes an empirical analysis on the relationship between international trade and international logistics. The conclusion is that international trade and logistics interact as both cause and effect, while trade has more positive reaction. Wang Li-jun (2005) points that there is interaction between the development of international trade and modern logistics: international trade is the base of international logistics, and scientific and reasonable development of international logistics is beneficial to international trade. Chu Zhao-fang, Wang Qiang (2010) studies the relationship between air logistics and both international trade and economic development. The results show that there is a stable long-term equilibrium relationship between air logistics and both international trade and economic development. It is also found that the impact on air cargo of innovation from international trade is higher than that from GDP, while the impact of the innovation from air cargo is higher on international trade than on GDP. Finally, some advices are presented. Han Hong (2009) reveals that GDP has direct and indirect effects on the air

transportation needs and there is Co-integration relationship between them. He Han-wu, Wang Bin (2007) analyzes the characters of China air logistics and gives some advice on development. Chen Ru-jia (2010) uses Granger causality tests to examine the relationship between Shanghai port cargo and the sum of import and export from 1985 to 2008.It concludes that the level of Shanghai logistics industry development is the main factor to promote the international trade. And some suggestions on how to develop Shanghai port logistics are proposed.

Zuo Da-jun (2009) points out that the problems in Shanghai logistics industry and gives suggestion on developing Shanghai modern logistics industry by learning successful experience of Japanese and the United States. Zhang Liang (2007) thinks that Shanghai logistics industry has formed a multi-level linkage mechanism supporting by the joint of shipping and air transportation, industrial linkage, and so on. Then the suggestion on the development of logistics industry in Shanghai is proposed.

From the above, it can be seen that most researches focus on modern logistics, not air logistics. And there is no research on the relationship between Shanghai's air logistics and international trade. Furthermore, empirical research is needed while qualitative analysis methods are mostly used in the present study. Thus, this article will focus on this issue.

3. Indicators and Data

In order to find whether there is a positive causality between Shanghai's air logistics and international trade, the article tests the relationship between both of them using Granger causality test with the relevant data from 1985 to 2009. In this causality test, the two indicators were selected: one is air cargo (SAC), and the other is total sum of import and export (SFT).All of the data come from "Shanghai Statistical Yearbook" (1986-2010).

In order to eliminate heteroscedasticity in the sample data, they are adjusted by natural logarithm functions, which are shown in table 1.

Table1: Sample Data of SFT and SAC

Year	SFT	SAC
1985	3.95	1.10
1986	3.58	1.39
1987	3.73	1.79
1988	3.83	2.40
1989	3.92	2.40

1990	4.31	2.56
1991	4.39	2.77
1992	4.58	2.94
1993	4.85	3.18
1994	5.06	3.30
1995	5.25	3.61
1996	5.41	3.71
1997	5.51	3.87
1998	5.75	4.04
1999	5.96	4.33
2000	6.30	4.48
2001	6.41	4.61
2002	6.59	4.88
2003	7.02	5.09
2004	7.38	5.27
2005	7.53	5.40
2006	7.73	5.53
2007	7.95	5.67
2008	8.08	5.72
2009	7.93	5.70

4. Empirical Analysis

4.1Unit Root Test

To avoid the phenomenon of false regression caused by the regression analysis of non-stationary time series, the smooth of SFT and SAC should be tested before Granger causality test. Their stationary can be seen from the Graph 1.
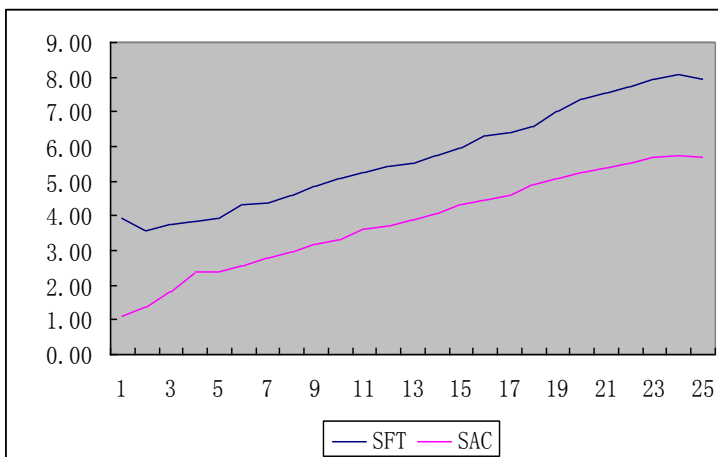
Graph1: time series graph of SFT and SAC from 1985 to 2009

Further, this article tests the stationary of time series SFT and SAC using ADF unit root test. The ADF test results are calculated by the econometric software Eviews5.1, shown in the table 2.It can be seen that the ADF test result of series SFT first-order difference is -5.417380, which is less than the test critical values of 5% level. It indicates that the series SFT's first-order difference is stationary, denoted SFT ~ I (1). Similarly, the ADF test result of series SAC first-order difference is -3.757559, which is less than the test critical values of 5% level. It indicates that the series SAC's first-order difference is stationary, denoted SAC ~ I (1).

Table2：The ADF test statistic of SFT and SAC

series	Lag Length	ADF t-statistic	1% level	5% level
SFT	1	-5.417380	-3.752946	-2.998064
SAC	1	-3.757559	-3.752946	-2.998064

4.2 Co-integration Test

In order to study whether there is a long-term stable relationship, that is co-integration relationship, between SFT and SAC, this article makes test using Johansen trace statistic test. The Co-integration Test result is calculated by the econometric software Eviews5.1, shown in the table 4.

It can be seen from Table 3 that there is a Co-integration relationship between SFT and SAC. Under the hypothesis "none Co-integration", the trace statistic is 20.11920 which is greater than the 0.05 Critical Values 15.49471, so the null hypothesis is rejected. Further, similarly, under the hypothesis "at most 1 Co-

integration", the trace statistic is 3.242967 which is less than the 0.05 Critical Values 3.841466, so the null hypothesis is accepted. Thus, it shows that there is a Co-integration relationship between SFT and SAC at 5% critical level.

Table3：Co-integration Test statistic of SFT and SAC

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.519894	20.11920	15.49471	0.0093
At most 1	0.131509	3.242967	3.841466	0.0717

4.3 Granger Causality Test

Now let's make the Granger causality test between SFT and SAC. Granger causality test means that, if the forecast of the variable Y through the past information of two economic variables X and Y is better than it only by the past information of Y, that is , variable X contributes to the improvement in prediction accuracy of variable Y, then variable X and Y have a Granger causality relationship. The test is made by the econometric software Eviews5.1, shown in the table 4.

Table4：Granger causality test statistic of SFT and SAC

Null Hypothesis	F-Statistic	Probability
SAC does not Granger Cause SFT	2.88505	0.0819
SFT does not Granger Cause SAC	1.39893	0.0725

From the above result in Table 5,we can find that under the hypothesis " SAC does not Granger Cause SFT", F statistic is 2.88505, and the corresponding probability value is 0.0819, which is less than the 10% Critical Value, so the hypothesis can be rejected. Similarly, under the hypothesis" SFT does not Granger Cause SAC" ,F statistic is 1.39893, and the corresponding probability value is 0.0725, which is also less than the 10% Critical Value, so the hypothesis is also can be rejected. Thus, the test result indicates that there exists apparent Granger causality relationship between SFT and SAC.

5. Conclusions

The Co-integration test results shows that there is long-term relationship between Shanghai's air cargo and international trade, while both of them are non-stationary time series. The Granger causal relationship test results indicate that there is a two-way causality between them. It means the incensement in the import and export is favor to the air cargo in the long run and the growth of air

cargo also can promote import and export. However, there is an obvious lag in the interaction between them, indicating the limit of Shanghai air transport capacity.

The conclusion reveals that we should develop air logistics rapidly to be a great boost to the economy. Based on the results, there are some suggestions on developing Shanghai's air logistics.

Firstly, air logistics infrastructure in Shanghai is should be added rapidly. Logistics facilities which include modern storage facilities, cargo handling centre, logistics facilities for protective trade, commercial office facilities, basic services facilities, and specialized machinery should be added to achieve the rational distribution of logistics facilities.

Secondly, public information platform for air cargo should be established to enhance the competitiveness and management level of air logistics companies with modern technology.

Thirdly, the cooperation of airline companies and cargo agencies should be strengthening. Both of them could take part in developing airport logistics functions and building a third party logistics system, which not only reduces costs from small quantities cargo, but also encourages cargo agencies join the establishment of air logistics system to become a model of driving the rapid development of aviation logistics.

Finally, the cultivation of human force in the field of air logistics should be enforced. Unlike other logistics field, air logistics is a human-intensive and technology-intensive industry. There is a huge demand of professional personnel familiar with air logistics services organization, logistics network, modern cargo industry, computer technology, electronic commerce, the production, operation and sales. Essentially, the competition of air logistics companies is the competition in professional human resource. Therefore, speeding up the cultivation of professionals is an important issue for air logistics companies.

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