

Study on the Economic Correlation and Ripple Effect of Agricultural Industry in Anhui Province

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Abstract

Anhui province is a big agricultural province in China, and its agriculture plays an important role in economic development. According to China's industry classification standard, this paper processed the data of input-output table of 42 departments in Anhui province in 2015, formed six input-output tables, and calculated the economic correlation effect and industrial ripple effect of agricultural industry in Anhui province, as well as the production induction coefficient and the dependence degree of final demand. The results show that the manufacturing industry in Anhui province has the greatest influence on the development of agriculture, and the agriculture in Anhui province has the greatest dependence on export and outflow from outside the province. Finally, the paper puts forward the main problems in the development of Anhui's agricultural industry, and puts forward relevant policy Suggestions to promote the development of Anhui's agriculture.

Keywords

Agricultural industry; Input-output model; Induction coefficient; Influence coefficient.

1. Introduction

Anhui province is a major agricultural province in China, and its economy has been promoted by national and local agricultural policies for a long time. In the new period, the national implementation of the "the Belt and Road Initiative", the Yangtze river economic belt and the Yangtze river delta integration development strategy, and Anhui provincial party committee and provincial government development plan of action, full implementation of the five national technical innovation project pilot provinces, "Hefei ,Wuhu and Bengbu" national independent innovation demonstration zone, Hefei city circle, such as regional development strategy, strong impetus for agricultural modernization gathering. With continuous and stable development of economy and residents' income level unceasing enhancement, the urban and rural residents' consumption demand presents the phase change, health, safety, high quality and green agricultural products demand more urgent, to meet the broad masses of urban and rural residents eat very delicious a safety oriented structure of consumer demand to speed up the upgrade, and Anhui province based on the geographical advantage of Yangtze river delta, add a huge driving force to develop modern agriculture development space.

Many scholars have calculated the development and influence coefficient of different industries in China through input-output table. Based on the data in the input-output extension table of 2015, Zhang Qin (2019) used the input-output method to analyze the relationship between the financial industry and other industries from three perspectives of direct correlation, influence and inductance according to the industrial relevance theory [1]. Zhu Heliang, Wang Mingyan (2018) based on the data of past years China input-output table, the middle of the circulation industry demand rate is obtained by using the input-output method, Intermediate demand rate, induction degree coefficient, influence coefficient and related indicators, industrial relationship and industrial spread effects of circulation industry is analyzed, at the same time, comparative and historical data, to reveal the evolution of the industrial relationship and industrial spread effect of circulation industry trends [2]. Li fang and Yuan Tianang (2016) conducted input-output analysis of China's financial industry based on the static input-output model [3]. Guan Gaofeng and He Genqing (2014) used the input-output table data of

Hainan province in 1997, 2002 and 2007 to reveal the correlation effect and ripple effect of the real estate industry by studying the dynamic response mechanism between the real estate industry and economic development in Hainan province [4]. Wang Lianfen, Li Juan (2013) in Hunan province in 2002 and 2007, the basis of the analysis of the input-output table, the auto industry correlation effect and economic industry of calculation results show that the ripple effects compared to 2002, the Hunan automobile industry in 2007, the total consumption coefficient and influence coefficient are decreased, and showed the auto industry to the economy of the weakening trend leading role, supporting industries have not been able to keep up with the development of automobile industry, car industry is restricted to the promotion of economic impetus ability [5]. To sum up, many scholars have studied the local industry, but few have studied the agriculture in Anhui province. Based on this, this paper starts from the input-output model to study the agriculture in Anhui province.

2. Designing of empirical research

2.1 Data sources and collation

The data in this paper are mainly from the extension table of China's input-output in 2015 in China statistical yearbook (2017). According to the standard of industrial classification of national economy in China, the input-output table data of 42 departments in Anhui province in 2015 were collated and combined to obtain the input-output table of 6 departments, which was dominated by agriculture, mining, manufacturing, production and supply of electricity, heat, gas and water, construction and service industry.

2.2 Correlation analysis of agricultural industry

2.2.1 Direct consumption coefficient

The calculation formula of direct consumption coefficient is as follows:

$$a_{ij} = \frac{x_{ij}}{x_j} (i, j = 1, 2, \dots, n) \quad (1)$$

Direct consumption coefficient of agricultural industry in Anhui province is obtained by using input-output table data of 6 departments in Anhui province. The calculated result is shown in table 1.

Table 1 Direct consumption coefficient of agricultural industry in Anhui province

Department	Agricultural	Extractive industries	Manufacturing	Electricity, heat, gas and water production and supply industry	The construction industry	The service sector
Agricultural	0.125793	0.002556	0.056650	0.000013	0.007517	0.018234
Extractive industries	0.125793	0.104818	0.062311	0.327916	0.000226	0.001087
Manufacturing	0.181596	0.194678	0.503441	0.110096	0.019520	0.192959
Electricity, heat, gas and water production and supply industry	0.000824	0.052845	0.028332	0.118745	0.002943	0.023201
The construction industry	0.000459	0.001572	0.000489	0.001600	0.027958	0.005587
The service sector	0.100423	0.152000	0.113912	0.126210	0.007606	0.283626

It can be found from table 1 that the manufacturing industry has the highest degree of direct dependence on itself, with a direct dependence coefficient of 0.503441. In terms of agriculture, agriculture has the highest dependence on manufacturing industry, with a direct consumption coefficient of 0.181596, followed by agriculture itself and mining industry, and the lowest dependence on construction industry, with a direct consumption coefficient of 0.000459. As Anhui province's agriculture is in the stage of agricultural modernization transformation and upgrading, its dependence on manufacturing industry is the highest. In the process of agricultural production, agricultural products will enter into agricultural production as inputs, so its dependence on itself is also high.

2.2.2 Forward and backward correlation coefficient

On the basis of the above direct consumption coefficients, the forward and backward correlation coefficients of Anhui agricultural industries were calculated. The calculation formula of forward correlation coefficient is as follows:

$$L_{F(i)} = \sum_{j=1}^n x_{ij} / x_i \tag{2}$$

In formula (2), x_j is the total output of industry I, and x_{ij} is the intermediate input provided by industry I to industry j.

The calculation formula of backward correlation coefficient is as follows:

$$L_{B(j)} = \sum_{i=1}^n x_{ij} / x_j \tag{3}$$

In formula (3), x_j is the total input of other industries to industry j, and x_{ij} is the intermediate input of industry j obtained from industry i.

Based on the input-output table data of six departments in Anhui province, formula (2) and (3) are used to calculate the forward and backward correlation coefficients of each industry in Anhui province. The calculation results are shown in table 2.

Table 2 Backward correlation coefficient of each industry in Anhui province

Industry \ Correlation coefficient	Agricultural	Extractive industries	Manufacturing	Electricity, heat, gas and water production and supply industry	The construction industry	The service sector
Forward correlation coefficient	0.57894	0.00123	0.41701	0.00001	0.01015	0.05794
Backward correlation coefficient	0.12579	0.12579	0.18160	0.00082	0.00046	0.10042

It can be found from table 2 that the forward correlation coefficient of agricultural industry in Anhui province is much higher than the backward correlation coefficient, indicating that agriculture mainly relies on the forward industry to drive development, while the backward industry has a small pull, which belongs to the intermediate input industry. The reason is that the quantity of agricultural products sold directly and used as output is very small, which is mainly used as intermediate inputs to provide raw materials or intermediate products to other industries.

3. Impact analysis of agricultural industry

Through the induction coefficient, the influence coefficient, the production induction coefficient, the final demand dependence of the agricultural industry in Anhui province to calculate its industrial ripple effect.

3.1 Analysis of induction coefficient and influence coefficient

The influence coefficient, influence coefficient, production induction coefficient and final demand dependence of the industry were used to measure the industrial ripple effect.

(1) Coefficient of inductance and coefficient of influence

The calculation formula of induction pair coefficient is as follows:

$$E_i = \frac{n \sum_{j=1}^n \bar{b}_{ij}}{\sum_{i=1}^n \sum_{j=1}^n \bar{b}_{ij}} \tag{4}$$

In formula (4), E_i is the inductance coefficient of the industry, $n \sum_{j=1}^n \bar{b}_{ij}$ is the sum of the transverse inverse matrix coefficients of the industry Leontief matrix, and $\sum_{i=1}^n \sum_{j=1}^n \bar{b}_{ij}$ is the average sum of the transverse inverse matrix coefficients of the whole industry Leontief matrix.

The formula for calculating the influence coefficient is as follows:

$$F_j = \frac{\sum_{j=1}^n b_{ij}}{\sum_{i=1}^n \sum_{j=1}^n b_{ij}} \tag{5}$$

In formula (5), the industrial influence coefficient is the sum of the vertical column coefficients of the Leontief matrix of the industry and the average sum of the vertical column inverse matrix coefficients of the whole industry.

Based on the input-output table data of 6 departments in Anhui province, formula (4) and (5) are used to calculate the induction coefficient and influence coefficient of each industry in Anhui province. The calculation results are shown in table 3.

Table 3 Induction coefficient and influence coefficient of each industry

Industry types Coefficient Of species	Agricultural	Extractive industries	Manufacturing	Electricity, heat, gas and water production and supply industry	The construction industry	The service sector
sensitivity coefficient	0.31876	0.46081	1.03987	0.31155	0.21630	0.65075
influence power coefficient	0.50624	0.49850	0.68160	0.57573	0.23420	0.50373

It can be found from table 3 that among all industries in Anhui province, the induction coefficient of manufacturing industry is 1.03987, followed by that of service industry is 0.65075, indicating that agriculture has the greatest impact on manufacturing industry and service industry. In the influence coefficient of various industries in Anhui province, the manufacturing industry has the largest influence coefficient of 0.68160, followed by the production and supply coefficient of electric power, heat, gas and water, which is 0.57573. Therefore, it has a larger power coefficient for other industries and can well promote the development of other industries. The reason is that in the production process, the manufacturing industry and the service industry are more dependent on agricultural products, so the extent of agricultural influence is greater. In addition, as the manufacturing industry needs to provide a variety of tools, pesticides, seeds and other intermediate products in agricultural production, the supply and production of electricity, heat and gas water provide power and raw materials for it, so agriculture is more dependent on the manufacturing industry and the production and supply of electricity, heat and gas water.

3.2 Production induction coefficient and final demand dependence

In order to further explore the impact of other industries and projects on the development of agricultural industry, this paper calculates its inducing coefficient and demand dependence. Production induction coefficient:

$$W_{il} = Z_{il} / Y_L \tag{6}$$

In the formula, W_{il} represents the production induction coefficient of L project of the final demand of the industry in the its sector, the production induction amount of L project in the its sector, and the Y_L represents the final demand of each industry.

Final demand dependence:

$$Q_{il} = Z_{il} / \sum_{j=1}^n x_{ij} \tag{7}$$

In the formula, Q_{il} represents the dependence of the production of I industry sector on the final demand L project, and z_{il} represents the production inductance of the final demand L project of I industry sector.

Based on the input-output table data of six departments in Anhui province, formula (6) and (7) are used to calculate the production inducement coefficient and final demand dependence of government consumption, household consumption, export and outflow from outside the province on agriculture in Anhui province. The calculation results are shown in table 4.

Table 4 Production induction coefficient and final demand dependence coefficient of agricultural industry in Anhui province

influence factors Coefficient of species	Government consumption	Residents' consumption	Exports and outflows from outside the province
Production inductance	0.1349	0.1087	0.7942
Final demand dependency	0.0133	0.2148	0.5159

It can be found from table 4 that the production induction coefficient of export and outflow from Anhui province is the largest, indicating that an increase of one unit of export and outflow from Anhui province will induce an increase of 0.7942 units of agricultural production in Anhui province. In addition, Anhui province also had the greatest dependence on export and outflow final demand, indicating that Anhui province had the greatest dependence on export and outflow, with a dependence of 51.59%. The main reason is that the quantity of agricultural products in Anhui province is large, the domestic demand is small, and the products are mainly sold outside the province and overseas, so the agricultural industry relies heavily on the export and the outflow from outside the province.

4. Conclusions and suggestions

The following conclusions are drawn from the data processing and calculation of the input-output table of Anhui province in 2015, and relevant policy Suggestions are put forward accordingly.

4.1 The conclusion

Based on Anhui province agriculture to industry association and direct influence coefficient measurement before and after the discovery, the Anhui province agricultural industry belongs to intermediate input type basic industries, to provide material support for other industries development, in addition, the high dependence on agriculture to manufacturing, in providing material support for the manufacturing industry, manufacturing industry and to boost the agricultural development. From the induction coefficient, Anhui province's agricultural industry has a great impact on the manufacturing and service industries. In terms of the influence coefficient, the influence coefficient of the manufacturing industry in Anhui province is the largest, followed by the production and supply coefficient of electricity, heat, gas and water, which indicates that agriculture has a large pull coefficient on other industries and can well promote the development of other industries. From the perspective of the dependence on production inducement amount and final demand, the outflow from outside the province has a great impact on the agricultural development of Anhui province, which indicates that the agricultural products of Anhui province are mainly exported to other provinces and overseas countries.

4.2 Suggestions

Based on the above conclusions, this paper puts forward the following three Suggestions: Firstly, the government increases the investment in the manufacturing industry of related agricultural materials, thereby reducing the prices of pesticides, seeds, machinery and other related products, which indirectly drives the agricultural development of Anhui province and promotes the process of agricultural mechanization in Anhui province, thus better saving related capital and improving profit margins.. Secondly, we will accelerate the development of water systems for agriculture and rural areas. The improvement of natural conditions can not only improve the local ecological environment, but also better facilitate the development of agriculture, can fight against natural disasters, promote agricultural development. Thirdly, increase agricultural exports. We will strengthen agricultural cooperation with neighboring provinces and overseas cooperation provinces, formulate relevant industrial policies, improve the quantity and quality of agricultural products exported, and boost the demand of Anhui's agricultural industry through external demand.

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