

Analysis of China's E-commerce and Economic Development by VAR Model

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Abstract: with rapid development of economy in each country, more and more facts have proved that e-commerce has a positive effect on economy. At the same time, development of economy has made higher demands for e-commerce in extent and depth. Based on the data between 1999 and 2007 about the developing conditions of e-commerce and economy, this paper builds a VAR model about the dynamic relationship between China's e-commerce and economic development. On the base of the model, causality test and impulse response function, it analyzes the dynamic effects between e-commerce and economic development. The study shows that China's e-commerce has a positive effect on the development of economy. So the government and relevant departments should spend more efforts to support e-commerce industry and perfect the trade mechanism. Besides, entrepreneurs should also have an advanced sense of e-commerce.

Keywords: E-commerce, Industry, Payroll security, VAR Model, Conceptual Marketing

1 Introduction

Based on the rapid development of Internet technology, and under the leadership of information technology departments, a new word "new economy" shows up in the global economy zone. And e-commerce is the engine of the new economy age. It breaks the Philips curve in traditional economics. Instead of a reciprocal relationship between inflation and unemployment rate, both of them decrease when economy increases. This certainly shows that new economy has a great effect on national economy. It's counted that network size and volume of activity of Internet double every six to nine months. This is the famous "New Moor's Law".

2 Comments on references

There are a lot of discussion and study of the relationship between e-commerce and economic development in the angle of quantitative analysis. In the article of "Curve cluster analysis of information streams in EC supply chain", Zhang Yongyun points out that the further development of e-commerce has greatly improved supply chain in extent and depth. And it also let the amount and curve of information streams on the supply chain road have a big change under the environment of EC. By obscure cluster algorithm of information streams, this article models on information stream curves under traditional and EC supply chain; analyzes the optimization of information stream curve in EC supply chain and corresponding optimization of information stream function; gives theoretical support to the development of EC supply chain. In the article "Model-building of EC agricultural products circulation organizations"(2008), Zheng Yingjie, Liu Yingni and Hu Liege use linear program, dynamic program, ranking and overall planning methods

to prove that from agricultural product circulation to the development of Chinese rural economy, they are important factors influencing Chinese national economy to develop rapidly. So, building models of agricultural product circulation organizations under the environment of EC is strategic to the development of socialist market economy.

On the base of the previous relevant studies and VAR model, using impulse response function and predicting variance decomposition, this paper will illustrate dynamic relationship between e-commerce and economic development.

3 Selection and processing of variables and data

In the wave of global e-commerce, our society is changing in the aspect of electronics and business. The former is a recovery in "usage" of business methods, and the latter is an evolution about the meaning of business. E-commerce is the product of market economy and modern scientific technology, which develop to a certain degree. Scientific evaluation about developing conditions and potential of e-commerce makes a great significance to cultivate e-commerce market, improve environment of developing e-commerce, perfect e-commerce streams, lift its competitive ability and develop economy. However, the concept of e-commerce is not very clear and the quantification problem hasn't been systemized. Because of its short history, we cannot find special describing indicators to account data. E-commerce is a complete economic phenomenon. Now, there are no indicators, which can comprehensively reflect its developing conditions. On the base of relevant references researches into e-commerce evaluating indicator, this paper selects the following indicators to describe the developing condition

of e-commerce.

3.1 E-commerce indicator

Evaluating whether e-commerce trade is mature or not, we often depend on whether its trade mechanism is perfect or not, payroll security market size, etc. But now, we cannot separate them from the output of industry. Though the number of network users and the capacity of backbone network have a closed relationship with e-commerce, they cannot truly reflect its developing condition. Therefore, this paper chooses Total Amount of E-commerce Trade (ECT) as the indicator to evaluate the developing condition of e-commerce.

3.2 Indicator of economic development

As for economic development, this paper only evaluates the developing conditions of economy in the angle of quantity. Considering the availability and valid of data, it chooses Gross Domestic Product (GDP) as the indicator to evaluate the developing speed of economy.

Besides, the paper selects the time series data from 1999 to 2007. And it does not use CPI index to deflate the above indicators: GDP and ECT, because of the small fluctuation of CPI index. To eliminate the effect of heteroskedasticity and strong fluctuation of data, the paper transforms these time series variables into logarithm,

which are separately called LnGDP and LnECT. So, the final variables to be used are LnGD and LnECT which separately stands for Gross Domestic Product and Total Amount of E-commerce after logarithmic transformation.

4 Empirical study of China’s E-commerce and economic development

4.1 ADF Test

Make an ADF test on the unit root of Lngdp and Lnect by Eviews 5.0 software. The test equation which is selected based on corresponding data figures uses minimum AIC, SC to decide the best lagging order number. The test result is shown in chart 1. From chart 1, we can know that ADF test value of Lngdp and Lnect and their first order difference are all above the critical value of significance level 1%, 5%, 10%. So, original hypothesis cannot be refused. But series Lngdp, Lnect and their first order difference all have unit root. So they are not stable. Besides, ADF test value of Lngdp and second order difference of Lnect are below critical value of significance level 1%, 5%, 10%, so the original hypothesis should be refused. Therefore, Lnect and second order difference of Lngdp don’t not have unit root. They are stable. In a word, Lngdp-I (2), Lnect-I(2) are shown in table 4.1

Table 4.1: Chart for ADF test on unit root of Lngdp and Lnect

Variable	(C, F, K)	ADF	1%	5%	10%	result
<i>Lngdp</i>	(C, F, 1)	-3.172436	-4.3942	-3.6118	-3.2418	Uneven
<i>D (Lngdp)</i>	(C, F, 2)	-1.425809	-4.4415	-3.6330	-3.2535	Uneven
<i>D² (Lngdp)</i>	(0, 0, 1)	-3.618017	-2.6756	-1.9574	-1.6238	smooth
<i>Lnect</i>	(C, F, 2)	-2.463139	-4.4167	-3.6219	-3.2474	Uneven
<i>D (Lnect)</i>	(C, F, 3)	-2.186950	-4.4691	-3.6454	-3.2602	Uneven
<i>D² (Lnect)</i>	(0, 0, 1)	-5.218235	-2.6757	-1.9574	-1.6238	smooth

Chart4.2:

Null Hypothesis:	Obs	F-Statistic	Probability
LNGDP does not Granger Cause LNECT	7	2.29339	0.30364
LNECT does not Granger Cause LNGDP		7.03941	0.12439

4.2 Causality Test on e-commerce and economic development.

The object of Granger causality test is to judge whether X can obviously improve the probability of predicting Y in consideration of X’s lagged value when regressing the past value of other variables including themselves. If it can, then X does Granger cause Y. After analyzing the result by Eviews5.0, we can deny the probability that Lnect does not Granger cause Lngdp is

0.12439. So, e-commerce is the Granger cause of economic development, as shown in chart 4.2.

4.3 Vector Auto regression Model (VAR Model)

In the part, the paper will build a VAR model based on the data of Lngdp and Lnect. It will use impulse response function and variance decomposition to analyze the model. Whether the best-lagged order number is first or second order difference depends on the minimum AIC,

SC. The OSL method is used to evaluate the model. The results are shown as follow:

$$Lngdp_t = 1.318 * Lngdp_{t-1} - 0.680 * Lngdp_{t-2} + 0.213 * Lnect_{t-1} + 0.112 * Lnect_{t-2} + 1.388 \dots(1) \quad (7.3754)$$

(-4.4257) (1.5912) (0.74711) (3.2143)

$$R^2 = 0.998838 \quad AIC = -3.303674 \quad SC = -3.059899$$

$$Lnect_t = 0.205 * Lngdp_{t-1} - 0.115 * Lngdp_{t-2} + 1.431 * Lnect_{t-1} - 0.421 * Lnect_{t-2} - 0.182 \dots(2) \quad (0.67173)$$

(-0.43957) (5.81736) (-1.67131) (-0.24641)

$$R^2 = 0.997148 \quad AIC = -2.230094 \quad SC = -1.986319$$

From equation (1) and (2), we can know that most estimated parameters are obvious in counting, except for few parameters. The reason is that multiple lagged value which has the same variables in an equation cause multicollinearity. While in general, those parameters are obvious. From lagging parameters in equation(1), we can know lagging value of Lngdp first order difference has a great positive effect on Lngdp, while lagging value of Lngdp second order difference has a smaller and smaller negative effect on Lngdp. And estimation value of the last two parameters in equation (1) is large and positive. This shows the contemporary Lngdp has a strong positive relationship with lagged value of Lnect. So e-commerce has a positive effect on economic development. From equation (2), we can know Lnect is closely related to the lagging value of its own first and second order difference. Among this, Lnect has a positive relationship with the lagging order number of its first order difference, and negative relationship with second order difference. Besides, Lnect has a strong negative relationship with lagging value of Lnect first order difference. And the estimation value is 1.431. This shows that economic development greatly contributes to e-commerce.

4.4 Impulse Response Function

Impulse response function is aimed to evaluate the influencing track of one standard impact of disturbance on the contemporary and future selection of other variables. It vividly describes the dynamic interaction and effect among variables.

Figure4.3 shows the response of Lnect to one standard innovation. From the figure, we know Lnect has a strong reflection of its own one standard innovation, which reaches to the highest in the third stage. From the eighth stage, positive effect always keeps in a high point, which shows China's e-commerce is becoming comparatively perfect. And one standard innovation of Lngdp has a positive and continually growing effect on Lnect. Especially after the third stage, this positive effect becomes stronger and keeps in a high point.

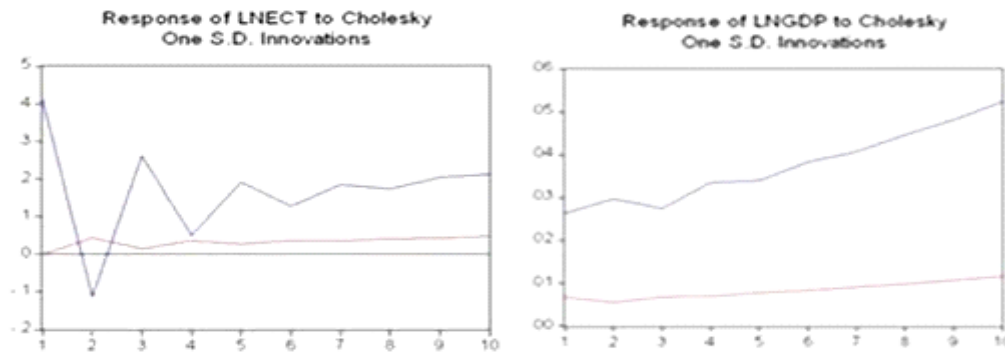


Figure 4.4 is the response of Lngdp to one standard innovation. From the figure, we can know that response of Lngdp to its own standard innovation is reflected slowly. And one standard innovation of Lnect begins to firm up from the third stage.

5 Conclusion

Analysis of Granger causality test and impulse response function shows that on one hand, e-commerce has

a great positive effect on economic development; and on the other hand, economic development also greatly contributes to e-commerce. Besides, e-commerce has a strong positive time effect on economic development. And Lnect has a strong positive relationship with the lagged value of Lngdp first

order difference. The estimating value of parameters is 1.431. This means increasing amount of e-commerce industry has an effect on economic increase in this year

as well as in the following years.

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