Research on the Relationship between Sino-EU Trade and Economic Growth

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Abstract. The dependence on foreign trade of China and European Union are both at a relatively high level, and the space for Sino-EU trade is still enormous. So, this paper adopts cointegration analysis and error correction model to study the relationship between Sino-EU trade and economic growth from a long-term and short-term perspective respectively. Cointegration analysis shows that: whether it is Sino-EU trade and China's economic growth or Sino-EU trade and EU's economic growth, there exists long-term cointegration relationship between them. Sino-EU trade plays a more important role in economic growth of China than its role in stimulating economic growth of European Union. Error correction model demonstrates that Sino-EU trade may deviate from its long-run equilibrium with economic growth in the short run.
Key words: research, relationship, trade, economic growth

1 Introduction

In recent years, the all-round cooperation between China and European Union has been steadily promoted, the economic and trade cooperation has been fruitful. For a long time, the EU has been China's largest trading partner, the largest source of technology and an important source of foreign investment. According to the data from Eurostat, the proportion of trade between the EU and China has increased by three times since 2000, from 5.5% to 14.9% in 2016, and total trade has reached 515 billion euro. In 2016, the EU's major import source was China, which was up to 20% of EU's imports from the non-EU, and China ranked second in EU export destination, which was up to 10% of EU's exports to non-EU countries. In June 2017, Li Keqiang, Premier of China's State, pointed out that there's broad prospects for economic and trade cooperation between China and EU in the twelfth EU-China Business Summit. Also, China is at an important stage of consumption upgrading and industrial upgrading, it's economy remains at around 6.5% growth at medium and high levels. So, the demand for European high-quality consumer goods, advanced technology equipment and outstanding services is increasing. At the same time, the upturn of Europe economic, steady growth of its' household consumption, the increasing of infrastructure investment will also provide new opportunities for Chinese enterprises. Therefore, with the further development of Sino-EU trade, it is of great significance to explore the relationship between Sino-EU trade and economic growth.

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However, in the process of developing the trade between China and European Union, trade frictions have been a fact that cannot be ignored. It has affected the trade relations between China and European Union seriously. Therefore, with the further development of Sino-EU trade, understanding the relationship of Sino-EU trade and economic growth correctly is of great significance for further strengthen bilateral economic and trade exchanges and achieving win-win situation in economic development for both sides.

The relationship between economic growth and foreign trade has always been the focus of scholar's attention. In 1930s, economist Robertson proposed the view that foreign trade is the engine for growth for the first time. From then on, many scholars' research supported this opinion. Balassa [1] investigates the relationship between exports and economic growth in a group of eleven developing countries that have already established an industrial base, and results show that export can promote economic growth. Edwards [2] develops a simple endogenous growth model that emphasizes the process of technological absorption in small developing countries, and holds the view that countries that liberalize their international trade and become more open tend to grow faster. Liu and Sinclair [3] find that economic development, exports and FDI appear to be mutually reinforcing under the open-door policy. Makki and Somwaru [4] analyze the role of FDI and trade in promoting economic growth across selected developing countries and the interaction among FDI, trade, and economic growth, their results suggest that FDI, trade, human capital, and domestic investment are important sources of economic growth for developing countries. Evidence supports the view that foreign direct investment has a positive effect on economic growth in the host country. Saggi [5] and Schneider [6] find that foreign technology has a stronger impact on per capita GDP growth than domestic technology.

Also, many scholars study the influence of international trade on environment, technology and so on. Frankel and Rose [7] find that trade tends to reduce three measures of air pollution and there is little evidence that trade has a determinantal effect on the effect. Galiani and Sanguinetti [8] study the impact of trade liberalization on wage inequality. Their research suggests that trade deepening can only explain a relatively small proportion of the observed rise in wage inequality.

However, contrary to the conventional view on the growth effects of trade barriers, Dhawan and Biswal [9] find that trade barriers are positively and, in most specifications, significantly associated with growth. Lee [10] uses Vector Autoregressive (VAR) model to examine the relationship between real GDP, real exports and terms of trade for India during the period 1961-93. Their results reveal that there is one long-run equilibrium relationship among the three variables, and the causal relationship flows from the growth in GDP and terms of trade to the growth in exports, and the causality from exports to GDP appears to be a short run phenomenon. Lu [11] finds that tariff rates and black-market premia, interacting with the estimated share of free trade imports, have significant negative effects on the growth rate of per capita income across countries. So, there is a dispute over the relationship between economic growth and foreign trade.

And many researchers from China hold view that foreign trade will promote China's economic growth. Bao [12] analyzes the relationship between Sino-EU trade volume and economic growth of China, results showed that there is positive correlation between them. Jiang [13] studies the interdependence between China and Europe in trade and economic growth, and the governance of trade protectionism, he finds that there's close relationship and interdependence for China and Europe's trade and economic growth, the development of Sino-EU trade promotes the economic growth of China and Europe. Spulber [14] point out that the overall pulling effect of Sino-EU trade on China's added value and employment is far greater than that of the EU's added value and employment, while its efficiency of boosting added value is less than that of the European Union.

This paper studies the relationship between Sino-EU trade and economic growth from a long-term and short-term perspective respectively. The following structure of this paper is: a brief description of the characteristics of Sino-EU trade and economic growth will be presented in section 2. Section 3 will explore the short-term and long-term relationship between Sino-EU trade and economic growth through cointegration analysis and error correction model. Section 4 is conclusion.

2 Statistical analysis of Sino-EU trade and economic growth

To examine the relationship between Sino-EU trade and economic growth, this paper uses data of economic growth, foreign trade and bilateral trade of China and European Union from 2000 to 2015. The data of Sino-EU trade and total foreign trade comes from UN Comtrade Database. And we get the data of economic growth from China's National Bureau of Statistics and Eurostat respectively.

The degree of dependence on foreign trade is the proportion of total foreign trade in GDP, which is used to measure the dependence of a country's economy on international trade, or the dependence of a country's production and consumption on the international market or the world economy. Figure1 and Figure 2 show the dependence on foreign trade of China and EU. As is shown in the Figure1, the dependence on foreign trade of China is at a relatively high level, which reflects that there's a large dependence on foreign trade of China's economic growth. But the dependence on foreign showed a trend of declining to a certain extent since 2007. This is closely related to the faltering of world economy and the reducing external demands of goods since the subprime mortgage crisis in 2007. As can be seen from Figure 2, the EU's dependence on foreign trade is also at a relatively high level, but lower than China, and there has been a certain decline in recent years.
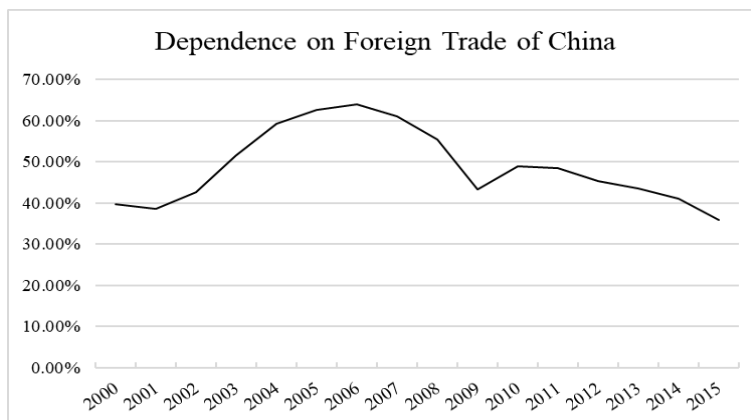

Fig. 1. Dependence on Foreign Trade of China

Fig. 2. Dependence on Foreign Trade of EU

Figures 3 and 4 show the proportion of Sino-EU trade in China and EU's total foreign trade respectively. It is not difficult to find that Sino-EU trade accounts for about 15% of China's total foreign trade in recent years, and remains at a relatively stable state. Also, Sino-EU trade accounts for a steady rise in the proportion of EU's total foreign trade. So, there's a close trade relation between China and EU, and the space for further trade is still enormous.

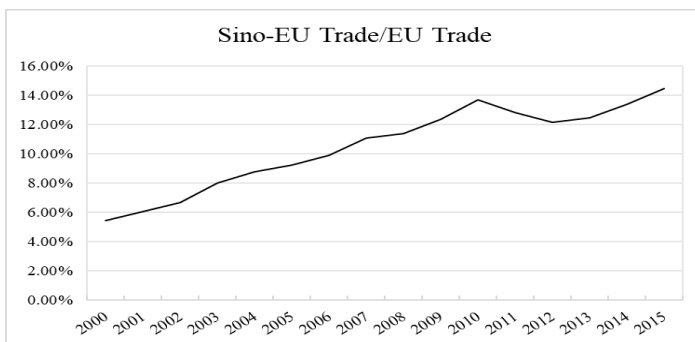**Fig.3.** Ratio of Sino-EU Trade to China's Trade

Fig. 4. Ratio of Sino-EU Trade to EU's Trade

3 Empirical analysis of Sino-EU trade and economic growth

The cointegration theory proposed by Engle and Granger provides an effective tool for the analysis of non-stationary time series and for the long-term equilibrium relationship of non-stationary time series data. And error correction model (ECM) proposed by Davidson, Hendry, Srba and Yeo is an extension of cointegration analysis. If there is a short-term deviation for some reason, it is bound to return the equilibrium state by correcting the error. The error correction model combines short-term volatility with long-term equilibrium in one model. So, this paper adopts cointegration theory and ECM to research the relationship between Sino-EU trade and economic growth. That is, we construct equation of Sino-EU trade (X) and China's economic growth (Y1) and Sino-EU trade (X) and EU's economic growth (Y2) respectively. In order to eliminate the possible heteroscedasticity of variables, this paper deals the economic variables with natural logarithm.

3.1 Unit root test

Before cointegration analysis, the unit root test is needed to test whether the time series is stationary, and the result is shown in Table1.

Table 1. Unit Root Test

Variables	Testing value of ADF	P-values	Conclusions
lnX	0.8577	0.9989	Non-stationary
lnY1	-0.6368	0.8340	Non-stationary
lnY2	-0.9393	0.9226	Non-stationary
ΔlnX	-3.584	0.0805	Stationary
ΔlnY1	-5.426	0.0056	Stationary
ΔlnY2	-4.669	0.0139	Stationary

As is shown in table 1, results of ADF unit root test indicate that time series lnX, lnY_1 and lnY_2 are non-stationary, while its' first order difference ΔlnX, ΔlnY_1 and ΔlnY_2 are stationary. That is, X, lnY_1 and lnY_2 are all integrated of order one I(1). So, cointegration analysis can be carried out.

3.2 Cointegration analysis

Using the E-G two step methods, we construct cointegration regression between Sino-EU trade and China's economic growth, Sino-EU trade and EU's economic growth to test their cointegration and long-term equilibrium relationship.

The cointegration equation between Sino-EU trade and China's economic growth is:

$$\ln Y_1 = 0.3578 + 0.7838 \ln X \tag{1}$$

Among which, each coefficient is tested by the significant level of 5%, $R^2 = 0.9260$. And the ADF unit root test of residual series (testing value of ADF is -2.204, P-values is 0.05) indicate that the series is stationary.

The cointegration equation between Sino-EU trade and EU's economic growth is:

$$\ln Y_2 = 19.65 + 0.3913 \ln X \tag{2}$$

Among which, each coefficient is tested by the significant level of 5%, R² = 0.9570. And the ADF unit root test of residual series (testing value of ADF is -1.818, P-values is 0.06) indicate that the series is stationary.

The significance of cointegration is that it reveals whether there is a long-term stable equilibrium between economic growth and Sino-EU trade. The economic variables that satisfy the cointegration cannot be deviated from each other too far, and a shock can only make them deviate from the equilibrium position in a short time and automatically revert to equilibrium in the long run. Therefore, whether it is Sino-EU trade and China's economic growth or Sino-EU trade and EU's economic growth, there exists long-term cointegration relationship between them. Also, Sino-EU trade plays a more important role in economic growth of China than its role in stimulating economic growth of European Union.

3.3 Error correction model

Cointegration analysis reflects the long-term equilibrium relationship between economic growth and foreign trade. The relationship between economic growth and foreign trade can be unbalanced, and this dynamic structure of the short-term disequilibrium relation can be described by the error correction model.

The error correction model of Sino-EU trade and China's economic growth is:

$$\Delta \ln Y_1 = 0.1191 + 0.1765 \, \Delta \ln X - 0.2359 e_{t-1} \qquad (3)$$

$$t = (10.03) \quad (3.074) \qquad \qquad (-5.117)$$

Among which R² = 0.7370.

The error correction model of Sino-EU trade and EU's economic growth is:

$$\Delta \ln Y_2 = -0.0101 + 0.4875 \, \Delta \ln X - 0.402 e_{t-1} \qquad (4)$$
$$t = (-2.6679) \quad (5.821) \qquad (-1.908)$$

Among which R² = 0.7462.

The parameters of equation (3) and (4) are all tested by significant test. What's more, error correction term e_{t-1} is also tested by significant test, which means that Sino-EU trade may deviate from its long-run equilibrium with economic growth in the short run, and its coefficient is negative, which shows that it conforms to the error correction mechanism.

4 Conclusions

Sino-EU trade plays an important role in the economic growth of China and European Union just as demonstrated by the empirical research in this paper. Also, Sino-EU trade may deviate from its long-run equilibrium with economic growth in the short term, but we cannot deny its driving force for economic growth.

Therefore, in order to further promote Sino-EU trade, the following suggestions are put forward. Firstly, practical measures must be taken to reduce trade protectionism in some European countries and to create a favourable market and institutional environment for Sino-EU trade and economic growth. Secondly, China and European Union are at different stages of economic development, and differences in the industrial structure and factor endowments between them are huge. So, we should make full use of China and EU's comparative advantages and give full play to their complementary trade. Also, technology trade improves the quality of innovation by increasing the pool of R&D experiments from

which the best technology is chosen (Spulber, 2008). So, some measures should be taken to promote the development of technology trade. In a word, extensive cooperation should be carried out in eras such as environmental protection, technology, economic and so on. Both sides should create opportunity to promote mutual trade and economic growth with respect to foreign investment growth, household consumption and the demand for qualified labour.

References

1. B. Balassa, Exports and economic growth: further evidence. *Journal of development Economics*, **5**(2), 181-189 (1978)
2. S. Edwards, Trade orientation, distortions and growth in developing countries. *Journal of development economics*, **39**(1), 31-57 (1992)
3. X. Liu, P. Burridge, Sinclair, Relationships between economic growth, foreign direct investment and trade: evidence from China. *Applied economics*, **34**(11), 1433-1440 (2002)
4. S. Makki, A. Somwaru, Impact of foreign direct investment and trade on economic growth: Evidence from developing countries. *American Journal of Agricultural Economics,* **86**(3), 795-801 (2004)
5. K. Saggi, Trade, Foreign Direct Investment, and International Technology Transfer: A Survey. *World Bank Research Observer*, **17**(2), 191-235 (2002)
6. P. Schneider, International trade, economic growth and intellectual property rights: A panel data study of developed and developing countries. *Journal of Development Economics*, **78**(2**)**, 529-547 (2005).
7. J. A. Frankel, A. K. Rose, Is Trade Good or Bad for the Environment? Sorting Out the Causality. *Review of Economics & Statistics*, **87**(1), 85-91 (2005)
8. S. Galiani, P. Sanguinetti, The impact of trade liberalization on wage inequality: evidence from Argentina. *Journal of Development Economics*, **72**(2), 497-513 (2003)
9. U. Dhawan, B. Biswal, Re-examining export-led growth hypothesis: a multivariate cointegration analysis for India. *Applied economics,* **31**(4), 525-530 (1999)
10. J. W. Lee, International Trade, Distortions, and Long-Run Economic Growth. *Staff Papers*, **40**(2), 299-328 (1993).
11. F. Lu, Correlation Analysis between Sino-European Union Trade and China's Economic Growth. *Journal of international trade*, 03 47-50 (2005)
12. J. Bao J., On interdependence of trade and economic growth between China and Europe and policy choice for new protectionism, **5**, 29-37 (2010)
13. X. Y. Duan, Jiang, The impact of Sino-EU trade on bilateral economy and employment. *Journal of international trade*, **8**, 29-39 (2012)
14. D. F. Spulber, Innovation and international trade in technology. *Journal of Economic Theory*, **138**(1), 1-20 (2008)