Study on the Interaction and Coordinated Development of Xinjiang Financial Industry and Logistics Industry—Research Based on VEC Model

Qi-qing ZHOU and A-man FAN

No. 35, Uni-president West Road, University Park, Fengxi New Town, Xixian New District, Xi'an City, Shaanxi Province, China

*Corresponding author

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Abstract. This paper selected the time series data from 1994 to 2015, and explored the interaction and coordination between the development of logistics industry and financial industry (including insurance industry) in xinjiang by means of cointegration test, granger test, vector error correction model and other measurement methods. Logistics industry and financial industry in the short term, according to the results of xinjiang from the inhibition effect of equilibrium will be quickly adjust to achieve long term steady relations of mutual promotion, the causal relationship, but the insurance industry to interact with the logistics industry has not yet formed, financial industry is not sensitive to the development of logistics industry, the interactive coordination needs to improve.

Introduction

In the new era, the logistics industry vigorously develops the profit source of the capital market, and the financial industry quickly penetrates into the logistics industry. The deep integration of the two promotes the further upgrading and reform of the logistics industry and the further improvement of the financial market. With the continuous advance of the national One Belt And One Road strategy and the continuous implanting of the concept of "unimpeded trade, financial financing and public opinion communication", xinjiang, as the core area of the silk road and an important gateway for China to open to the west, the coordinated development of logistics and financial industry has directly affected the overall benefits of the economic belt. In this context, it is of great significance to study the interactive development of xinjiang's financial industry and logistics industry.

Empirical Analysis of the Interaction and Coordination between Xinjiang Financial Industry and Logistics Industry

Index Selection and Data Source

Considering the special geographical environment and regional ethnic issues of xinjiang, this paper, drawing on the research of Xin-guang Li and other scholars, selects the ratio of the deposit balance of xinjiang financial institutions, the sum of the stock financing amount of listed companies and xinjiang GDP to measure the financial development level of xinjiang, denoted as F. As for the selection of logistics index, since China does not collect statistics on the added value of logistics industry, domestic scholars often refer to it as transportation mileage or cargo turnover. However, due to xinjiang's vast territory and complex terrain, the logistics development level cannot be accurately shown simply from the perspective of transportation mileage and turnover of goods circulation. Therefore, this paper considers both cargo turnover and passenger turnover. According to the Suggestions of relevant experts, the dimensionless processing of cargo turnover and passenger turnover is carried out by minimizing the dimensionless processing method respectively, and the weights of 82 are given respectively. After adding them up, the development level of logistics industry in xinjiang is obtained, which is denoted as W. In addition, due to the historical,
cultural and natural environment of xinjiang, the circulation of goods and passenger transport has made a great contribution to the development of insurance industry. Therefore, this paper takes the development of insurance industry as an important endogenous variable and measures the development level of insurance industry in xinjiang by the ratio of premium income to xinjiang GDP, which is denoted as B. In order to eliminate the time trend and heteroscedasticity, all variables are logarithmic, denoted as LNF, LNW and LNB. In view of the availability of data and the fact that there was only one listed company in xinjiang in 1994, the data interval selected in this paper was from 1994 to 2015. The data were all from the national ta’an database, the statistical yearbook of xinjiang and the statistical bulletin of xinjiang’s national economic and social development.

Data Processing and Model Establishment

In order to more accurately measure the development level of logistics industry in xinjiang, this paper first deals with the minimum dimension of freight turnover and passenger turnover, and then adds up the different weights to obtain the development level of logistics industry. The calculation formula is as follows:

\[ w_i = 0.8a'_{ic} + 0.2a'_{ip} \]

After standardization, the data of cargo turnover and passenger turnover are respectively
\[ a'_{ic} = a_{ic}/maxa_{ic} \]
\[ a'_{ip} = a_{ip}/maxa_{ip} \]

Among them, \( a_{ic}, a_{ip}, maxa_{ic} \) and \( maxa_{ip} \) Respectively represent the regulation \( i \) The original and maximum annual cargo turnover and passenger turnover.

Xinjiang logistics development level
\[ w_i = 0.8a'_{ic} + 0.2a'_{ip} \]

In order to eliminate the influence of trend terms, all data in this paper are logarithmic, denoted as LNB, LNW and LNF. Vector error correction model (VEC) is established based on vector autoregressive (VAR). VAR model is established first. If there is a co-integration relationship between non-stationary variables in this model, VEC model can be further established.

VAR model can regard all variables as endogenous variables. In the absence of other exogenous variables, VAR model can be established as follows:

\[ y_t = c + \sum_{j=1}^{p} \phi_j y_{t-j} + \epsilon_t; y_t = (LNW LNF LNB)^T; \]
\[ (t = 1994,1995 ...,2015); \]

Among them, \( y_t, \phi \) said k Dimensional endogenous variable column vector sum k × k Order matrix, p, \( \epsilon_t \) Is the lag order and the new information vector, c, t Represents the number of constants and years.

If LNW, LNF and LNB are non-stationary time series with cointegration relations, VEC model can be established as follows:

\[ \Delta y_t = c + \sum_{j=1}^{p-1} \tau_j \Delta y_{t-j} + aecm_{t-1} + \epsilon_t; \quad ecm_{t-1} = \beta' y_{t-1} \quad \tau_j = -\sum_{j=1}^{p} \phi_j \]

Among them, \( \Delta, ecm_{t-1} \) Denotes difference and long-term equilibrium error respectively; \( a \) Represents the adjustment intensity after the variable deviates from the long-term equilibrium state; The difference term coefficient reflects the short-term fluctuation of each variable on the short-term variation of the explained variable.

Quantitative Test and Empirical Analysis

Stationarity Test of Variables

Economic variables changing with time may be non-stationary time series, so LNW, LNF and LNB need to be tested for stationarity. In previous studies, most scholars adopted ADF unit root test, but it had very low test efficacy for small samples or stationary sequences with time trend. In order to
improve the accuracy of variable stationarity test, DFGLS test and KPSS test were used to test the stationarity of variables with the help of Eviews7, as shown in table 1.

<table>
<thead>
<tr>
<th>variable</th>
<th>LNW</th>
<th>DLNW</th>
<th>LNF</th>
<th>DLNF</th>
<th>LNB</th>
<th>DLNB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection form</td>
<td>(C, T, 0)</td>
<td>(C, T, 0)</td>
<td>(C, T, 0)</td>
<td>(C, T, 1)</td>
<td>(C, T, 1)</td>
<td>(C, T, 0)</td>
</tr>
<tr>
<td>DFGLS statistics</td>
<td>2.5609</td>
<td>5.1480</td>
<td>2.4440</td>
<td>4.2613</td>
<td>2.2284</td>
<td>3.3200</td>
</tr>
<tr>
<td>conclusion</td>
<td>Not smooth</td>
<td>Smooth **</td>
<td>Not smooth</td>
<td>Smooth ***</td>
<td>Not smooth</td>
<td>Smooth **</td>
</tr>
<tr>
<td>KPSS statistics</td>
<td>0.1214</td>
<td>0.1771</td>
<td>0.1011</td>
<td>0.1408</td>
<td>0.0870</td>
<td>0.1637</td>
</tr>
<tr>
<td>conclusion</td>
<td>Not smooth</td>
<td>Smooth **</td>
<td>Not smooth</td>
<td>Smooth *</td>
<td>Not smooth</td>
<td>Smooth **</td>
</tr>
</tbody>
</table>

Note: D represents the first-order difference, and the test form (C, T, K) represents the constant term, trend term and lag order in the unit root test equation. "***", "**" and "*" respectively represent 1%, 5% and 10% significant levels, the same as below

As can be seen from table 1, the unit root exists in all the original time series, but no unit root exists after the first-order difference, indicating that the original time series belongs to the first-order single integral time series, and there may be a co-integration relationship between variables.

**Johansen co-integration Test and Granger Test**

Before the co-integration test and granger test, VAR model should be guaranteed to be stable and the lag order of the model should be determined. AR root graph was used to test the stability of the model. The reciprocal of all root modules were in the unit circle, so the model established was stable. After several tests, according to AIC and SC minimum criteria, the optimal lag order of VAR model can be determined to be 1. Co-integration test reflects the long-term equilibrium relationship between variables. Johansen test is adopted to test the co-integration relationship between variables, as shown in table 2.

<table>
<thead>
<tr>
<th>The null hypothesis</th>
<th>The trace statistic</th>
<th>5% critical value</th>
<th>P values</th>
<th>conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no one</td>
<td>34.0410</td>
<td>29.7971</td>
<td>0.0153</td>
<td>Refused to</td>
</tr>
<tr>
<td>At most one</td>
<td>15.7377</td>
<td>15.4947</td>
<td>0.0460</td>
<td>Refused to</td>
</tr>
<tr>
<td>At most two</td>
<td>5.0392</td>
<td>3.8415</td>
<td>0.0248</td>
<td>Refused to</td>
</tr>
</tbody>
</table>

As can be seen from table 2, the null hypothesis is rejected at a significant level of 5%. Therefore, there are three co-integration relations among variables. The co-integration equation with LNW, LNF and LNB as dependent variables is:

\[
\begin{bmatrix}
LNW \\
LNF \\
LNB
\end{bmatrix} = \begin{bmatrix}
0 & 6.4196 & -1.2078 \\
0.1558 & 0 & 0.1881 \\
-0.8282 & 5.3152 & 0
\end{bmatrix} \begin{bmatrix}
LNW \\
LNF \\
LNB
\end{bmatrix}
\]

As can be seen from the co-integration equation, there is a long-term equilibrium relationship among the three. The development of the financial industry promotes the development of the logistics industry, but the driving effect of the insurance industry on logistics has not been shown, and the driving effect of the logistics industry on the insurance industry and the financial industry is not very strong. For every 1 unit of financial development, the logistics industry will grow by about 6.4 units, which greatly promotes the development of the logistics industry.

In order to further explore the internal transmission relationship between logistics and financial development, this paper uses granger causality test to test the causal relationship between finance, insurance and logistics. Since granger test can only test stable time series, DLNW, DLNF and DLN'B should be tested. The test results are shown in table 3 below.

<table>
<thead>
<tr>
<th>Lag order</th>
<th>The null hypothesis</th>
<th>F statistic</th>
<th>P values</th>
<th>conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DLNW is not the granger cause of DLN'B</td>
<td>0.0575</td>
<td>0.8133</td>
<td>accept</td>
</tr>
<tr>
<td>1</td>
<td>DNB is not the granger cause of DLNW</td>
<td>4.5114</td>
<td>0.0478</td>
<td>Refused to</td>
</tr>
<tr>
<td>1</td>
<td>DLNW is not the granger cause of DNB</td>
<td>3.7056</td>
<td>0.0702</td>
<td>Refused to</td>
</tr>
<tr>
<td>1</td>
<td>DLNF is not the granger cause of DLNW</td>
<td>2.9978</td>
<td>0.1005</td>
<td>accept</td>
</tr>
</tbody>
</table>
Table 3 shows that DLNB is the granger cause of DLNW and DLNW is not the granger cause of DLNB, indicating that the development of insurance industry in Xinjiang is only a one-way granger cause of logistics industry. DLNW is the granger reason of DLNF and DLNF is not the granger reason of DLNB, indicating that the development of logistics industry is the one-way granger reason of financial development. However, DLNF is not DLNW because of its poor acceptability, that is, it has a certain degree of rejection. To a certain extent, it can be believed that the development of finance in Xinjiang also promotes the development of logistics.

Vector Error Correction Model

Through co-integration of variables and granger causality analysis, it can be seen that there is a long-term equilibrium relationship between them, but there may be a short-term imbalance. In order to investigate the long-term equilibrium and short-term fluctuations between the logistics industry, the financial industry and the insurance industry, the VEC model is established to more systematically and comprehensively study the long-term and short-term causal relationships and dynamic changes between variables. The estimation results of the VEC model are as follows:

\[
\begin{pmatrix}
DLNW \\
DLNF \\
DLNB
\end{pmatrix} = \begin{pmatrix}
-0.166 & 0.039 & -0.194 \\
-0.293 ** & -0.120 & -0.287 *** \\
-0.759 *** & -0.848 ** & 0.548 ***
\end{pmatrix} \begin{pmatrix}
DLNW(-1) \\
DLNF(-I) \\
DLNB(-1)
\end{pmatrix} + \begin{pmatrix}
0.009 * \\
0.083 *** \\
-0.014 *
\end{pmatrix} ecm
\]

Error correction item: \( ecm = LNW(−1) − 6.42LNF(−1) + 1.21LNB(−1) + 7.45 \)

According to VEC model estimation, the development of financial industry and insurance industry has little impact on the development of logistics industry in the short term, and the development of logistics industry has certain inhibitory effect on the development of financial industry and insurance industry. All three deviated from the equilibrium level in the short term, but the coefficient of error correction term was small and significant, indicating that once the variable deviated from the equilibrium level, the error correction mechanism would quickly adjust to the equilibrium level in the short term.

Variance Decomposition Based on VEC Model

In order to analyze the mutual contributions of the three in the development process, variance decomposition was carried out for LNW, LNB and LNF, respectively. The results are shown in Table 4.

<table>
<thead>
<tr>
<th>nper</th>
<th>The variance decomposition of LNW</th>
<th>The variance decomposition of the natural log of b</th>
<th>The variance decomposition of LNF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LNW</td>
<td>LNF</td>
<td>LNB</td>
</tr>
<tr>
<td>1</td>
<td>67.257</td>
<td>29.201</td>
<td>3.542</td>
</tr>
<tr>
<td>2</td>
<td>65.313</td>
<td>32.037</td>
<td>2.650</td>
</tr>
<tr>
<td>3</td>
<td>65.767</td>
<td>31.609</td>
<td>2.623</td>
</tr>
<tr>
<td>4</td>
<td>64.710</td>
<td>32.507</td>
<td>2.783</td>
</tr>
<tr>
<td>5</td>
<td>63.331</td>
<td>33.772</td>
<td>2.897</td>
</tr>
<tr>
<td>6</td>
<td>61.984</td>
<td>34.910</td>
<td>3.106</td>
</tr>
<tr>
<td>7</td>
<td>60.842</td>
<td>35.808</td>
<td>3.350</td>
</tr>
<tr>
<td>8</td>
<td>59.868</td>
<td>36.549</td>
<td>3.583</td>
</tr>
<tr>
<td>10</td>
<td>58.300</td>
<td>37.723</td>
<td>3.977</td>
</tr>
</tbody>
</table>

It can be seen from Table 4 that, relatively speaking, the development of the financial industry contributes a lot to the logistics industry, and the driving role of the insurance industry in logistics has a lot of room for improvement. The logistics industry also has a low contribution to the development of the financial industry and insurance industry. The interaction between the logistics
industry and the financial industry is not coordinated enough, but it is improving constantly. The conclusions are basically the same, which is related to Ming-feng Huang et al.\textsuperscript{[3]}

**Conclusions and Suggestions**

By using cointegration test, Granger causality test, variance decomposition and VEC model to study the coordinated development of logistics industry and financial industry in Xinjiang, the insurance industry interaction relations, the following conclusions: (1) The Xinjiang finance, insurance and long-term steady relationship in the logistics industry, financial industry and logistics industry and the insurance industry to some extent, promote each other, the interaction of the insurance industry and logistics industry has not been effectively play.(ii) In the short term, the development of the three deviates from the equilibrium level and restrains each other, but the three will adjust to the equilibrium level quickly and strongly.(3) The interaction and development of the three are not coordinated. The development of the financial industry is only the one-way Granger reason for the development of the logistics industry, and the financial industry lacks elasticity to the development of the logistics industry.

Based on this, combined with the actual situation of Xinjiang, this paper puts forward the following reasonable Suggestions to achieve the interactive and coordinated development of logistics, financial industry and insurance industry in Xinjiang: (1) Establish logistics distribution centers and promote the upgrading of logistics industry. Xinjiang should seize the Silk Road Economic Belt core strategic location advantages, to establish a large logistics distribution center, to become China's trade with the west "packers", the international trade of goods classification, turnover, packaging and processing business such as transferred to the logistics distribution center of Xinjiang; Promoting the transformation of production mode of logistics enterprises, take the road of logistics automation and intelligent operation, reduce logistics costs, introduce logistics talents, lay the foundation for future growth and development.(2) To Increase the openness of Xinjiang's financial market and promote financial innovation. At present, finance plays a more and more important role in regional economic growth and is more closely integrated with other industries. Xinjiang as the portal of open to the west of our country, have more inland port, occupies an important position in the trade with central Asia, should accelerate the pace of construction of regional financial center, actively develop offshore RMB business, introduce overseas or foreign financial institutions to establish branches in Xinjiang, activate the local financial market, develop diversified sources of financing, to speed up financial innovation, improve the financial system. (3) Actively develop insurance products and give full play to the advantages of insurance. Due to various reasons, Xinjiang highly conforms to the principle of adverse selection, and insurance industry is more important. The insurance depth of Xinjiang is in the forefront of the country, but the use efficiency of insurance funds is low, and the insurance industry has not formed a good interactive and circular relationship with the financial industry and logistics industry. Xinjiang should develop insurance product energetically, be like weather danger, serious natural disaster danger to wait, the insurance fund that takes up a long time can be used at investment logistics infrastructure or burgeoning industry, promote insurance and the amalgamation of other industry. (4) To improve the legal system and give full play to the guiding role of government policies. Due to the lag of law amendment and implementation, it is inevitable to make mistakes in regulating industry. At present, China's logistics industry and capital market law there are still lack, the Xinjiang government according to its own development practice, introducing the right rules and regulations, on the development of logistics industry and financial industry depth fusion, market risk and insurance awareness, strengthen the innovation of the logistics industry, finance and insurance industry support, which guarantees the three coordinated development of good interaction.

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References

