The Relationship between Foreign Trade and Economic Growth in Heilongjiang Province

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Abstract: On the background of global integration, the impact of foreign trade on economic growth is growing. As the world's second largest economy, the relationship between foreign trade and economic development in China has strong research significance. Because of the large difference of various provinces and regions in China, it is of theoretical and practical significance to study the relationship between foreign trade and economic growth in Heilongjiang Province alone. The foreign trade volume, import, export and GDP data of Heilongjiang Province from 1996 to 2015 are selected, and Eviews software is used. Through ADF unit root test, Granger causality and co-integration test, it is practical to conclude the exact relationship. And useful policies and suggestions for foreign trade development are put forward for reference by the government.
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1. Introduction

The relationship between foreign trade and economic growth has always been the focus of scholars' research. Scholars expound their relationship from different perspectives, such as the transmission mechanism, measurement methods and measurement analysis. Most scholars use the quantitative analysis method to obtain their specific relationship, which is helpful to give the feasible suggestion according to the analysis result.

Anne O. Krueger (1979) established a mathematical model to analyze the relationship between trade policy and economic growth in developing countries. The CNP growth rate increased by an average of 0.1% for every 1% increase in exports, so that an open export-oriented policy could promote rapid economic growth. Scholar Zhang Erzhen (1995) summarized foreign trade promoting economic development mechanism as eight effects, including the competition effect. Scholar Xu Helian and Baoqun (2003) selected five indicators to measure the degree of trade openness since China's reform and opening up, found that the ratio of dependence on foreign trade reflects best. Lin Yifu (2001) revises the traditional method of calculation, the impact of exports on consumption and investment in the national income inequality was taken into account.

This paper studies the impact of foreign trade on economic growth in Heilongjiang Province. The subject comes from the recent development status of foreign trade in Heilongjiang Province. Exports volume in 2016 in Heilongjiang Province was negative growth for 11 consecutive months. And as a representative old industrial base in northeastern China, serious resource depletion will have a great impact on Heilongjiang Province, whose exports are mainly industrial products. If foreign trade development situation become worse, it will affect various aspects of economic development. Heilongjiang Province is rich in mineral resources, so petrochemical, coal and steel products export industry has been the main driving force of economic growth. But the export of Heilongjiang Province has always been low value-added, low profit margins and low technical content. At the same time, Heilongjiang Province is facing a severe resource depletion test. The Chinese National Development and Reform Commission announced three batches of 69 resource-exhausted cities, and six on the list belong to Heilongjiang Province. This will affect the role of exports for economic growth in Heilongjiang Province. In recent years, lacking of motivation, the economic growth in Heilongjiang Province has been the last count for many years. How to adjust the foreign trade structure, implement effective policies to deal with the problems Heilongjiang Province is facing, promote balanced economic development, that are more important for the development of Heilongjiang Province during this period.

2. An overview of GDP and foreign trade of Heilongjiang

2.1 Economic development in Heilongjiang Province

Heilongjiang Province is located in northeastern China, rich in natural resources with precious black soil in Sanjiang Plain. As one of the old industrial bases in Northeast China, the industrial base is

superior. The resources are abundant while the population density is small, so per capita resources are abundant. The border line between Heilongjiang Province and Russia is up to 3045 km, which let Heilongjiang become the most important trade area with Russia. From Table 1 we can see that the economic development is in good condition in overall situation, maintaining a positive economic growth rate for many years. By 2015, provincial GDP has reached 150 billion Yuan. Per capita GDP is close to provincial GDP, maintaining synchronous growth.

Table 1 GDP and Per Capita GDP in Heilongjiang Province

Year	GDP (billion Yuan）	GDP growth rate	Per Capita GDP（Yuan）	Per Capita GDP growth rate
2002	3637.2	7.29%	9541	7.20%
2003	4057.4	11.55%	10638	11.50%
2004	4750.6	17.08%	12449	17.02%
2005	5513.7	16.06%	14440	15.99%
2006	6211.84	12.66%	16255	12.57%
2007	7103.96	14.36%	18580	14.30%
2008	8314.4	17.04%	21740	17.01%
2009	8587	3.28%	22447	3.25%
2010	10368.6	20.75%	27076	20.62%
2011	12582	21.35%	32819	21.21%
2012	13691.6	8.82%	35711	8.81%
2013	14454.9	5.58%	37697	5.56%
2014	15039.4	4.04%	39226	4.06%
2015	15083.67	0.29%	39462	0.60%

Source: "Statistical Yearbook of Heilongjiang Province" 2003-2016

2.2 Foreign trade development

From table 2 and 3, it is obvious that the proportion of primary products and industrial products in foreign trade is becoming more reasonable, but the technical content of export commodities is low and the proportion of primary products is still too high. Imports of primary products is still as high as 70% although it shows a downward trend, and resources and primary industrial products are still the main import part.

Table 2 Proportion of export products in Heilongjiang Province

Year	Primary products	Industrial products
1995	58.50%	41.50%
2000	70.30%	29.70%
2004	74.10%	25.90%
2005	87.30%	12.70%
2006	90.30%	9.70%
2007	92.80%	7.20%
2011	94.33%	6.00%
2012	93.84%	6.49%
2013	94.09%	6.29%
2014	94.41%	5.93%
2015	89.29%	11.99%

Source: "Statistical Yearbook of Heilongjiang Province" 1996-2016

Table 3 Proportion of Imported Products in Heilongjiang Province

Year	Primary products	Industrial products
2005	41.2%	58.8%
2007	53.6%	63.4%
2011	87.91%	12.09%
2012	81.62%	39.72%
2013	80.44%	19.56%
2014	81.35%	18.65%
2015	76.39%	23.61%

Source: "Statistical Yearbook of Heilongjiang Province" 2006-2016

Table 4 Mode analysis of trade exchange in Heilongjiang Province

	2011	2012	2013	2014	2015
Ordinary Trade	74.91%	69.53%	67.13%	67.13%	64.55%
Border Trade	17.02%	21.98%	22.66%	21.57%	16.92%
Other	2.27%	3.48%	6.00%	6.60%	3.22%
Processing Trade	2.01%	2.51%	2.55%	2.52%	8.02%

Source: "Statistical Yearbook of Heilongjiang Province" 2012-2016

According to table 4, the general trade has been in the dominant position for many years. Although the proportion of general trade in the past five years showed a downward trend, but it is still as high as 60% or more. The proportion of processing trade is too low while the total amount is too small. Border trade is relatively stable, around 20%.

There are more than 200 countries and regions which have trade with Heilongjiang Province. In recent years, the number of trading partners has been rising, and showing a wide range of characteristics. As can be seen from table 5, the proportion of Russia, which has the largest trade volume in 2015, has declined over the previous year, but still accounts for more than 50%. There are still some problems that the foreign trade market is too narrow and the trade partners are too concentrated.

Table 5 Major trading partners with Heilongjiang Province

2014		2015	
Country	Ratio	Country	Ratio
The Russian Federation	59.85%	The Russian Federation	51.68%
United States	5.53%	United States	7.09%
Angola	2.56%	Brazil	3.74%
Brazil	2.43%	Saudi Arabia	2.80%
Malaysia	1.42%	India	1.99%
Germany	1.34%	Indonesia	1.96%
Saudi Arabia	1.32%	Turkey	1.78%
India	1.28%	Korea	1.69%

Source: "Statistical Yearbook of Heilongjiang Province" 2015-2016

2.3 Dependence degree on foreign trade

The ratio of dependence on foreign trade can show the importance of foreign trade in a country or region. From the horizontal point of view, if the ratio is higher, it means that the status of foreign trade in the economic is higher, the degree of opening up is higher, the participation in international division of labor is deeper and wider. From the vertical point of view, if the ratio has increased, it means that the country or region expanded the degree of opening up, deepened cooperation with trading partners. Or foreign trade growth rate is higher than GDP.

Table 6 Dependence degree on foreign trade of Heilongjiang Province and China

Year	Foreign Trade		Export		Import	
	Heilongjiang	China	Heilongjiang	China	Heilongjiang	China
2004	11.83%	59.03%	6.41%	30.34%	5.42%	28.69%
2005	14.22%	62.42%	9.02%	33.44%	5.20%	28.97%
2006	16.50%	64.24%	10.83%	35.36%	5.67%	28.88%
2007	18.52%	61.77%	13.13%	34.65%	5.38%	27.12%
2008	19.13%	56.31%	13.84%	31.42%	5.28%	24.89%
2009	12.90%	43.16%	8.02%	23.50%	4.88%	19.66%
2010	16.65%	48.84%	10.63%	25.91%	6.02%	22.93%
2011	19.77%	48.31%	9.07%	25.19%	10.70%	23.13%
2012	17.44%	45.18%	6.66%	23.94%	10.78%	21.24%
2013	16.66%	43.37%	6.95%	23.04%	9.70%	20.33%
2014	15.89%	41.03%	7.08%	22.34%	8.81%	18.69%
2015	8.67%	35.81%	3.32%	20.59%	5.35%	15.22%

Source: "Statistical Yearbook of Heilongjiang Province" and "China Statistical Yearbook" 2004-2016

According to table 6, from the vertical point of view, the ratio of dependence on foreign trade of Heilongjiang Province gradually increased since 2001 until reaching a peak of 19.77% in 2011, and then showed a slow downward trend. Due to the sharp decline in foreign trade volume in Heilongjiang Province in 2015, the year's dependence on foreign trade is only 54% of the previous year. Before 2011, the contribution of exports to the economy of Heilongjiang Province has been slightly higher than imports, but since 2011 the situation has changed, the dependence on imports is higher than the export dependence.

But from the horizontal point of view, the ratio of dependence on foreign trade in Heilongjiang Province has been far below than that in China, less than 50%. And the gap with the national average expanded year after year.

3. Empirical analysis

3.1 Selection of sample data

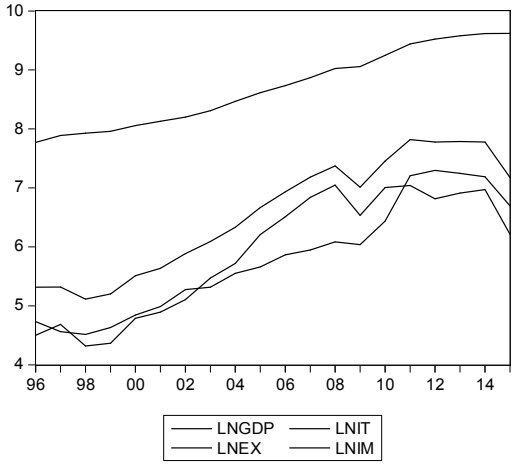

Fig. 1 Trends of lnGDP, lnIT, lnEX, lnIM during 1996-2015

In the empirical analysis, the data of gross domestic product (GDP) of Heilongjiang Province, total foreign trade volume (IT), foreign trade export volume (EX), and foreign trade import volume (IM) are chosen. 1996-2015 is the selected sample interval, using total 20 years of data from "Heilongjiang Statistical Yearbook". In order to make the analysis more rigorous, the logarithm is processed separately for the sample variables. The processed variables are then expressed as lnGDP, lnIT, lnEX, lnIM.

Table 7 Variables after logarithmic changes

	lnEX	lnGDP	lnIM	lnIT
1996	4.499	7.771	4.733	5.316
1997	4.686	7.889	4.562	5.319
1998	4.318	7.928	4.516	5.115
1999	4.365	7.961	4.632	5.201
2000	4.788	8.056	4.845	5.510
2001	4.894	8.129	4.988	5.635
2002	5.104	8.199	5.275	5.886
2003	5.470	8.308	5.316	6.089
2004	5.719	8.466	5.551	6.332
2005	6.209	8.615	5.658	6.664
2006	6.511	8.734	5.865	6.933
2007	6.838	8.868	5.947	7.182
2008	7.048	9.026	6.084	7.372
2009	6.535	9.058	6.039	7.010
2010	7.005	9.247	6.436	7.454
2011	7.040	9.440	7.205	7.819
2012	6.815	9.525	7.297	7.778
2013	6.913	9.579	7.246	7.787
2014	6.971	9.618	7.189	7.779
2015	6.215	9.621	6.694	7.176

Source: "Statistical Yearbook of Heilongjiang Province" 1997-2016

3.2 Unit root test

The original data, first order differential time series and second order differential time series of the above four variables are respectively performed ADF unit root test by Eviews software. The results are shown in table 8.

Table 8 ADF test results

Variable	Inspection type (c,m,t)	ADF Test Value	10% Critical value	Test Result
lnGDP	(c,m,1)	-2.400	-3.287	Unstable
lnIT	(c,m,0)	-0.562	-3.277	Unstable
lnEX	(c,m,0)	-0.187	-3.277	Unstable
lnIM	(c,m,3)	-3.097	-3.310	Unstable
Dln (GDP)	(c,m,0)	-2.344	-3.287	Unstable
Dln (IT)	(c,m,0)	-2.570	-3.287	Unstable
Dln (EX)	(c,m,0)	-3.386	-3.287	Unstable
Dln (IM)	(c,m,0)	-1.980	-3.287	Unstable
Dln (GDP,2)	(c,0,0)	-5.231	-3.887	Stable
Dln (IT,2)	(c,0,1)	-4.488	-3.920	Stable
Dln (EX,2)	(c,0,1)	-5.739	-3.920	Stable
Dln (IM,2)	(c,0,0)	-4.320	-3.887	Stable

(1) For the test form, c represents the constant term, m represents the time trend term, t is the lag order; (2) The number of t is selected according to the minimum principle of AIC and SC value; (3) Dln (A) represents the first order difference of the variable, Dln (A, B) represents the second order difference of the variable; From the table it can be seen lnGDP, lnIT, lnEX, lnIM and their first-order differential time series are not smooth. But ADF statistic of the second order differential is less than the corresponding critical value, so that the second order differential time series are stable.

3.3 Co-integration regression test

First use the two-step EG regression analysis method, and then test the stability of the regression residual, the results can show whether the co-integration relationship between the variables exist or not.

Firstly, economic growth and import and export:

$$\ln GNP = 4.4816 + 0.6426 \ln It + e_{t1} \quad (1)$$

（16.4965）（15.6990）

R^2=0.9319 F-statistic=246.4594 Prob (F-statistic)=0.000000

The statistic of the model is significant, and the regression results show that the equation is highly fitted.

e_{t1} residual stability results:

T_{ADF}=-0.4181>$T_{0.1}$=-1.6071

So that there is no co-integration relationship between lnGDP and lnIT, and the long-term equilibrium relationship between the two does not exist.

Secondly, economic growth and exports:

$$\ln GNP = 5.2793 + 0.5804 \ln EX + e_{t2} \quad (2)$$

（14.4062）（9.4733）

R^2=0.8329 F-statistic=89.7432 Prob (F-statistic)=0.000000

The statistic of the model is significant, and the regression results show that the equation is highly fitted.

e_{t2} residual stability results:

T_{ADF}=0.0398>$T_{0.1}$=-1.6071

So that there is no co-integration relationship between lnGDP and lnEX, and the long-term equilibrium relationship between the two does not exist.

Thirdly, economic growth and imports:

$$\ln GNP = 4.8274 + 0.6676 \ln IM + e_{t3} \quad (3)$$

（24.6050）（20.0025）

R^2=0.9569 F-statistic=400.0986 Prob (F-statistic)=0.000000

The statistic of the model is significant, and the regression results show that the equation is highly fitted.

e_{t3} residual stability results：

T_{ADF}=-3.3137<$T_{0.01}$=-2.7175

So that there is co-integration relationship between lnGDP and lnEX, and the long-term equilibrium relationship between the two also exists.

3.4 Granger causality test

From the results of the co-variance test above can be learned that the economic growth and import volume of Heilongjiang Province has maintained a long-term equilibrium and stable relationship, but there is no long-term equilibrium relationship between foreign trade volume, export volume and economic growth. The last step to complete the empirical test only needs to test whether the causal relationship between the two variables exists or not. As co-integration test results show that GDP and foreign trade, imports do not exist long-term balanced and stable relationship, so the next step only test lnGDP and lnIM causal relationship.

Table 9 Granger causality test

Zero hypothesis	F Statistics	P Value
LnIM is not the Granger cause of lnGDP	0.5733	0.4599
LnGDP is not the Granger cause of lnIM	3.4838	0.0804

As can be seen from table 9, lnIM is not the Granger cause of lnGDP, lnGDP is the reason for lnIM.

That is, the effect of imports in Heilongjiang Province on the economy is not obvious. GDP in Heilongjiang Province has a very significant effect on pulling import trade, and is the reason for the growth of imports.

4. Summary and discussion

4.1 Summary

Firstly, there is a long-term stable relationship between import trade and GDP.

According to the results of co-integration analysis, it can be seen that the linear relationship between foreign trade volumes, export volume in Heilongjiang Province is non-stationary, so there can be no long-term stable relationship between two time series. From a long-term point of view, there is a smooth relationship between imports in Heilongjiang Province and GDP. The two linear combinations also showed a steady state. An increase of 1% of imports will lead to an average increase 0.6676% of GDP.

Secondly, economic growth has a one-way causal relationship with imports.

From Granger test result can conclude that foreign trade in Heilongjiang Province is not the driving force for economic growth, but economic growth is the reason of the development of import trade being promoted.

However, there is no significant relationship between exports and GDP growth.

4.2 Suggestion

The degree of opening up in Heilongjiang Province is too low, and has brought a variety of adverse effects to the development of foreign trade. Heilongjiang Province should actively seek new partners while create deeper and wider cooperation with the existing partners at the same time. The diversification of trading partners and the further decentralization of the proportion of trade objects are of great significance to foreign trade.

Heilongjiang Province has a unique natural conditions and rich in forest resources. With precious black soil resources, the agricultural products are of high quality. Heilongjiang Province can upgrade the existing resource-intensive products for deep processing, with technological transformation and product upgrades. This will be able to enhance the added value of products and improve profit margins, and the resource advantages can be converted to economic advantages.

Heilongjiang Province can learn reforming administrative and trade policies from other developed provinces, to reduce unnecessary institutional departments and approval procedures as much as possible. At the same time issue relevant support policies to bring convenience to small and medium enterprises and bring vitality to the economy. The provincial government should also do a good job of service work; make full use of information technology to promote the flow of information in the trade industry and timely update international trade information. So that import and export enterprises can follow the international pace and avoid unnecessary economic losses brought when the information is not smooth.

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