

Research on the Contribution of Logistics Industry to Economic Development in China

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Abstract: with the rapid development of our national economy, the modern logistics industry has turned from the original scattered, inefficient logistics development activities into a relatively complete and efficient one, since the start of the new century. Modern logistics has already become a new growth point of economic development in China in the new period. It is of great significance for policymakers to formulate relevant macroeconomic policies to study the internal quantity relationship between logistics industry and economic development in China by using marginal elasticity analysis.

1. Introduction

As a new industry, the logistics industry occupies an important position in China's national economy. It integrates many fields, such as transportation, warehousing and information industry. With the rapid development of our national economy, the modern logistics industry has turned from the original scattered, inefficient logistics development activities into a relatively complete and efficient one, since the start of the new century and has become one of the key areas of the new century. Sustained growth of the logistics industry has been a basic component of the change of global, regional and local economic system^[1]. with the implementation of the national "The Belt and Road" strategy, the role of modern logistics industry has become increasingly obvious in the Chinese supply side structural reform process, and it has become a new era of a new growth point of Chinese economic development^[2]. In order to further study the logistics industry related to national economic development and function of the size, this paper uses the Logistic model to explore the logistics industry with the economic development of our country, and uses marginal elasticity analysis to study the modern logistics industry in the process of national economic growth to provide a basis for policy makers to formulate relevant macroeconomic policies.

2. Selection of model indexes

2.1 Index selection

At present, most national governments and academic circles regard the gross domestic product (GDP) as a measure of a country's economic development level, therefore, the selection of the index has a certain degree of generality and greater authority^[3]. This paper will also take GDP as a measure of the development level of the national economy and freight turnover as indicators of the level of logistics industry development. The two measures can truly reflect their respective representatives in the field of development level, and it is easy to get a complete data. Therefore, it has certain representativeness and operability.

2.2 Data collection

According to the statistical yearbook of Chinese National Bureau of statistics, this paper collects the gross domestic product (GDP) and the turnover of goods (as shown in Table 1) from the year 2001 to 2015, with the goods turnover being the independent variable x , and the dependent variable y to study the quantitative relations between the two to GDP.

3. Empirical analysis

3.1 Model building

Seen From the development process of modern logistics industry, its development presents an "S" type curve: it grows slowly in the initial phase, but rapidly at a certain stage, and then it slows down again showing a saturation state trend like a horizontal line. This development model is similar to the development and application of some new technologies and new products in market. According to the statistical data from 2001 to 2015, the volume of freight turnover (x) is taken as abscissa, and GDP (y) is used as ordinate, then the scatter diagram of function relation between the two is drawn by SPSS19.0 software, as shown in figure 1:

Table 1: turnover of goods and data of GDP in China from 2001 to 2015

annually	t	Turnover of goods (100 million tons)	GDP (Billion yuan)
2001	0	47709.90	108683.4
2002	1	50685.90	119765.0
2003	2	53859.20	135718.9
2004	3	69445.00	160289.7
2005	4	80258.10	184575.8
2006	5	88839.85	217246.6
2007	6	101418.81	268631
2008	7	110300.00	318736.7
2009	8	122133.31	345046.4
2010	9	141837.42	407137.8
2011	10	159323.6.0	479576.1
2012	11	173804.46	532872.1
2013	12	168013.80	583196.7
2014	13	185837.42	636727.2
2015	14	173689.76	676708

Data source: Statistical Yearbook of the National Bureau of statistics over the years

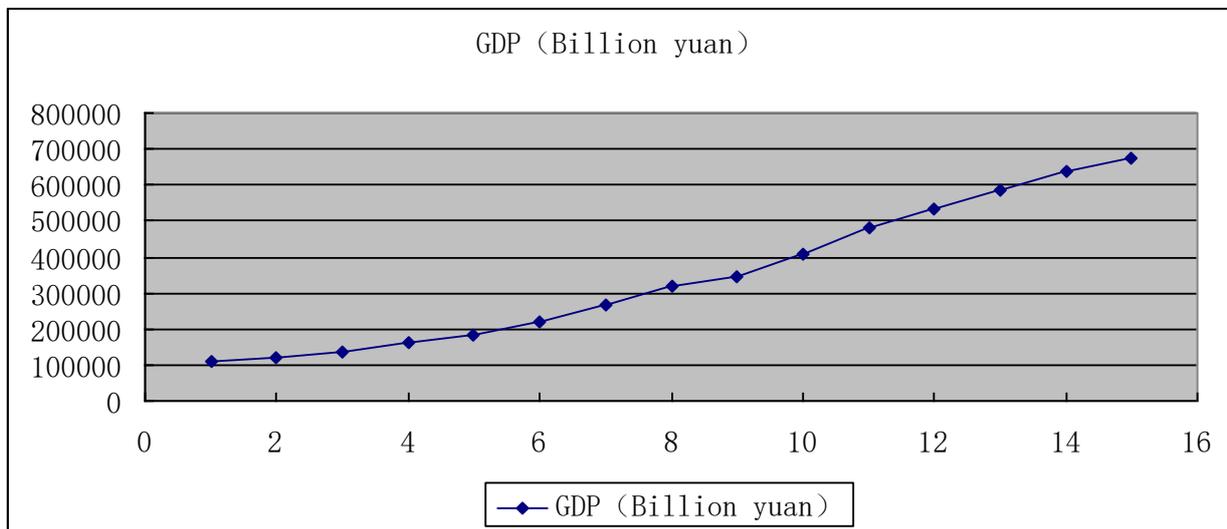


Fig. 1 scatter diagram of relation between freight turnover and GDP function

According to Figure 1, We can see that the correlation with the growth trend between the turnover of goods and GDP in 2001 and 2015 is very similar to that of the Logistic function. Logistic function, also known as the growth curve function model, is first discovered by American biologist and statistician R. Pearl and J. Reed in the study of biological reproduction, and is fully utilized later in the industrial development[4], the function expression is:

$$y = 1/k + ab^x, \text{ (where } k > 0, a > 0, b > 0 \text{ and } b \neq 1)$$

Take the natural log of both sides of the equation (1) after deformed:

$$\ln(y-1/k) = \ln a + x \ln b \tag{2}$$

Then set $\ln(y-1-k)=y'$, $\ln a=a'$, $\ln b=b'$, Then (2) is converted to:

$$y' = a' + b' x \tag{3}$$

In this way, the least squares method can be used to estimate the parameters a 'and b' in the model (3)

According to Logistic equation theory, the parameter $x \rightarrow \infty$ approaches infinity, $k \rightarrow 1/y$, so $1/k$ is the saturation value of y , but in the concrete production practice, freight turnover x can't go to infinity, the same gross domestic product is not likely to tend to be saturated value y , therefore this article has forecasted China's gross domestic product in 2020 as a saturated value of GDP, thus to calculate k value. According to the linear regression model, in 2020 China's GDP is predicted to be 949117 trillion , amplifying its saturation value to 950 yuan (\$000 trillion), available $k = 1/950\ 000$, application SPSS19.0 to regression analysis (3) , the results are shown in Table 2, table 3 and table 4:

Table 2 summary of freight turnover and GDP model

Model	R	R ²	adjustmentR ²	Error of standard estimate
1	0.980 ^a	0.960	0.957	40844.30663

a. forecast variables: (constant), freight turnover (100 million tons).

Table 3 Analysis of variance of freight turnover and GDP model (Anova^b)

Model	Sum of squares	Df	mean square	F	Sig.	
1	regression	5.205E11	1	5.205E11	312.017	0.000 ^a
	residual	2.169E10	13	1.668E9		
	Total	5.422E11	14			

a. forecast variables: (constant), freight turnover (100 million tons);

b. dependent variable: GDP (\$100 million).

Table 4 Analysis of freight turnover and GDP model coefficients

Model	Non standardized coefficient		Standard coefficient	t	Sig.
	B	Standard error	Trial version		
1	(constant)	-10.525	0.207	-3.816	0.000
	freight turnover (100 million tons)	-3.910	0.221	17.664	0.000

a. dependent variable: GDP (\$100 million).

As it can be seen from table 2, fitting coefficient equation (R) was 0.960, showing that the regression equation is representative, table 3 shows that the $F=312.017$, $Sig<0.001$, showing a linear regression relationship exists between the two variables, the model has a certain credibility, as shown in Table 4, significant level of a' and b' were less than 0.001, which shows better parameter estimation, according to the a 'and b' standard deviation can be calculated $a=0.0000268$, $b =0.02004$. From the model test results, we can see that the GDP of our country increases with the increase of freight turnover, and conforms to the economic growth law.

3.2 Elastic analysis

According to the statistical data of China's 2001-2015 cargo turnover and GDP (see Table 1), the amount of GDP increases with the increase of freight turnover. The national freight turnover was 4.77099 trillion ton-km in 2001 and 17.368976 trillion ton-km in 2015, which has increased 3.64 times, while GDP in 2001 was \$10.86834 trillion and reached to 67.6708 trillion yuan in 2015, whose growth rate is 6.23 times. This is just the growth situation of two independent variables, but to analyze freight turnover growth contribution to GDP growth, it requires both elastic analyses. GDP elasticity of logistics E refers to the increase percent of GDP caused by the additional 1% increase of logistics turnover each time, and the formula is expressed as:

$$E = \frac{dy}{dx} \cdot \frac{x}{y} = \frac{-ab^x \ln b}{k + ab^x} \cdot \frac{x}{\frac{1}{k + ab^x}} = -a \ln b \frac{xb^x}{k + ab^x} \tag{4}$$

According to formula (4), The data for 2015 is that $E=1.2937$, which shows that the national

freight turnover for each additional 1% will boost the national GDP growth of 1.2937%. It can be seen from the index that the national GDP growth rate is greater than that of the turnover of goods and logistics industry plays a role in promoting economic growth. However, the impact of economic growth on logistics industry is not obvious enough. Therefore, the government should vigorously develop the logistics industry to promote a healthy benign interaction with economic growth within a period of quite a long period in the future.

4. Conclusions and recommendations

Based on above research, it can come to the conclusion that modern logistics industry, as an emerging industry in our country, although the development of the time is not long, but to the promoting function of China's economic development cannot be ignored, the development of the industry and the development of the national economy is highly relevant with each other, in promoting the development of social economy of our country has outstanding contribution. Under the background of our country economic society to enter the new normal, China should tightly around the "steady growth, structural adjustment, promote the transformation and livelihood" strategic overall situation, to develop the logistics industry, make full use of the logistics industry in the "third profit source" for the favorable factors of economic growth, take various effective measures to promote the healthy and orderly steady development of national economy in our country.

4.1 Increase government's support for the logistics industry

Development experience at home and abroad shows that the development of any emerging industry requires the government's policy support. As China's logistics industry lasts only more than 20 years since its beginning, the domestic system of relevant laws, regulations and policy is still not perfect. As a new industry with relevance effect, the logistics industry is limited by the development of itself. Greater support must be given by the government to develop the logistics industry, such as to give a certain policy tilt on fiscal revenue, corporate finance and logistics industrial park construction in order to promote the benign interaction between logistics industry and economic and social development.

4.2 Strengthen the infrastructure construction of logistics industry

The government should increase the investment in logistics infrastructure construction and plan the layout of the logistics park in a reasonable way. The transportation efficiency needs to be improved by upgrading the existing transportation network, building a new transportation network, optimizing the transportation routes, and improving the construction of rural logistics information system. By this way, rural storage centers and distribution stations can be established, thus providing security facilities to agricultural products. Meanwhile the government should also strengthen the development and application of new logistics technology to promote the open and share of logistics information system.

4.3 Broaden the financing channels of small and medium-sized logistics enterprises

In the modern logistics industry, small and medium-sized logistics enterprises play an important role in promoting the development of the national economy. However, due to the limitations of its own conditions, it is difficult for the group to raise money thus limiting their development. In order to develop the logistics industry in an all-round way, it is necessary for the government to lead the banking and other financial institutions to break through the restrictions of conventional rules and regulations, and increase credit support for small and medium-sized logistics enterprises. At the same time, various financial institutions incentives are needed to increase the enterprise's investment. The act of enterprises to issue corporate bonds and corporate bonds of multi-channel financing should be encouraged. The enterprises should also be encouraged to take part in the construction of major national projects so that to further stimulate the vitality of enterprises and to provide support for the lasting power of national economic growth.

4.4 Solve the problem of talents through various channels

We must solve the talent shortage and unreasonable talent structure phenomenon faced in logistics industry. For one hand, we can continue to develop and find the existing personnel within the industry through market competition; for the other hand, talent from outside the industry can be introduced based on a certain condition. The government can develop or introduce professionals with modern logistics knowledge and comprehensive management personnel through various channels, so as to improve the daily management level of logistics industry as a whole and provide strong human resources support for the effective growth of national economy.

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