CSCanada
Canadian Social Science
Vol. 7, No. 6, 2011, pp. 134-137
DOI:10.3968/j.css.1923669720110706.107

ISSN 1712-8056[Print]
ISSN 1923-6697[Online]
www.cscanada.net
www.cscanada.org

Research on the Effects of Logistics Industry on Economic Growth in Jilin Province in China

RECHERCHE SUR LES EFFETS DE L'INDUSTRIE DE LA LOGISTIQUE CONCERNANT LA CROISSANCE ECONOMIQUE DE LA PROVINCE DE JILIN EN CHINE

SHAO Yang[1,2,*]; ZHENG Jianguo[2]

[1]School of economics and management, Changchun university of science and technology, 130022, Changchun, China
[2]School of Xuri management, Donghua University, 20051, Shanghai, China
[*]Corresponding author.
Email: shaoyangliangliang@yahoo.com.cn

Supported by Spatial Agglomeration of Producer Service in Jilin Province , Department of Education in Jilin (2010JYT43)

Received 25 September 2011; accepted 29 November 2011

Abstract

This paper constructs the econometrical model of the relationship between economic growth and logistics industry in Jilin province, analyzes quantitative relation between economic growth and logistics industry in Jilin province, measures the contribution of logistics industry on economic growth in Jilin province. The results show the status of logistics industry in economic development in Jilin province. The conclusions will supply some necessary proposals for decision-making of the development programming of logistics industry in Jilin province.

Key words: Logistics industry; Economic growth; Econometric model

Résumé

Cet article construit le modèle économétrique de la relation entre la croissance économique et de la logistique dans la province de Jilin, des analyses relation quantitative entre la croissance économique et de la logistique dans la province de Jilin, des mesures de la contribution de l'industrie de la logistique sur la croissance économique dans la province de Jilin. Les résultats montrent l'état du secteur de la logistique dans le développement économique dans la province de Jilin. Les conclusions seront fournir quelques propositions nécessaires pour la prise de décision de la programmation de développement du secteur logistique en province de Jilin.

Mots clés: Industrie de la logistique; Croissance économique; Modèle économétrique

SHAO Yang, ZHENG Jianguo (2011). Research on the Effects of Logistics Industry on Economic Growth in Jilin Province in China. *Canadian Social Science*, *7*(6), 134-137. Available from: URL: http://www.cscanada.net/index.php/css/article/view/j.css.1923669720110706.107
DOI: http://dx.doi.org/10.3968/j.css.1923669720110706.107.

INTRODUCTION

In 21 century, the development of modern logistics industry is going into the rapid growth stage in China. But China logistics industry is still in the primary modern logistics. The logistics industry in Jilin Province, one of the Northeast old industrial base in China, is lower intensification, specialization and standardization compared with modern logistics in coastal developed area in China. In order to achieve the strategic objectives of revitalization of northeast old industrial base and promote the accelerating development of Jilin economy, the modern logistics industry must be developed in Jilin Province. This paper constructs the econometrical model of the relationship between economic growth and logistics industry in Jilin province, analyzes quantitative relation between economic growth and logistics industry in Jilin province, measures the contribution of logistics industry on economic growth in Jilin province. The results show the status of logistics industry in economic development in Jilin province. The conclusions will supply some necessary proposals for decision-making of the development programming of logistics industry in Jilin province.

1. EMPIRICAL ANALYSIS OF THE EFFECT OF LOGISTICS INDUSTRY ON ECONOMIC GROWTH IN JILIN PROVINCE

1.1 Parameter Estimation and Test of Logistics Econometrical Model

In general, the level of transportation, storage and logistics management decides the logistics development. To make the model easily understand, we use freight volume to measure the logistics level for predicting the trend of logistics. These freight volume data can be gained in the Jilin statistical Yearbook and the official statistical website.

According to the general econometric analysis method, we use the regional Gross Domestic Product (GDP) to measure the regional economic development level. Firstly, we state statistically the regional freight volume and GDP data. By drawing the scatter diagram of freight volume, X-axis and GDP, Y-axis, we derive initially that the two terms accord with the Logistic Model of economic growth trend, namely, the function is as follow:

$$y = \frac{1}{K + ab^x} \tag{1}$$

which y is the GDP, Gross Domestic Product; x denotes the freight volume, K, a and b are the unknown constants, $K>0$, $a>0$, $0<b\neq 0$.

What the characters of Logistic curve describe phenomena is that the rise is primarily slow and then gradually accelerating, when it is accelerated to some point, the rise rate is gradually going down, finally to the horizontal line. The statistical description between the freight volume and GDP accords with the characters of Logistic curve. To use easily the parameter estimation method of the linear model, the function (1) is transformed into (2) as below:

$$\frac{1}{y} = K + ab^x$$

$$\frac{1}{y} - K = ab^x$$

$$\ln(\frac{1}{y} - K) = \ln a + x \ln b$$

To set up $\ln(\frac{1}{y} - K) = y', \ln a = a', \ln b = b'$ then

$$y' = a' + b'x \tag{2}$$

Now we can use the Ordinary Least Square to estimate the constants, a' and b'. In the preset K, according to the Logistic function, as $0<b<1$ and $x\to\infty$, $K\to 1/y$, namely $1/K$ is a saturation value. In reality, x freight volume is impossible to be infinity, and y the regional GDP is also impossible to have a saturation value. Because the logistics industry is a comparatively new industry in China, it is possible that the trend of logistics industry development is unstable. In this paper we will just predict the development of logistics industry in 2025, so we set the 2025 predicted value as a saturation value which is determined to be constant M. We need to make an statistical analysis on time series of regional GDP. After estimating K, we will transform the Logistic Model into the linear function and estimate a and b value by OLS.

After estimating each parameter, we will make the marginal analysis and elastic one on this Logistic model. We will calculate a unit increment of the freight volume will bring how much is the absolute value of GDP growth.

1.2 Empirical Analysis

1.2.1 Construction of Logistic Model

Figure 1 is the relation diagram of freight volume{x} and GDP{y} from 1996 to 2010. We can see the significant positive correlativity between freight volume and GDP in Figure 1, but it is nonlinear and shows S curve. On the basis of the character, we can use Logistics curve to fit the relation between freight volume and GDP.

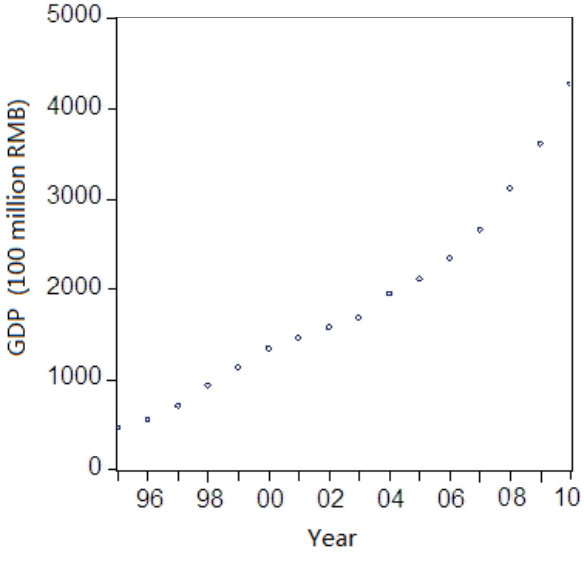
We set the curve function $y = \frac{1}{K + ab^x}$, which y is GDP, x is freight volume, K, a and b are all unknown constants and bigger than zero, but $b\neq 1$.

Next we will estimate the K value. Firstly we draw the increment trend of GDP in Jilin Province. Figure 2 is the scatter diagram of GDP in Jilin Province. On the Figure 2 the GDP trend is basically linear. We assume $y=a+bt$, which y denotes GDP, $a>0$, $b>0$. We estimate the constants, a & b values by OLS and the conclusions are as follows:

Y=458.36+235.69t

(8.425432) (36.94277)

R^2= 0.947248, Adj.R^2=0.952758, F=209.7583



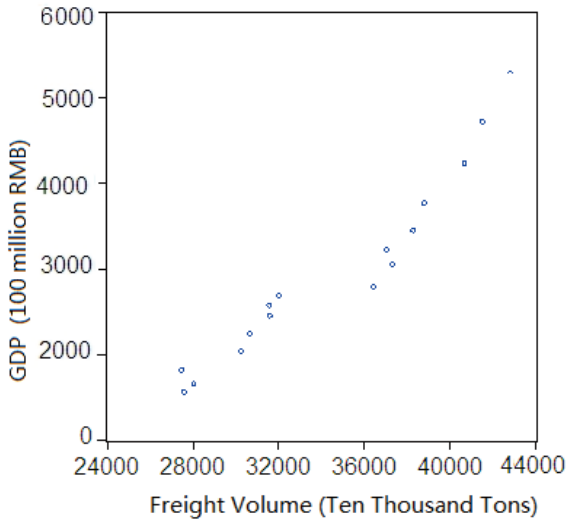


Figure 2
The Scatter Diagram of GDP Form 1995 to 2010 in Jilin

On the regression results, the fitting is very good and the t-test and F-test are significant. It means the unary linear regression model fit for this relationship. The coefficients of regression function are significant effective.

According to the regression model, the 2025 (t=24) GDP predication value is about 1023.63 billion RMB, we can make the saturation value 1100 billion RMB, as $K \rightarrow 1/y$, then K=1/11000.

We estimate the function $y'=a'+b'x$, and then

Y= -4.474862 -0.205565x

(-8.72552351) (-8.943412)

R^2=0.927273, Adj. R^2=0.913357, F=156.0375

On the basis of regression results, the function is fitted very well; the t-test and F-test are all passed significantly, the coefficients of function are effective. And a & b values are as below:

$a=e^{a'}$=0.01396, $b=e^{b'}$=0.99989

The assumed the Logistic Model function is

$$y = \frac{1}{\frac{1}{11000} + 0.01396 * 0.99989^{x}} \tag{3}$$

We estimate the meaning of tested coefficients, K=1/11000>0, a=0.01396>0, 0<b=0.99989≠1, by economical theory. The values accord with the economical laws in which the freight volume is increasing along with GDP growth.

1.2.2 Analysis on the Marginal Effect

According to Logistics Model (1), we conclude the marginal effect function of the Jilin province's logistics industry on GDP:

$$\frac{dy}{dx} = -a(\ln b)\frac{b^x}{(K + ab^x)^2} \tag{4}$$

As 0<b<1, ln b<0, and b^x>0, $(k+ab^x)2$ >0, then dy/dx>0, it means GDP is increasing along with the development of logistics industry. We take 2010 year's freight volume, x=1391.94, into the marginal function and derive dy/dx=0.575.

It means that GDP will be increasing to 0.0575 billion BMB when Jilin Province's freight volume increase 10,000 unit.

Then we solve the function (5) to derive a stagnation point x=49572. When x<49572, then $\frac{d^2y}{dx^2} > 0$. When x>49572, then. We can conclude that the contribution of Jilin Province's freight volume on GDP can be divided into two stages:

When the freight volume is smaller than 495.72 million tons, the GDP growth will be increasing as the freight volume is increasing.

When the freight volume is bigger than 495.72 million ton.kilometer, the GDP growth will be decreasing as the freight volume is increasing one unit.

When the freight volume is equal to 495.72 million ton.kilometer, the GDP will be the biggest value. The Jilin Province 2010 year's freight volume did not reach the biggest value, and then in the future to broaden moderately the scale of logistics industry and strengthen the logistics management will prominently simulate GDP growth in Jilin Province.

$$\frac{d^2y}{dx^2} = -a(\ln b)^2 \frac{b^x}{k + ab^x}\left[\frac{1}{k + ab^x} - \frac{2ab^x}{(k + ab^x)^2}\right] = 0 \tag{5}$$

1.2.3 Elastic Analysis

We derive the elastic coefficient of regional logistics industry on GDP in Jilin Province on the basis of Logistics Model:

$$\xi = \frac{dy}{dx} \bullet \frac{x}{y} = -a \ln b \frac{b^x}{(k + ab^x)^2} \bullet \frac{x}{\frac{1}{k + ab^x}} - a \ln b \frac{xb^x}{k + ab^x} \tag{6}$$

The ξ denotes the change rate of GDP as logistics industry increases 1% freight volume. In (6), b^x>0, k>0, a>0, 0<b<1, lnb<0, x>0, then ξ>0. That is, the trend of GDP is in accordance with that of logistics industry. According to 2010 year's statistical data, we calculated ξ_{2010}=2.536, which means when Jilin Province freight volume will be increasing 1% over 495.72 million tons, the Jilin Province GDP will be increasing 2.536%. On the basis of the elastic coefficient value, the development of Jilin Province's logistics industry will drive strongly its economic growth.

CONCLUSIONS

According to the empirical analysis, we can conclude that the logistics industry contributes greatly to the regional economic growth. And the contribution of logistics industry on economic growth shows different trend in

different stages. In the future the development of logistics industry in Jilin Province will enter into the fastigium, so government, enterprise and others must make unite development programming to foster main parts of logistics market, improve the logistics infrastructure, import and practice fast logistics technology and benchmark, and educate more logistics talents.

REFERENCES

CHENG Shiping, PENG Qiyuan (2007). The Empirical Analysis on the Effect of Logistics Industry on Economic Growth in Anhui Province. *Communication Standardization, 53*(3), 56-58.

GAO Tiemei (2006). *Econometric Analysis and Modeling: Eviews Applications and Examples*. Beijing, China: Tsinghua University Press.

National Bureau of Statistic of China. (1997-2011). *1997-2011 Statistical Yearbook of Jilin Province*. Beijing: China Statistical Press.

PENG Rengui, WANG Li, YANG Zhihua (2007). The Empirical Analysis on the Effect of Logistics Industry on Economic Growth. *Yangtze River Delta Market Forum, 4*(10), 121-123.

Wooldridge, Jeffrey M. (2008). *Introductory Econometrics: A Modern Approach* (4th ed.). Beijing, China: Tsinghua Uinversity Press.