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Feifei Huang

*College of Management, Xiamen University, Xiamen, China; College of Management, Jimei University, Xiamen, China*

Lu Wang

*College of Management, Jimei University, Xiamen, China*

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# Empirical Research on the Relationship between Foreign Trade Growth and Cross-Border Electronic Commerce in Fujian Province

*Feifei Huang<sup>1, 2</sup>, Lu Wang<sup>2</sup>*

<sup>1</sup> College of Management, Xiamen University, Xiamen, China

<sup>2</sup> College of Management, Jimei University, Xiamen, China

**Abstract:** Based on the of domestic and foreign scholars' researches, foreign trade growth has a booming effect on economic development, otherwise, the role of cross-border electronic commerce developing in international trade business and economic still has not been proved by the actual data available. This essay selects quarterly data of foreign trade and cross-border electronic commerce in Fujian Province who has the advantages of foreign trade, to makeup the VEC model and research the relationship between the growth of foreign trade and cross-border e-commerce, the results show that: there is the long-term interactive relationship between foreign trade growth and cross-border electronic commerce. Cross-border electronic commerce in Fujian province is only starting, needing more positive and long-term policies to promote.

Keywords: Cross-Border e-Commerce, Foreign Trade, Empirical Research, VEC

## 1. INTRODUCTION

China's foreign trade industry rise rapidly since having joined the world trade organization, which greatly promoted the economic development, but in recent years, the increase of foreign trade has slowed or even stagnated, seeking the transformation and upgrading for industry is a vital issue in the current foreign trade in 2013, cross-border electronic commerce was recognized and concerned widely, for its low cost, fast speed, fewer steps and other specific advantages, it is considered to be a new foreign trade mode, which can reduce costs effectively, create more opportunities of trade and employment. Cross-border electronic commerce has the operational and practical significance in reforming China's industrial structure, taking economic transformation, up grading the foreign trade and our country's economic growth <sup>[1]</sup>. As a result, our country and local governments have instituted many policies on cross-border electronic commerce to support it, but the applicability of these policies needs to be further discussed.

The former studies are mainly about relationship between foreign trade and economic growth, and their actual data, the research on a this new cross-border electronic commerce model is insufficient, at present, a lot of researches have still focused on the promoting role of cross-border electronic commerce to foreign trade, not on the empirical research, this essay provide a theoretical basis for drawing up the policies by choosing the relevant cross-border electronic commerce and foreign trade data in Fujian province, which having the advantages of foreign trade, and also by using the VAR model analysis the interaction mechanism between foreign trade and cross-border electronic commerce.

## 2. COMPREHENSIVE REVIEWS

Libin E, Yongwen Huang (2014) compared cross-border e-commerce with traditional foreign trade industry by the following five aspects of trade steps, industrial chain, product cost, production and policy guidance, showing that the development of cross-border electronic commerce has better opportunities <sup>[2]</sup>, but also face the adjustment, our governments should give more policy supporting. Cheng Chang (2015) analyzed the promoting role of cross-border electronic commerce on the trade increasing from the two aspects of qualitative and quantitative analysis, showing that cross-border electronic commerce will not only promote the development of

foreign trade, but also will benefit from the new opportunities brought by the growth of foreign trade demand in the long time<sup>[3]</sup>. Yu (2016) also found that cross-border electronic commerce has played an important role in promoting China's foreign trade by using case analysis<sup>[4]</sup>. On the other hand, Ji(2016) analyzed whether the cross-border electronic commerce has a subtle influence on China's foreign trade or not by the Transaction cost theory and Agglomerative economies theory, combined with the Alibaba, and showing that cross-border electronic commerce has not only created the perfect shopping experience but improved China's foreign trade<sup>[5]</sup>. Wenjing Yu (2016) found cross-border electronic commerce has a profound effect on China's foreign trade using case analysis method from two aspects of business mode and value chain reconstruction<sup>[6]</sup>. Most scholars agree that electronic commerce can promote the development of cross-border electronic commerce, but few scholars have done special researches on whether the trade development can promote cross-border electronic commerce, when and how to draw up the relevant policies. Fengyi Li (2016) analyzed the role of cross-border electronic commerce investment by econometric analysis, and then drew the conclusion that cross-border electronic commerce has the long-term promoting role to foreign trade<sup>[7]</sup>. Feng Zuo (2016) analyzed the effect of cross-border electronic commerce on economic growth in Guangdong Province using cointegration, and found the long-term equilibrium relationship between them<sup>[8]</sup>.

According to the present documents, we can find that the researches on cross-border electronic commerce mainly depended on qualitative analysis, the few quantitative study without focusing on the long-term relationship between cross-border electronic commerce and the trade economic data, and did not research its short-term force, additionally, there has been a large number of study on the relationship between foreign trade and economic growth, the relationship between cross-border electronic commerce and economic growth on the country, there was not many quantitative researches on the relationship between cross-border electronic commerce and foreign trade, therefore, this essay takes cross-border electronic commerce as the research object, trying to make the quantitative analysis the relationship of cross-border electronic commerce and foreign trade.

### 3. THEORETICAL CONSTRUCTION AND EMPIRICAL ANALYSIS OF VAR MODEL

#### 3.1 Theoretical model ideas seem similar to Alexander's synthesis of form.

The VAR model is an extension of the time series autoregressive model (AR), in which each endogenous variable in the system is constructed as a function of the lagged values of all endogenous variables in the system, describing the endogenous variables of  $n$  during the same sample period as a linear function in the past values.<sup>[9]</sup>The VAR model constructed in this paper contains three endogenous variables: the total amount of foreign trade in Fujian Province (billion yuan), the amount of cross-border e-commerce transactions in Fujian Province (billion yuan), the number of netizens in Fujian Province people(million people).

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + u_t; \quad Y_t = \begin{bmatrix} \ln T \\ \ln E \\ \ln N \end{bmatrix} \quad (1)$$

#### 3.2 Data selection and unit root test

This paper collects 24 quarterly data of Fujian Province from 2011 to 2016, of which the total amount of foreign trade comes from Bureau of Statistics of Fujian Province<sup>[10]</sup>, the Cross-border e-commerce, Netizen data are from China E-Commerce Research Center, and metering software chooses STATA and EVIEWS. To remove the heteroscedasticity, we should make the logarithm from original data and begin stationarity tests. The results are as follows: At 5% level, the sequence is integrated of second order.

**Table 1. ADF unit root test results**

Variable <sup>⊖</sup>	ADF Statistic <sup>⊖</sup>	1% Critical Value <sup>⊖</sup>	5% Critical Value <sup>⊖</sup>	10% Critical Value <sup>⊖</sup>	P <sup>⊖</sup>	Result <sup>⊖</sup>
LnT <sup>⊖</sup>	-2.2756 <sup>⊖</sup>	-3.7696 <sup>⊖</sup>	-3.0049 <sup>⊖</sup>	-2.6422 <sup>⊖</sup>	0.1879 <sup>⊖</sup>	unstationarity <sup>⊖</sup>
DLnT (-1) <sup>⊖</sup>	-1.5565 <sup>⊖</sup>	-3.7696 <sup>⊖</sup>	-3.00489 <sup>⊖</sup>	-2.6422 <sup>⊖</sup>	0.4871 <sup>⊖</sup>	unstationarity <sup>⊖</sup>
DLnT (-2) <sup>⊖</sup>	-5.6068 <sup>⊖</sup>	-3.7880 <sup>⊖</sup>	-3.01236 <sup>⊖</sup>	-2.6461 <sup>⊖</sup>	0.0002 <sup>⊖</sup>	stationarity <sup>⊖</sup>
LnE <sup>⊖</sup>	-1.5077 <sup>⊖</sup>	-3.7529 <sup>⊖</sup>	-2.9981 <sup>⊖</sup>	-2.6388 <sup>⊖</sup>	0.5119 <sup>⊖</sup>	unstationarity <sup>⊖</sup>
DLnE(-1) <sup>⊖</sup>	-2.0869 <sup>⊖</sup>	-3.7696 <sup>⊖</sup>	-3.0049 <sup>⊖</sup>	-2.6422 <sup>⊖</sup>	0.2512 <sup>⊖</sup>	unstationarity <sup>⊖</sup>
DLnE(-2) <sup>⊖</sup>	-4.7056 <sup>⊖</sup>	-3.7880 <sup>⊖</sup>	-3.0123 <sup>⊖</sup>	-2.6461 <sup>⊖</sup>	0.0013 <sup>⊖</sup>	stationarity <sup>⊖</sup>
LnN <sup>⊖</sup>	-1.63429 <sup>⊖</sup>	-3.7880 <sup>⊖</sup>	-3.0124 <sup>⊖</sup>	-2.6461 <sup>⊖</sup>	0.4483 <sup>⊖</sup>	unstationarity <sup>⊖</sup>
DLnN(-1) <sup>⊖</sup>	-3.3591 <sup>⊖</sup>	-3.7880 <sup>⊖</sup>	-3.0124 <sup>⊖</sup>	-2.6412 <sup>⊖</sup>	0.0248 <sup>⊖</sup>	stationarity <sup>⊖</sup>
DLnN(-2) <sup>⊖</sup>	-3.4582 <sup>⊖</sup>	-3.7880 <sup>⊖</sup>	-3.0124 <sup>⊖</sup>	-2.6462 <sup>⊖</sup>	0.0202 <sup>⊖</sup>	stationarity <sup>⊖</sup>

### 3.3 VAR model of the order

According to the information criteria, select LR, AIC and SIC, the comparison results are as follows, select the order of 5.

**Table 2. The best lag period to determine the results**

滞后阶数 <sup>⊖</sup>	LOGL <sup>⊖</sup>	LR <sup>⊖</sup>	FPE <sup>⊖</sup>	AIC <sup>⊖</sup>	SC <sup>⊖</sup>	HQ <sup>⊖</sup>
0 <sup>⊖</sup>	52.52874 <sup>⊖</sup>	NA <sup>⊖</sup>	1.09E-06 <sup>⊖</sup>	-5.213551 <sup>⊖</sup>	-5.064429 <sup>⊖</sup>	-5.188314 <sup>⊖</sup>
1 <sup>⊖</sup>	173.1107 <sup>⊖</sup>	190.3926 <sup>⊖</sup>	8.82E-12 <sup>⊖</sup>	-16.95902 <sup>⊖</sup>	-16.36253 <sup>⊖</sup>	-16.85807 <sup>⊖</sup>
2 <sup>⊖</sup>	181.9553 <sup>⊖</sup>	11.17214 <sup>⊖</sup>	9.81E-12 <sup>⊖</sup>	-16.94266 <sup>⊖</sup>	-15.89881 <sup>⊖</sup>	-16.766 <sup>⊖</sup>
3 <sup>⊖</sup>	189.9744 <sup>⊖</sup>	7.597058 <sup>⊖</sup>	1.39E-11 <sup>⊖</sup>	-16.83941 <sup>⊖</sup>	-15.34819 <sup>⊖</sup>	-16.58704 <sup>⊖</sup>
4 <sup>⊖</sup>	224.52 <sup>⊖</sup>	21.81824 <sup>⊖</sup>	1.66E-12 <sup>⊖</sup>	-19.52842 <sup>⊖</sup>	-17.58983 <sup>⊖</sup>	-19.20033 <sup>⊖</sup>
5 <sup>⊖</sup>	362.1716 <sup>⊖</sup>	43.46893* <sup>⊖</sup>	8.84e-18* <sup>⊖</sup>	-33.07069* <sup>⊖</sup>	-30.68474* <sup>⊖</sup>	-32.66690* <sup>⊖</sup>

### 3.4 Cointegration test and VEC model

In this paper, we choose Johansen co-integration test for Cointegration test of multiple variables <sup>[11]</sup>. The results show that there are two co-integration:

$$\begin{aligned} LnT &= -0.3827LnE \\ LnT &= 0.3860L \end{aligned} \quad (2)$$

VEC model is based on the VAR model with a cointegration relationship constraint model. It focuses on the long-term balanced relationship between variables and reflect the dynamic influence between variables.

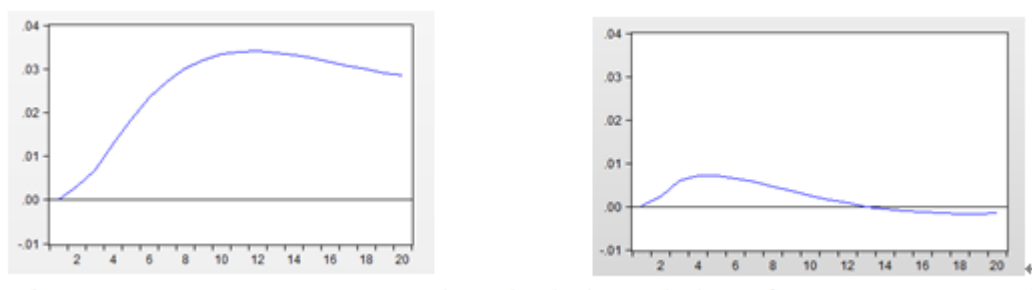
$$\Delta Y_{t-1} = \begin{pmatrix} -0.52 \\ 0.71 \\ -0.53 \end{pmatrix} Co\ int\ EQ_{t-1} + \begin{pmatrix} 0.39 & 0.13 & 0.16 \\ 0.04 & -0.01 & -0.28 \\ 0.54 & 0.73 & 0.90 \end{pmatrix} \Delta Y_{t-1} + \dots + \Delta Y_{t-4} + u_t; \quad (3)$$

$$\Delta Y_{t-1} = \begin{pmatrix} 0.05 \\ -0.12 \\ 0.11 \end{pmatrix} Co\ int\ EQ_{t-1} + \begin{pmatrix} 0.42 & 0.17 & 0.17 \\ 0.01 & 0.31 & -0.08 \\ 0.52 & -0.39 & 0.05 \end{pmatrix} \Delta Y_{t-1} + \dots + \Delta Y_{t-4} + u_t; \quad (4)$$

The judgment coefficient of the equation R2 = 0.8956, the revised judgment coefficient R2 = 0.8260; AIC = -16.01388, SC = -14.37248, they are all negative number, indicating that the correction model is good. The AR root test was used to test the stability of the model. The test results showed that the reciprocal of all the characteristic roots 's absolute value is less than 1 and all the distributed points were located in the unit round, the model was stable.

### 3.5 Impulse Response Function IRF

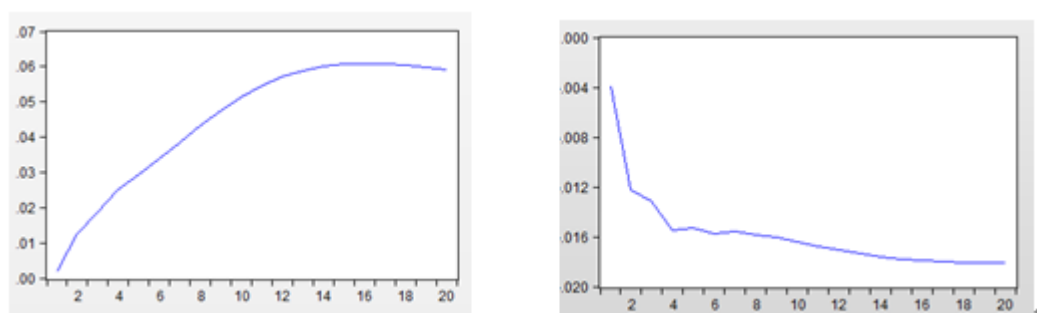
Using the impulse response function and variance decomposition, we analyze the dynamic behavior of the VEC model. Impulse response function (IRF) is used to measure the impact of a standard deviation impact on the current and future values of all endogenous variables in the VEC model. Fig. 1 depicts the IRFs of  $\ln T$ ,  $\ln E$ , and  $\ln N$ .



**Figure 1. Impulse response of  $\ln T$  to  $\ln E$ , and impulse response of  $\ln T$  to  $\ln N$ , respectively.**

When  $\ln E$  lashed to  $\ln T$ ,  $\ln T$  began to respond positively, the response was very rapid, and showed the largest response at the twelfth period, the later stage slowly slow down into the stable period. This finding suggests that the impact of the Cross-border e-commerce transactions in Fujian Province can induce a rapid increase on the Fujian Province's total import and export trade in a short period of time. The gradual slowdown in the impact of cross-border e-commerce in Fujian Province may due to the fact that the cross-border e-commerce still has some problems, lack of stamina. When  $\ln T$  lashed to  $\ln E$ , there will be a up and down effect to  $\ln T$ , and in the 13th, it's around at 0. eventually, the negative response began to converge and into the stable period. The growth rate is small, indicating that the number of netizens in Fujian Province has a cyclical fluctuations to the foreign trade in Fujian Province in the short term, but in the long run, the wave gradually disappear, which indicate that the impact is not deep.

Fig. 2 depicts the IRFs of  $\ln E$ ,  $\ln T$ , and  $\ln N$ .



**Figure 2. Impulse response of  $\ln E$  to  $\ln T$ , and impulse response of  $\ln E$  to  $\ln N$ , respectively.**

When  $\ln T$  make an impact to  $\ln E$ ,  $\ln E$  affected significantly and began to rise, reaching the maximum around the 15th, began to decline gradually. This shows that the impact on the volume of foreign trade transactions in Fujian Province can lead to the rapid growth of cross-border e-commerce transactions in Fujian Province over a certain period of time. As seen from Figure 3-5,  $\ln N$  makes impact on  $\ln E$ ,  $\ln E$  showed a downward trend overall, and began into the eriod of stability only after the 12th; This shows that the relationship between the number of Internet users in Fujian province and Fujian's foreign trade is not obvious, which is consistent with the actual situation.

### 3.7 Variance decomposition

By Variance decomposition, we can analyze the contribution rate of each variable's lag period to the volatility

of the target variable, reflecting the relative importance of the each endogenous variable's random impact in the VAR system.

### 3.7.1 Variance contribution of variables to the foreign trade

Variance decomposition results in Fig 3 support and complement the empirical findings from the impulse response functions. According to the results of variance contribution, we can see that the foreign trade is affected by its own fluctuations only in the first period, and the second period begins to show the variance contribution of the change rate of cross-border e-commerce transactions. It rose to 87% at the 13th period and began to stabilize. The netizen change rate reached 22% in the third phase, with a clear short-term promotion effect and a long-term stability of about 1.6%.

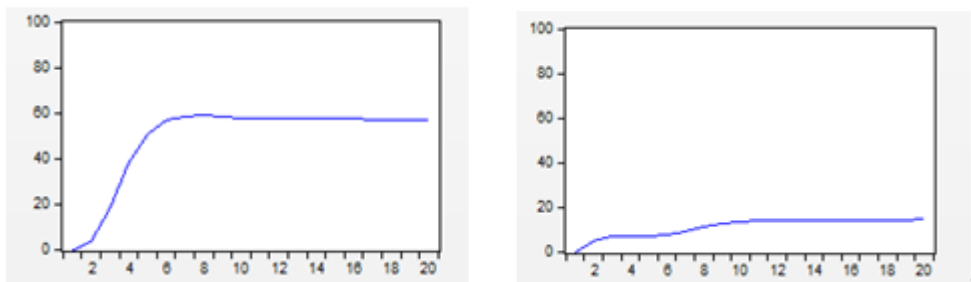


Figure 3. The variance decomposition of LnT

### 3.7.2 Variance contribution of variables to the cross-border e-commerce transaction volume

The variance contribution to the cross-border e-commerce transaction volume is shown in Fig 4. In the first phase, the cross-border e-commerce was affected by its own impact about 99%, and from the second phase, the foreign trade and the number of netizens's effect began apparent. the impact of foreign trade was basically stable and finally maintained at 11% after the fourth phase reached 13.8%, While the number of Internet users reached the maximum in the eighth period, then slowly declined.

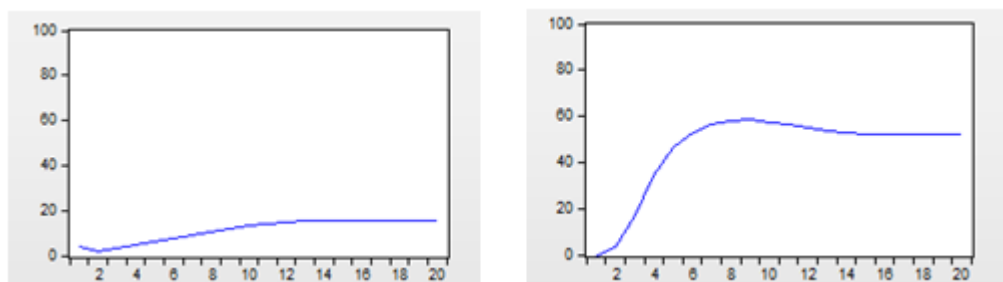


Figure 4. The variance decomposition of LnE

The results of the variance show that there is an interaction between the cross-border e-commerce and foreign trade, the economic development affect of cross-border e-commerce to foreign trade fully demonstrated in one year and the effect is long-lasting. However, the development impact of foreign trade to the cross-border e-commerce is relatively small, less than 15%. After all, we are still a trade surplus nation, the number of Internet users has little effect on foreign trade economy. It has a limited impact. However, Internet users still have an impact on the development of cross-border electricity suppliers in the long run. So talent base is an important driving force for industrial development.

#### 4. CONCLUSIONS

This essay discusses the dynamic relationship between foreign trade and cross-border electronic commerce in Fujian province. The utilized foreign trade data are from Fujian province having the advantages of foreign trade and cross-border electronic commerce, by VEC model, we can find there is the interactive relationship between the total amount of foreign trade and cross-border electronic commerce transactions, the number of Internet users, moreover, we also can find the influence of cross-border electronic commerce on foreign trade is stronger, foreign trade on cross-border electronic commerce relatively weaker.

The results of empirical research showed the relationship between foreign trade and cross-border electronic commerce has the following characteristics: first, the government's great attention, more dividend policies making, especially the establishment of the free-trade area provide conditions for the development of cross-border electronic commerce, and promote its development greatly, and in the short term (1-3 years) can achieve certain profit, which will become an important driving force to foreign trade, if the policy is persistent, this force will last long time; however the advantages of traditional foreign trade does not mean it has the priority in new emerging industries, foreign trade transformation is a long-term job, this need to play a more active role of the government, adjusting industrial policy and industrial structure to promote foreign trade transformation and upgrading based on the various time and conditions. We should take market demand as the guidance, constantly open new fields, improve the proportion and requirements of business and information service industry, draw up relevant policies, set up unique core foreign trade industries and enhance the influence in international trade. Furthermore, with the national policy support, Fujian province establish experimental free-trade area, the government should strongly recognize the great advantage of cross-border electronic commerce, using the advantage of free-trade area, to accelerate the exchange of information between enterprises, to guide transformation and upgrading of cross-border electronic commerce and foreign trade industry.

The influence of net users are not expected to be obvious, showing that the basic facilities, our Internet penetration rate has reached a certain degree, the online transaction has become a common way of trading, the policy for future guidance should not be using any longer, but should turn to the in-depth application and understand the enterprise need to enhance the international competitiveness.

The rapid development of cross-border electronic commerce in Fujian Province will not only introduce the new business model into the traditional foreign trade industry, but apply the advantages of low cost and cross international exchange to foreign trade, it has become an important driving force of foreign trade of Fujian province; yet the effect of number of net user on foreign trade growth is limited, this lower degree told us there still exist some problems in the actual cross-border electronic commerce in Fujian province.

As everyone knows, cross-border electronic commerce is based on electronic commerce transaction mode<sup>[12]</sup>, its development can never break away the coordination of the customs, logistics, after sale service and tax etc., the supply chain is not enough, only the government solve the problems of import and export and logistics, can that further motivate the enterprises' initiative, accelerate the upgrading and promote the economic development.

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