Retail Business and the Freight Industry in Shanxi Province of China: an Empirical study of Interactive Relationship

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Abstract: The fate of the retailing industry is related to the freight industry of a country. In order to enhance the pulling power that the retailing has to the freight industry, this research investigated the interactive relationship of retailing and freight industry in Shanxi Province of China. Using the software Eviews 5.0®, a Co-integration Model was proposed. Evaluation of the validity of the model, using the Stationary Test, Granger Causality Test and Error Correction, proved that the model proposed had the ability to repair itself. Using the model to explain the relationship between retailing and freight results further revealed that there is a long-term equilibrium relationship between the two variables. Furthermore, this study proved that in order to enhance the pulling power that retailing has to freight industry, there is a need to pay attention to the final consumption, to support retailing and to speed up the urbanization construction.

Keywords: Retail; freight industry; co-integration model; Granger Causality Test; China

1. Introduction

Retail business and freight industry are two important industries of national economy and have very close relationship. Retailing has had the profound changes since its reform and opening up, becoming a hot spot of economic growth industry and having a positive impact on circulation industry and the economic operation mode. The development of the retail business produced a large demand for goods transportation. The rapid development of retailing has a significant implication to the production, consumption, employment, economic and social development; and people's living standards. The development of the freight industry speeds up the development of the commodity circulation speed, which can promote the retail business in turn. In a report by Yang (2012); David Reid the Chairman of Tesco pointed out that retail was an important impetus of economic growth and modern retailing can promote the domestic demand and consumption. It gradually becomes an important part of national economy, and leads to the emergence of the industrial agglomeration and urban development, and strongly promotes the economic and social development (Jun, 2011). In addition, wholesale and retail have strong support to the manufacturing of goods (Xia, 2012). According to the Ministry of Commerce (2012) existing literatures were focused on interactive relationship between retail business and the freight industry from qualitative point of view. To our knowledge little has been done with the subjects on their quantitative aspects; how the retail business and the freight industry interact exactly, drive by one-way or promote each other, influence degree. In this paper, based on two time series data (volume of freight and social retail sales of consumer goods), we analyzed the interactive relationship of retailing and freight industry in Shanxi Province of China; and provided conclusions and pertinent opinions and

suggestions.

The retail business and freight industry influenced each other

Variable selection and data instruction as the third industry: Retail business and industry have various types of enterprises and were distributed on scattered region. Therefore, it was difficult to acquire the data. On the premise of the lack of data, most of scholars survey data through carrying field investigation or analysis these two kinds of theory and calculate the model theoretically. While this article took the empirical analysis method to study the relationship between them. Among them, the “Total Retail and Sales of Consumer Goods” represented social retail sales of consumer goods. “Freight Ton-Kilometers” represented freight turnover; Unit of Measurements used 100 million Yuan and million ton-km; original data was obtained from “Statistic Yearbook of Shanxi Province”; sampling intervals were from 1978 to 2011; sample size was 34; and analyzed using software Eviews 5.0. To eliminate the influence of different variance of time series data, this paper evaluated the logarithm of RETAIL and TURNOVER before quantitative analysis. Two logarithmic sequences expressed as LNRETAIL and LNTURNOVER respectively, two sequence trends are shown in figure 1.

Figure 1: Trend series of LRETAIL and LTURNOVER

The figure 1 shows that both time series data LRETAIL and LTURNOVER rose continuously, the trend had obvious synchronicity regress analysis time series data directly, difference disposal was applied to DLRETAIL and DLTURNOVER respectively to prevent the emergence of the phenomenon of "spurious regression", first order difference sequence was DLRETAIL and DLTURNOVER, the trend is shown in figure 2 two first-order difference sequence no time trend and intercept term; and both in steady state.

The stationarity: Test stationarity of Time Series, refers to the time sequence of statistical rule will not change with the passage of time, which is the characteristics of stochastic process do not change with time. This paper chose the most commonly used DF-ADF test to judge the LRETAIL and LTUENOVER and the

stability of difference sequence. For each test time sequence, the null hypothesis of test was sequence for non-stationary sequence; alternative hypothesis was sequence for stationary series.

Table 1: DF-ADF Test of LRETAIL and LTURNOVER and Difference Sequence

Sequence Name	DF-ADF Statistics	Test Type (c,t,k)	Probability Value	Conclusion
LRETAIL	-3.08	C,t,1	0.1278	Non-stationarity
DRETAIL	-3.03	C,0,3	0.0440	stationarity
LTURNOVER	-3.49	C,t,0	0.0570	Non-stationarity
DLTURNOVER	-8.49	C,0,0	0.0000	stationarity

Figure 2: Series of DLRETAIL and DLTURNOVER

DRETAIL and DLTURNOVER were the first-order difference sequence of LRETAIL and LTURNOVER respectively. When significance level α is 0.05, for LRETAIL and LTURNOVER, probability value of DF-ADF Statistics is 0.1278 and 0.0570 respectively, is greater than α , can't refuse the original hypothesis that sequence is non-stationary. The original sequences have unit root, so they do not have stability. For their first order difference sequence DRETAIL and DLTURNOVER, probability value of DF-ADF Statistics is 0.0440 and 0.0000 respectively, is less than α observably. So the null hypothesis can be rejected effectively, the two first-order difference sequence were stationary series. Therefore, two original sequences (LRETAIL and LTURNOVER) themselves are non-stationary, but the first order difference sequence is stationary series, namely after difference was applied, they changed into stationary series, so the two sequences are both integrated of order 1. Due to its single the same order, there is a cointegration relationship between them, so it entered the next step of cointegration test.

The cointegration test: This paper used the E-G two steps method to test the cointegration of LRETAIL and LTURNOVER. It estimated the simple regression (LRETAIL to LTURNOVER), and generated the corresponding residual sequence. The Eviews software showed the regression equation (1).

$$LTURNOVER = 8.12 + 0.52LRETAIL + ETCT \dots\dots\dots (1)$$

(81.23) (30.98)

R²=0.97 F=959.68 DW=1.35

In the regression equation (1), ETCt is residual error, () the figures show that the t value of corresponding coefficient. In order to confirm whether there is a cointegration relationship between LRETAIL and LTURNOVER, we still need to examine ETCt residual sequence using stationarity test. The test ADF unit root in ETCt. The test results are shown in Table 2.

Table 2: Conclusion of Residual Term ADF

Name of sequence	DF-ADF Statistics	Test Type (c,t,k)	Probability value	Conclusion
RESIDUAL	-2.69	0,0,1	0.0088	stationarity

Statistics of DF-ADF is shown on table 2: 2.69. probability value is 0.0088 (less than 0.01). So when the significance level of probability value of 0.01, can refuse to the original hypothesis that sequence is non-stationary, namely the residual sequence is stable. Due to the residual item is stationary series, there is a cointegration relationship between two sequences LRETAIL and LTURNOVER. This suggests that; the interaction between social retail sales of consumer goods and freight turnover has reached a long-term equilibrium.

Long-term equilibrium relationship analysis: The t value of the slope coefficient was 30.98. Under the significance level of 0.01, $t_{0.005}(32) = 2.75$. Because the absolute value of t statistic was greater than the critical value; the LRETAIL has highly significant effect on LTURNOVER. Determine coefficient of the model was 0.97, the interaction between retail business and industry, 97% can be explained by model, goodness of fit was good because the elasticity value was 0.52 when LTURNOVER sequence affects LRETAIL sequence, thus showed that when social retail sales of consumer goods increased by one percent, will pull the freight turnover increased by 0.52%. It indicated that development of Retail business have pull effect on freight industry.

Granger causality test: Through cointegration test, there was a stable long-term equilibrium relationship between social RETAIL sales of consumer goods (RETAIL) and freight TURNOVER (TURNOVER) however; to determine the causal relationship in the long-term equilibrium relationship; they were verified through the Granger test. Inspection results were selected in accordance with the principle of minimum AIC, lag period was for a year. The granger causality test results are shown in table 3.

Table 3: Granger Causality Test

Null Hypothesis	Sample Size	F Statistics	Probability Value
LTURNOVER is not the Granger Cause of LRETAIL	33	0.27127	0.60631
LRETAIL is not the Granger Cause of LTURNOVER	33	13.6211	0.00089

From table 3, when lag period is 1 year, the significance level of α 0.01, for the first null hypothesis, F statistic corresponding probability value is 0.60631 and greater than 0.01. Thus, the null hypothesis cannot be rejected; it suggests that LTURNOVER is not the granger reason of LRETAIL. For the second original hypothesis, probability value is 0.00089 and less than 0.01. Thus, the null hypothesis is rejected,

except the alternative hypothesis, namely that LRETAIL is LTURNOVER granger reason. Therefore, there is one-way causal relationship between the two sequences from LRETAIL to LTURNOVER.

Error correction model: In order to examine the interaction of self-repair mechanism between two sequences, screen of variables by applying the method of stepwise regression, error correction mode was set up as shown in (2).

$$LTURNOVER_{t-1} = 0.540 \Delta LRETAIL_t - 0.698 ETC_{t-1} + \dots \dots \dots (2)$$

The coefficient of Correction term ETC_{t-1} is negative, in accordance with reverse correction mechanism. The coefficient of 0.698, which indicates that such system deviates from the long-term equilibrium after the impact, error correction rate reaches 69.8%. Therefore, the interaction of both systems after the impact, it has a strong ability of error correction and a strong ability to repair itself.

The empirical conclusions and policy recommendations: Based on the data of Shanxi Province as an example for empirical study, the paper found that retailing and freight industry have close equilibrium relationship for a long time. Development of retail business has very obvious pull effect on freight industry. It can be seen that there was unidirectional causality within the two sequences from LNRETAIL to LTURNOVER. Error correction model has obvious ability to repair itself in response to external shocks. The prosperity of retailing directly showed that the development of a country's final consumption demand status and developing trend; and the final consumer demand were related to the development of freight and other related industries; so in the process of economic development, how to stimulate the development of the retail business to pull the development of related industries. This paper holds that efforts should be from the following three aspects:

Attach great importance to the final consumption role in economic growth: The current China's economic growth is mainly driven by investment and export, over-reliance on investment and exports, however, will have great negative impact on the economy. Rely too much on investment, will fuel inflation, resulting in excess production capacity; and after the financial crisis and European debt crisis, excessive reliance on exports obviously doesn't work. Because the world economic recovery will take long time, it is impossible to have much demand abroad. Therefore, to develop economy in our country, must attach great importance to the role of domestic final consumption in economic growth. Consumption is the result of the development of national economy and boost national economic growth, the consumption as a motive force of the economic growth, increase the proportion, to expand the economic development space, absorbing and digesting the domestic productivity effectively, form the development of new advantages, has the very vital significance.

Actively support and promote the development of retail business: Final consumption plays a very important role in economic growth, promote the economic growth in the proportion of consumption is the top priority. The retail business is an important part in the terminal consumer market, reflects the consumers consumption preference and choice model. Therefore, to actively support and promote the development of retail business is particularly important. Recently, the ministry of commerce issued "on the 12th five-year period guidance to promote the development of retailing" made it clear that "department stores, supermarkets and other retail enterprises will be encouraged to raise the proportion of independent operation, training system, establishing and perfecting the buyer to expand business scope buyout, according to customer demand to develop their own brands. Shengli (2012) reported that;

the procurement and sales, is the core retail business, earn purchasing and selling price as the main profit model, have always been a timeless retail business, and is the spirit of the retail. On this basis, by improving the channels of distribution, improve service, customer satisfaction, cooperation and other means to reduce operating costs and improve the core competence is the success of international retail giants. According to Shanxi Securities (unknown) the development of retail business, the industry has a very big role, supporting the retail will greatly promote the development of freight industry.

Efforts to the construction of the new type of urbanization, a better basis for the future growth of the consumer:

The party 18 large and the central economic work conference, put forward a new type of urbanization strategy and deployment, adjust the economic structure and transformation of the mode of development in our country is a major strategic move, according to the report spirit of the eighteenth, urbanization in the future will become the important carrier of building a moderately prosperous society in an all-round way in China, but also move the biggest potential in domestic demand. Rapid development of the new urbanization is to become China's economic growth and social development the powerful engine. Urbanization in our country is in the second stage, marked by rapid development infrastructure and real estate, the final transition to consumption-driven growth stage. According to Ruochi (unknown) new city of town construction is put forward to the consumption of laid the foundation for a better future. On the one hand, the propulsion of urbanization provides more employment opportunities, transfer a large number of rural surplus labor, thus improve the urban and rural residents income level, to improve their ability of consumption; urbanization can promote the development of service industry and the integration of urban and rural development, improve urban and rural consumption environment, promote the expanding consumer demand. On the other hand, urban population, resources, resource aggregation and consumption scale, stimulates the urban economic growth and development and prosperity, create conditions for the further advance of urbanization. In addition, the adjustment of consumption structure upgrade affect the development of urban industrial structure, space structure, the formation and development of consumer culture play a role in the development of urban characteristics. In this economic environment, urban consumption will greatly improve the bottleneck of China's domestic demand is insufficient, the final order to promote our country's economic construction.

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