Agricultural Production Conditions for Establishing a Commodity Trading Market under the Belt and Road Initiative --An Empirical Analysis of VAR Model Based on Statistical Data of South Sichuan Port-vicinity Pilot Free Trade Zone

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Abstract: "The Belt and Road" initiative and the "Pilot Free Trade Zone" are major strategic measures for national governance and deepening reform and opening up in the new era, and actively linking them will help enhance trade liberalization and openness. Because of the large volume and amount of transactions, commodity trading markets play an important role in activating the "China-EU railway" of the Belt and Road initiative and revitalize the "stock" of the open economy and enhance the "trade volume" of trade. Based on the investigation and statistical analysis of the micro-basis of the establishment of the commodity trading market in the South Sichuan Port-vicinity Pilot Free Trade Zone, it is found that the output value and sown area of important commodities have declined to varying degrees in 2018, which is extremely unfavorable for the selection of trading varieties and the high quality supply of commodity sources in the forthcoming commodity trading market. Moreover, the VAR model is used to analyze the natural conditions of agricultural production. The conclusion shows that the decline of crop yield and output value is not caused by bad natural conditions in recent years, but still caused by farmers' lack of "intensive cultivation" and improvement of agricultural technology. To this end, to set up a commodity trading market platform in the southern Sichuan Port-vicinity Pilot Free Trade Zone, it is necessary to actively adjust to connect to the Belt and Road Initiative. In the past, relying on the "China-EU railway" is an active transfer of domestic excess capacity. Now it is necessary to change the situation of "full train when leaving the country, basically empty car when returning home", and strive to import important commodities such as grain and timber from Eurasian countries rich in resources. In addition, it is also necessary to import bulk commodities from overseas by relying on the advantage of ports to lay a foundation for the establishment of commodity trading market platform, and promote high-quality economic development from the supply side according to the product perspective.

1. Introduction

"The Belt and Road" and "Pilot Free Trade Zone" are important strategic initiatives for the central government to comprehensively deepen reform and opening up and achieve national economic governance under the new situation, and also an important starting point for promoting the development of high quality economy in the new era. The stable operation of the "China-EU railway" has promoted the connection of the Belt and Road initiative and the node cities along the line of China, and has also activated the commodity flow and promoted the "free trade" of commodities. In a manner of speaking, the "China-EU railway" is an important link linking the two major strategies of "the Belt and Road" and "Pilot Free Trade Zone", and is also a transportation condition to ensure the effective implementation of them. In 2019, China is facing new opportunities and challenges in promoting comprehensive deepening of reform and opening up and economic governance in the new era. In terms of the operation of the China-EU railway, a large part

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of the goods transported back and forth are commodities. The deepening of the strategy of “the belt and road” and “Pilot Free Trade Zone”, or the upgrading of 2 and 3 editions, is an important measure of the level of opening up to the outside world, which requires us not only to transfer domestic excess capacity, but also to import high-quality import commodities needed by our market, and to promote the structural transformation of the supply side and realize the supply of high quality mass products, which is reflected in the product level.

On the other hand, on the domestic market demand side, the number and scale of commodity trading market in China are growing rapidly, the level of service capacity is rising rapidly, and the trend of platform is obvious. [1] By the end of 2017, there were 1,969 electronic commodity trading markets in China, an increase of 60.0% over the same period last year, and the scale of physical transactions exceeded 30 trillion yuan. [2] The development momentum of commodity market trading platform or futures exchange is fierce because of the good spot market foundation as a support. To ensure the uninterrupted trading in the spot market, it is necessary to rely on the stable supply of spot products and output, so as to guarantee the supply of commodities in the commodity trading market.[3][4]

Sichuan Pilot Free Trade Zone is one of the seven Pilot Free Trade Zones set up in the third batch of our country, and the South Sichuan Port-vicinity Area is one of the three important areas because it has the largest port in the province, Luzhou Port. In Sichuan Pilot Free Trade Zone, Qingbaijiang Rail Port Area, Shuangliu International Airport Area and South Sichuan Port-vicinity Area are established on the basis of railway, air and water transport modes. Moreover, unlike the other two areas in the Pilot Free Trade Zone, the South Sichuan Port-vicinity Area is located in Luzhou without extensive economic hinterland and supply area similar to the Chengdu to ensure adequate supply of goods. Therefore, in the context of the new situation of “the belt and road” initiative, it is particularly necessary to set up a platform for commodity trading market, so as to promote commodity circulation, activate commodity circulation, and achieve a high quality supply of adequate supply of goods on the supply side.

At present, for the establishment of commodity trading market platform in the South Sichuan Port-vicinity Pilot Free Trade Zone, the bottleneck problem of the supply of goods is the selection of trading varieties and the protection of the supply of goods in the trading market. Restricted by the natural conditions of large agricultural products production in Luzhou, it is easy to find the unbalanced development that supply is difficult to meet the demand. After sorting out and analyzing the agricultural data of the Longmatan District of Luzhou where the South Sichuan Port-vicinity Pilot Free Trade Zone is located, it is found that in recent years, the output, planting area and output value of many large-scale agricultural products in Longmatan District are declining year by year, which is extremely disadvantageous to the commodity market trading platform currently being constructed actively.[5][6]

It is not difficult to find that the research perspective and framework of this paper can be refined based on the above topics. That is to say, the main contribution of this paper lies in discussing the feasibility of building a commodity trading market in the South Sichuan Port-vicinity Pilot Free Trade Zone and choosing the corresponding trading varieties through the analysis of the conditions of commodity production there taking South Sichuan Port-vicinity Pilot Free Trade Zone as an example, and how to effectively utilize the advantages of “the Belt and Road” initiative, “China-EU railway” and “Luzhou Port” to ensure the supply of high quality products and how to improve the trade level of products in the pilot free trade area in the new era on this basis. It is believed by the author that the topic of this article is not only a hot issue at present, but also an urgent problem to be solved in the practical work process. A large number of data and statistical research work have been carried out in the research process, supported by the necessary empirical econometric model, which has strong theoretical foresight and scientific demonstration.

2. Production data characteristics and typical facts of major commodities in south sichuan port- vicinity pilot free trade zone

South Sichuan Port-vicinity Pilot Free Trade Zone is located in Longmatan District of Luzhou, a

lately developed area where more specialized wholesale markets for bulk commodities are distributed mainly for trading food crops, fruits and vegetables, oil crops and vegetables. According to the author's investigation during his work in South Sichuan Port-vicinity Area and the data of Longmatan Statistical Yearbook, the following statistical tables on agricultural products, tea, silkworm, fruit and agricultural value were classified and sorted out, to provide a basis for the study of commodity market trading platform product supply and selection of trading varieties.

Table 1 Production of major agricultural products

Indicators	Planting area in 2017	Yield in 2017	Growth rate of sown area in 2018 compared with 2017 (%)	Production growth rate in 2018 compared with 2017 (%)	Growth rate of sown area in 2017 compared with 2016 (%)	Production growth rate in 2017 compared with 2016 (%)
Total sown area of crops	231990	78947	0.1		-1	
I. Cereal crops	164505	5774	-1.9	-0.3	0.3	2.9
Crops sown in late spring	23460	73173	-12.7	-5.3	-1	0
Crops sown in spring	141045	67898	-0.1	0.1	0.5	3.2
(I) Cereal	131280	37115	1.6	0.7	-4.4	1.2
Paddy	55695	37115	-1.2	-1	0.8	3.2
Semilate rice	55695	1209	-1.2	-1	0.8	3.2
Wheat	6585	1322	-65.6	-65.1	-2.4	-5.8
Maize	4935	29461	-6.1	-4.3	-6.5	-4.6
Sorghum	70650	638	1.2	1.7	0.8	3.6
(II) Beans	3615	638	2.9	3.6	0.4	2.2
Soybean	3615	0	0	0	0.8	2.6
Mung bean	0	9202	0	0	-100	-100
(III) Tubers	23025	2814	5.4	5.1	-0.3	2.4
Sweet potato	5385	6388	4.5	4.2	-0.3	2.5
Potato	17640	3973	5.7	5.5	-0.3	2.4
Late spring	13395	2415	9.3	9	-0.8	1.4
Spring	4245	1437	-5.7	-0.3	1.1	4
II. Oil crops	9930	112	15.4	16.6	4.1	6.7
Peanut	435	1319	0	0	-12.1	-9.7
Rapeseed	9465	6	16.2	18	5	8.4
Sesame	30	437	0	0	0	0
III. Sugar crops	180	114617	0	0.2	0	1.6
IV. Vegetables (including vegetable melons)	54090	52461	2.7	4.6	0.4	6.2
Late spring	25125	62156	4.7	4.9	0.2	2.4
Spring	28965	1128	1	4.3	0.6	9.6
V. Melon and fruits	735		24.5	-4.6	122.7	133.1
VI. Other Crops	2550		1.8		-14.1	
Greenfeed	2415		3.1		-10.6	

Note: After the agricultural census, the national and provincial statistical bureaus will link up the data. The Longmatan District Statistical Bureau will not publish the total data for 2018.

Table 1 shows the production of major agricultural products in Longmatan District. It is observed that in 2017, the planting scale of crops sown in late spring, maize, wheat, mung beans, sweet potatoes, potatoes and peanuts decreased in varying degrees compared with 2016, but the yields of grain, rice, sweet potatoes and potatoes increased qualitatively compared with 2016, except that the yields of maize and wheat still declined. In 2018, the sown area of grain, paddy, wheat, maize and

potato (spring) declined further, especially the wheat planting scale declined sharply, with the consequent decrease in the yield of these crops. It is worth mentioning that the planting area of melons and fruits has increased by 24.6% compared with 2017, but the yield has decreased by 4.6%. From this point of view, the yield does not increase proportionally with the increase of planting area. At the moment of emphasizing the transformation of agricultural structure, it is urgent to realize the transformation of agriculture from traditional extensive production to intensive production.

The problem is that the selection of commodity varieties necessarily requires stable output. Despite the emphasis on the high quality of trading products, stable supply of goods is still a necessary condition! The uninterrupted supply of commodities in the commodity trading market can guarantee that the price of commodities will not be forced to rise because of the discontinuity of the supply of agricultural products. It is noteworthy that, according to the data of Longmatan District, the situation is not optimistic if the trading varieties are selected for the grain, paddy, maize, wheat and so on supplied by the region itself. Although the grain and rice yield has increased to a great extent, there is still a big gap between the trading “volume” and “scale” of tens of thousands of tons, or even hundreds of thousands of tons of tons of trading varieties.[7]

Therefore, it is only expected to protect transactions through logistics and transportation in other districts or counties outside Luzhou, which invisibly increases the cost of logistics and transportation, and its own logistics and transportation efficiency is also worth discussing. Compared with the Qingdao international commodity exchange market in the country which is built with the mature commodity wholesale market, it is an enlightenment to us that commodity futures exchanges, trading markets or trading platforms also need adequate stock as a guarantee. According to the data of Longmatan District itself, it does not have the conditions of grain and other crops to satisfy the construction of commodity trading market.[8][9]

Note: After the agricultural census, the national and provincial statistical bureaus will link up the data. The Longmatan District Statistical Bureau will not publish the total data for 2018.

Table 2 shows the production of commodities such as tea and silkworm. It is observed that the output of tea has basically maintained at 2 tons in the past two years, but that of silkworm cocoon has shown a general trend of decline which is decreasing year by year. In terms of the planting scale, the tea remained unchanged after 2016 with basically unchanged output, but the silkworm is still shrinking with declining supply. The production data of tea and silkworm also show that they do not have the objective conditions to become commodity trading varieties.

Note: After the agricultural census, the national and provincial statistical bureaus will link up the data. The Longmatan District Statistical Bureau will not publish the total data for 2018.

Table 3 shows the production situation of commodity fruits and melons. Compared with 2015, the production situation in 2016 is shrinking. However, the data in 2017 show that the production situation of typical fruits and melons has greatly improved. Especially the production of citrus, longan and pear has increased with the planting scale unchanged or reduced, and the characteristics of agricultural intensive production are obvious. The characteristic fruit of Luzhou is mainly longan and citrus, which is very beneficial to the establishment of the fruit wholesale market. However, litchi and grapes seem to be suspected of being little value because of their unsatisfactory output not matching with the planting area. The production data of watermelon and strawberry can make up for this shortcoming. In the case that other fruit production is difficult to improve in the short term, these two kinds of fruits can be considered to increase cultivation to ensure the continuous demand of market supply varieties.

It should be noted that although the yield of typical melons and fruits has been greatly improved, it has shown a downward trend in recent years. It is thus clear that the output of fruits and melons does not increase with the expansion of the scale, and stable and high yield can be achieved through improved planting technology, which is a piece of good news for the establishment of the port-vicinity commodity market.

Table 2 Production of commodities such as tea and silkworm

Indicators	In 2017	In 2016	In 2015	Variation in 2018 over 2017	Variation in 2017 over 2016	Variation in 2016 over 2015
				Relative quantity (%)	Relative quantity (%)	Relative quantity (%)
Actual tea garden area throughout the year(mu)	37	37	45	0	0	-17.8
Annual tea production (tons)	2	2	2	0	0	0
Real area of mulberry plantation at the end of the year (mu)	680	682	690	-0.1	-0.3	-1.2
Actual sporadic mulberry trees at the end of the year (10,000 plants)	24.4	24.8	25.1	-1.6	-1.6	-1.2
Annual mulberry leaf yield (tons)	128	129	145	-3.1	-0.8	-11
Mulberry leaves for silkworm rearing (tons)	120	117	133	-2.5	2.6	-12
Silkworm rearing throughout the year (pieces)	343	326	387	-2.6	5.2	-15.8
Annual cocoon production (tons)	37	35	42	-2.7	5.7	-16.7

Table 3 Production of commodities such as fruits

Indicators	In 2017	In 2016	In 2015	Variation in 2018 over 2017 (%)	Variation in 2017 over 2016 (%)	Variation in 2016 over 2015 (%)
				Relative quantity (%)	Relative quantity (%)	Relative quantity (%)
1. Year-end orchard area (mu)	24078	24030	24525	-0.1	0.2	-2
Citrus (mu)	6742	6958	7065	0.1	-3.1	-1.5
Litchi (mu)	940	1020	1140	0.5	-7.8	-10.5
Longan (mu)	9907	11232	11078	-0.2	-11.8	1.4
Pear (mu)	2991	2670	2925	-0.7	12	-8.7
Grape (mu)	1006	1005	1290	-0.1	0.1	-22.1
2. Sporadic fruit trees at the end of the year (10,000 plants)						
Citrus (10,000	220	224	228	-0.9	-1.8	-1.8

plants)						
Litchi (10,000 plants)	17	17	16	0	0	6.3
Longan (10,000 plants)	48	48	47	2.1	0	2.1
Pear(10,000 plants)	39	39	39	0	0	0
3. Total fruit (tons)	9031	7542	6254	-100	19.7	20.6
(1) Garden fruits (tons)	7705	7058	6179	0.2	9.2	14.2
Citrus (tons)	3730	3442	3217	0.1	8.4	7
Litchi (tons)	333	378	112	0.6	-11.9	237.5
Longan (tons)	2168	2079	1801	0.2	4.3	15.4
Pear(tons)	1134	889	778	0.2	27.6	14.3
Grape (tons)	103	88	106	6.8	17	-17
Peach (tons)	77	63	62	1.3	22.2	1.6
Plum (tons)	45	35	48	-4.4	28.6	-27.1
Loquat (tons)	52	43	55	9.6	20.9	-21.8
(2) Melons and fruits (tons)	1326	484	75	-1	174	545.3
Watermelon (tons)	1061	392	48	2.2	170.7	716.7
Muskmelon (tons)	90	78		15.6	15.4	
Strawberry (tons)	175	14	6	-56	1150	133.3

Note: After the agricultural census, the national and provincial statistical bureaus will link up the data. The Longmatan District Statistical Bureau will not publish the total data for 2018.

Unlike the data presented in Table 1, the output value of agriculture, forestry, animal husbandry and fishery in Table 4 showed a better growth momentum in 2017. But in 2018, the output value of wheat, soybeans, trees and fruits, typical grain and timber, declined sharply, with a large decline of double digits. The output data of Table 1 calms people down a little bit, but it's amazing that the output value of Table 4 has dropped dramatically. Surprisingly, the adjustment of agricultural structure and the transformation of the mode of agricultural economic development have been advocated in recent years, but the result of the transformation to 2018 was unsatisfactory. Therefore, it is necessary to imitate melon and fruit planting in the cultivation of grain and timber crops, to improve farmers' agricultural production technology, to eliminate the information asymmetry of agricultural production, and to vigorously rectify the cultivation of grain and timber crops.

Table 4 Gross agricultural output value, forestry, animal husbandry and fisheries (at current prices)

Unit: 10,000 yuan

Indicators	In 2017	In 2016	In 2015	Variation in 2018 over 2017 (%)	Variation in 2017 over 2016 (%)	Variation in 2016 over 2015 (%)
				Relative quantity (%)	Relative quantity (%)	Relative quantity (%)
Gross agricultural output value, forestry, animal husbandry and fisheries	177507.8	165604	154608	1.7	7.2	7.1
I.Agricultural output value	74660	72228	67439	0.7	3.4	7.1

Cereals and other crops	34705	34066	32668	0.1	1.9	4.3
Cereals	28682	27650	26672	-2.1	3.7	3.7
Wheat	292	324	323	-64.9	-9.9	0.3
Paddy	10202	9728	9290	-2.5	4.9	4.7
Maize	357	366	333	-9.6	-2.5	9.9
Tubers	4275	4655	4260	11	-8.2	9.3
Oil plants	724	707	697	16.8	2.4	1.4
Peanut	79	84	108	-3.3	-6	-22.2
Rapeseed	645	617	583	18.3	4.5	5.8
Beans	931	933	912	2.1	-0.2	2.3
Soybean	559	75	88	-87.4	-0.2	-14.8
Sugar crops	31	45	44	22.2	-31.1	2.3
Other crops	62	76	83	-0.3	-18.4	-8.4
Feed crop	55	64	77	8.7	-14.1	-16.9
Vegetables and horticultural crops	35809	34445	31451	8.1	4	9.5
Vegetables (including vegetable melons)	30252	28824	25870	8.4	5	11.4
mushrooms	367	283	225	9.1	29.7	25.8
Flowers and plants	1757	1750	1739	6.1	0.4	0.6
Bonsai gardening	3433	3588	3617	6.3	-4.3	-0.8
Fruits, nuts, beverages and spice crops	4146	3717	3320	-57.8	11.5	12
II. Forestry output value	522	477	456	227.1	9.4	406
(1) Cultivation and planting of trees	248	236	221	-37.8	5.1	608
(2) Bamboo and wood harvesting and transportation	11	241	235	10460.3	-95.4	2.6

3. Study on the effect of high-quality development of agricultural economy under the natural conditions of commodity production in south sichuan port-vicinity pilot free trade zone based on the empirical analysis by VAR model

According to the statistical survey data of commodities in the South Sichuan Port-vicinity Pilot Free Trade Zone in the second section, it is obvious that 2018 is an “unusual” year for the South Sichuan Port-vicinity Pilot Free Trade Zone and Longmatan District. In the nearly one year since its establishment on April 1, 2017, the planting scale and output value of typical grain and timber crops in the South Sichuan Port-vicinity Pilot Free Trade Zone have declined dramatically, although the output of melons and fruits has increased. However, the overall output in 2018 is also significantly lower than that in 2017, so it is necessary to explore the reasons behind it.

Unlike industry and service industry, agriculture under the production of commodities is greatly affected by lots of natural conditions. In view of the need for scientific proof, in this paper, based on the data provided by the Municipal Bureau of statistics, the vector autoregressive (VAR) model of econometrics was used to analyze the effects of natural conditions on the development of agricultural output and economic quality in order to identify whether the natural conditions are too harsh in recent years to lead to the shrinkage of agricultural production in Longmatan District of

Luzhou, so as to clear how the commodity trading market platform in the pilot free trade zone should make good use of the advantages and avoid disadvantages, and how to select the trading varieties and guarantee the high quality of commodities under the current “belt and road” initiative and the unique advantages of the South Sichuan Port-vicinity Pilot Free Trade Zone.[10][11]

3.1 Definition of variables and selection of data

Considering the feasibility of data acquisition and the authenticity of monthly data, the proxy variables of agricultural natural conditions selected here are sun shine hours, average temperature, precipitation and air relative humidity, because agricultural production is affected not only by fertilizers, pesticides and agricultural technology, but also by agricultural soil and hydrological conditions. According to the above data analysis, the soil conditions in Luzhou will not change much after 2016. Soil fertility will increase after deep tillage, which will not be related to the decline of important food crops and fruit production, but will increase the yield of crops. Therefore, soil is not the natural agricultural condition that determines the decline of yield, so it is not selected as the proxy variable here.

The main index to measure the high-quality development of agricultural economy in the South Sichuan Port-vicinity Pilot Free Trade Zone is the gross value of agricultural production. Because the agricultural production conditions are basically the same in the urban area, in this section, the scope of agricultural production in the southern Sichuan Port Free Trade pilot area is enlarged to the Luzhou, which is also the supply hinterland of the smallest commodity market.[12] The gross agricultural output value in Luzhou is based on the agricultural output value calculated at the current price as the proxy variable. The data used are provided by the Luzhou Statistical Bureau, Luzhou Agricultural Bureau, Luzhou Meteorological Bureau, Longmatan District Statistical Bureau, referring to the Statistical Yearbook of Luzhou and the Luzhou National Economic and Social Development Statistical Bulletin. Because of the large amount of data after selection, in order to make econometric analysis feasible and prevent the violent vibration of data, all of them are processed logarithmically. The names of variables are defined as: sun shine hours (LNSH), average temperature (LNAT), precipitation (LNPP), air relative humidity (LNRH), and total agricultural production value (LNAOV).

In view of the fact that agricultural production conditions such as sunshine, precipitation, temperature, soil and hydrology at a municipal level did not change significantly after 2015 and 2016, according to the data on the statistical yearbook and provided by various departments, only the monthly data before 2017 were available. The monthly data from January 2015 to December 2016 were fitted, and the gross agricultural product data provided by the Statistics Bureau and other departments had no monthly data on the annual data. The gross agricultural product value of Luzhou in 2014, 2015 and 2016 was 15.98527 billion yuan, 16.78418 billion yuan and 17.80677 billion yuan. With the help of the Frequency Conversion function of Eviews 8.0, cubic-match last conversion method was selected in the view of low to high frequency conversion method to convert the data of annual gross agricultural output value for three years.

3.2 Time series diagrams

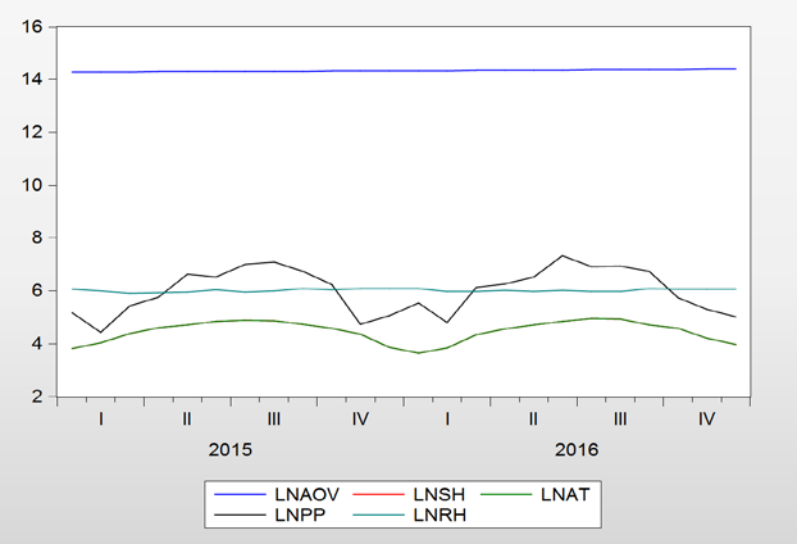

Figure.1 Variable time sequence

Source: Drawn using Eviews 8.0.

Figure 1 shows the time series of variables, in which the horizontal axis represents the time and quarter, and the vertical axis represents the log values of variables. It is observed that the monthly data of gross agricultural output value was basically stable, and the data of precipitation (LNPP) and average temperature (LNAT) were basically consistent with the seasonal characteristics, and that the precipitation and average temperature in the second and third quarters of each year are the highest in one year. Because sun shine hours (LNSH) do not vary with months and seasons, they were automatically eliminated by Eviews8.0 in the calculation process. The relative humidity of air does not change with the month due to the natural regulation of the Yangtze River and Tuojiang River system in Luzhou. The time series diagram fits well the consistency of variables and time.

3.3 Modeling

For dynamic economic sample data, VAR model is used consistently because it is the main time series model in the process of time series data research for such a district or region by most scholars. The main idea was put forward by American economist Sims who believed that VAR model can effectively analyze and predict the variables in the economic model, especially the impact effect detection, impact size, duration and positive and negative prediction of random disturbance on the system. The empirical research in this paper is based on the following models:

$$\begin{bmatrix} LNAOV_T \\ LNSH_T \\ LNAT_T \\ LNPP_T \\ LNRH_T \end{bmatrix} = \begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} & A_{15} \\ A_{21} & A_{22} & A_{23} & A_{24} & A_{25} \\ A_{31} & A_{32} & A_{33} & A_{34} & A_{35} \\ A_{41} & A_{42} & A_{43} & A_{44} & A_{45} \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} \end{bmatrix} \begin{bmatrix} LNAOV_{T-1} \\ LNSH_{T-1} \\ LNAT_{T-1} \\ LNPP_{T-1} \\ LNRH_{T-1} \end{bmatrix} +$$

$$\begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} & A_{15} \\ A_{21} & A_{22} & A_{23} & A_{24} & A_{25} \\ A_{31} & A_{32} & A_{33} & A_{34} & A_{35} \\ A_{41} & A_{42} & A_{43} & A_{44} & A_{45} \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} \end{bmatrix} \begin{bmatrix} LNAOV_{T-2} \\ LNSH_{T-2} \\ LNAT_{T-2} \\ LNPP_{T-2} \\ LNRH_{T-2} \end{bmatrix} + U_T$$

Where, $LNAOV_T$, $LNSH_T$, $LNAT_T$, $LNPP_T$, $LNRH_T$ are the current values of gross agricultural

output value, sun shine hours, average temperature, precipitation, relative humidity of air of Luzhou in the measurement period respectively, while $LNAOV_{T-1}, LNSH_{T-1}, LNAT_{T-1}$ $LNPP_{T-1}$, $LNRH_{T-1}$ are the lagged values of the above variable in the $T-1$ period respectively, and $LNAOV_{T-2}, LNSH_{T-2}$ $LNAT_{T-2}, LNPP_{T-2}, LNRH_{T-2}$ are the lagged values in the $T-2$ period.

$$\begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} & A_{15} \\ A_{21} & A_{22} & A_{23} & A_{24} & A_{25} \\ A_{31} & A_{32} & A_{33} & A_{34} & A_{35} \\ A_{41} & A_{42} & A_{43} & A_{44} & A_{45} \\ A_{51} & A_{52} & A_{53} & A_{54} & A_{55} \end{bmatrix}$$

is a coefficient matrix and U_T is the white noise .With $T-1$ and $T-2$ lags, all variables are endogenous variables without additional assumptions of endogenous variables, thus a VAR model can be established. In the process of econometric regression of the model, it is generally considered that the larger lag order is more advantageous to the results of empirical analysis, because the length of lag order can largely reflect the characteristics of the model in this time interval. Short lag time can easily lead to inconsistent coefficients in actual regression. However, with the increase of the lag time, the degree of freedom of the model decreases and the estimated parameters increase, which is not entirely beneficial to the accuracy of the empirical analysis results. In this paper, the optimal lag order of VAR model was determined according to the two criteria of Schwarz Criterion and Akaike Information Criterion, so as to take account of the respective advantages of the degree of freedom and lag

3.4 Unit root test

Unit root test is to test whether unit root exists in time series. If it exists, it shows that time series is not stable, and regression analysis has a pseudo-regression. Of course, the unit root can be eliminated by first-order difference and regression of variables, or by co-integration analysis. In this paper, ADF unit root test was adopted, and unit root test of time series was carried out before the establishment of VAR model. The test pattern is as follows:

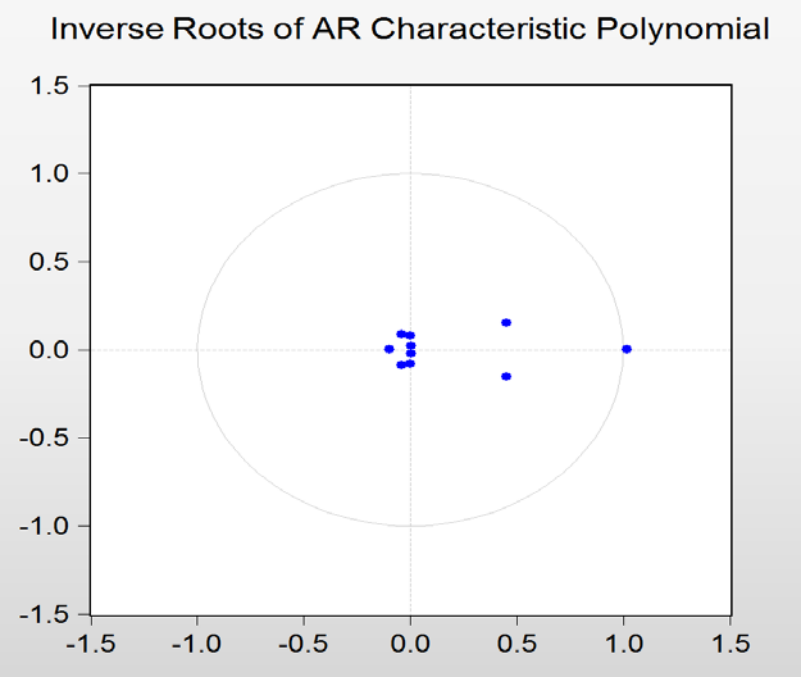

Figure.2 Unit root test

Source: Drawn using Eviews 8.0.

The points in Figure 2 are basically within the circle, and there is only one point on the circle line of the gross agricultural output value value, which means that the time series data are relatively

stable in general, and the VAR model can be constructed on this basis. There is only a single point on the circle line, which can be resolved by the first-order difference method. But here, the author hopes to explain it by the following residual sequence diagram:

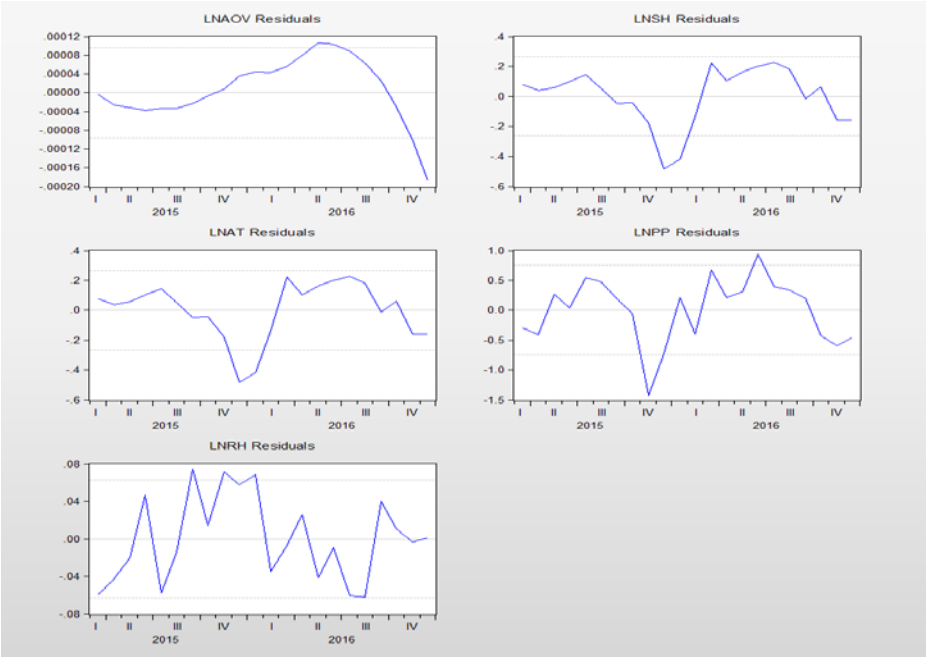

Figure.3 Residual sequence diagram of variables

Source: Drawn using Eviews 8.0

Figure 3 shows the residual sequence, which reflects the variation trend of the difference between the actual observed values and the fitted values of each variable. The fluctuation around the zero axis is the error degree in the process of collecting data samples. It follows that the methods adopted by each unit in the process of collecting data are not very accurate, and of course, the error of measurement itself is not excluded (for example, the total value of agricultural production is in ten thousands, and the monthly data converted from the annual data is used in the measurement process. The stability of the data itself is not very good, but because it is a numerical simulation, the monthly data selected by the computer is just a little bit on the circle line. The numbers of sun shine hours, average temperature, precipitation, air relative humidity and so on are rounded to integers, and eventually turn into decimals through logarithmic transformation. In this process, there is inherent data instability), which is also a good explanation for the phenomenon of “a little bit on the circle line” in Figure 2, and of course does not affect the overall measurement and measuring results.

3.5 Granger causality tests

Source: VAR model output of Eviews 8.0 software.

The Sample shown in Figure 4 is from January 2015 to December 2016. It is concluded that there is no causal relationship between the five variables selected, namely gross agricultural product (LNAOV), sun shine hours (LNSH), average temperature (LNAT), precipitation (LNPP) and relative humidity of air (LNRH). In other words, sun shine hours, average temperature, precipitation and relative humidity of air did not affect the gross agricultural output value of Luzhou in the course of advancing with time. It is thus clear that the natural conditions of agricultural commodities can not be the reason for the sharp decline in the output and planting scale of the main grain crops such as wheat and corn.

Pairwise Granger Causality Tests
Date: 08/23/18 Time: 23:01
Sample: 2015M01 2016M12
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNSH does not Granger Cause LNAOV	22	3.46315	0.0547
LNAOV does not Granger Cause LNSH		0.55354	0.5849
LNAT does not Granger Cause LNAOV	22	3.46315	0.0547
LNAOV does not Granger Cause LNAT		0.55354	0.5849
LNPP does not Granger Cause LNAOV	22	0.10194	0.9036
LNAOV does not Granger Cause LNPP		2.51992	0.1100
LNRH does not Granger Cause LNAOV	22	3.55818	0.0512
LNAOV does not Granger Cause LNRH		3.39435	0.0575
LNAT does not Granger Cause LNSH	22	NA	NA
LNSH does not Granger Cause LNAT		NA	NA
LNPP does not Granger Cause LNSH	22	4.24957	0.0319
LNSH does not Granger Cause LNPP		4.32319	0.0303
LNRH does not Granger Cause LNSH	22	0.43921	0.6517
LNSH does not Granger Cause LNRH		4.71644	0.0235
LNPP does not Granger Cause LNAT	22	4.24957	0.0319
LNAT does not Granger Cause LNPP		4.32319	0.0303
LNRH does not Granger Cause LNAT	22	0.43921	0.6517
LNAT does not Granger Cause LNRH		4.71644	0.0235
LNRH does not Granger Cause LNPP	22	5.78535	0.0121
LNPP does not Granger Cause LNRH		0.89147	0.4284

Figure.4 Results of granger causality test

3.6 Pulse effect function

Source: VAR model output of Eviews 8.0 software.

The impulse effect fits the impact effect of A variable on B variable in the course of time advance, that is to say, the influence degree. Five graphs in the left column of Figure 5 (Response of LN…to LNAOV) are all impulsive effects of sunshine hours, average temperature, precipitation and relative humidity of air on gross agricultural output value (LNAOV). The transverse axis is the time scale of impulse effect, from January 2015 to December 2016 which is divided by the software into ten periods automatically. In the initial stage, sunshine hours, average temperature, precipitation, air relative humidity indicators have a strong impact on the gross agricultural output value, which is commonly understood as “harvest” and “disaster”. After the advance of time and the evolution of the years, the impact effect gradually returned to normal. The impact of “harvest” or “disaster” in the short term is gradually fading away. In the long run, there is no substantial “Granger causality”.

The impulse effect of the five graphs in the first row of the figure does not conform to the criterion of fitting impulse effect in the VAR model of econometrics. That is to say, the criterion of determining impulse effect is that the impulse effect of the initial A variable on the time scale has a great impact effect on the B variable, and then gradually shrinks to the vicinity of the zero axis, and at the end of the time scale it is basically near the zero axis as the optimal criterion, or the impulse effect of the VAR model fits well. But the five graphs in the first row do not conform to it, which explains that the total agricultural production value can not affect the sunshine hours, average temperature, precipitation and air relative humidity, which is also in line with economic common sense.

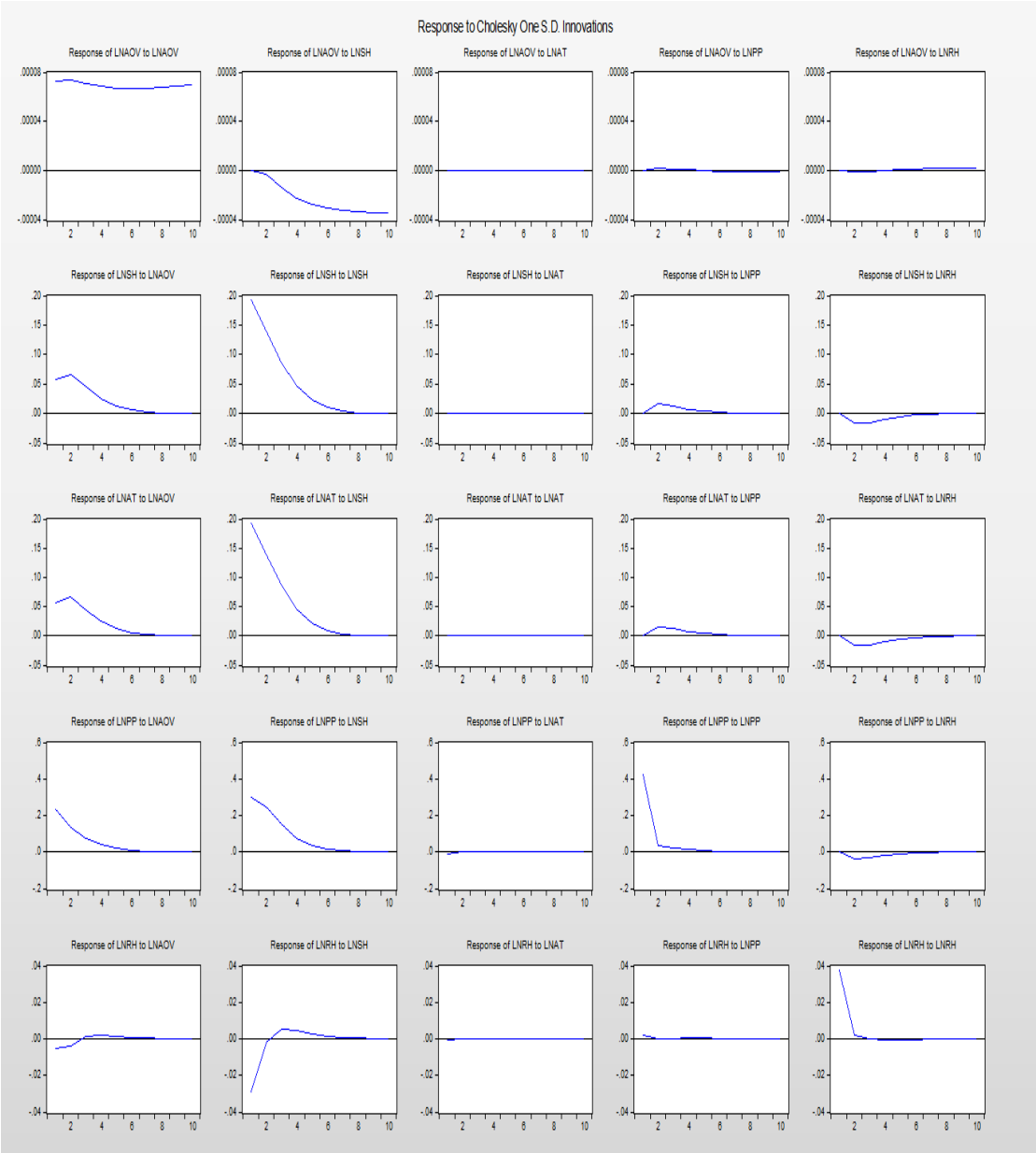

Figure.5 Pulse effect functions

4. Conclusions and suggestions

The demonstration of data characteristics and empirical analysis of econometric models show that

In the context of “the belt and road” initiative, the national commodity market has shown a good momentum of increasing demand side market scale, continuously improving service capability, and platform trend. Moreover, in the supply-side market, the main purpose of the South Sichuan Port-vicinity Pilot Free Trade Zone is to deepen the reform and opening-up in an all-round way. Hence, it is necessary to build a high-standard “business environment” and carry out the “market liberalization” reform, and to realize the market-oriented and efficient allocation of commodity resources in the region and strengthen the construction of economic hinterland. The important way is to construct a commodity trading market with regional influence from the perspective of products, which can stimulate the circulation of regional commerce and trade and activate the “stock” commodity trading market and its corresponding trading platform. The commodity trading market and platform play an important role in the development of regional commodity economy because of its large volume and large amount of trading.

The data characteristics and typical facts of commodities show that the output, scale of

production and growth trend of commodities in the economic hinterland of South Sichuan Port-vicinity Pilot Free Trade Zone have declined in varying degrees after 2016. For example, the decline of grain yield and the reduction of planting scale of typical agricultural products (wheat, soybean, maize, sweet potato, potato, etc.) can not be attributed to “natural disasters” or simply to the bad natural conditions in the past two years, which can be discerned from the production of typical fruits such as longan, citrus, pear and litchi whose scale of production has been reduced to varying degrees, but their output and output value are still increasing, because fruits are more harsh to climate conditions than food crops. It is thus clear that the main reason is that grain farmers or manors do not have “deep and intensive cultivation” and do not seriously improve agricultural production technology. “Human factors” are more critical than natural conditions, which objectively requires South Sichuan Port-vicinity Pilot Free Trade Zone to strengthen and improve the production of agricultural commodities, improve crop breeding and planting technology, and increase the output and scale effect of products for building a commodity trading market so as to have sufficient varieties and high quality supply.

Above all, the industrial structure of Luzhou needs to be thought deeply where the proportion of three industrial structures has been adjusted, or optimized since the founding of new China: the proportion of the primary industry has been declining, and that of the second and third industries has been increasing. The proportion of the three industries in 2017 was 12.0:59.1:28.9, which made Luzhou become the “industrial city” from an “agricultural city” in the early days of the founding of the People's Republic of China. The continuous optimization of industrial structure has also brought about negative problems. Long-term depressed agriculture has been shortage of advanced labor force because the labor force is constantly absorbed by industry and service industry, and the focus of government work is not in agriculture. Although the economic structure is being adjusted, the concept can not be fundamentally changed. The adjustment of industrial structure emphasized by itself is not to reduce agricultural production or output, but to improve its quality and development level while the proportion is constantly decreasing, which is the original intention of industrial structure optimization. However, the current production situation of agricultural products seriously deviates from this idea.

The commodity wholesale market, spot market, electronic trading platform and future commodity futures exchanges are all developed on the basis of sufficient supply of commodities and active commodity market transactions. At present, the prominent problem is that the area of South Sichuan Port-vicinity Area is only 19.99 square kilometers, so it is impossible to develop agricultural planting on a large scale and to transform it on its own. However, in order to improve agricultural technology and improve the efficiency of agricultural production management, short-term efforts may not be able to achieve the desired results, which requires broadening the train of thought, and continuing to promote the production of food crops by the relevant government departments of the municipal government, and importing commodities from the economic hinterland cities or other channels.

Firstly, in virtue of the Belt and Road initiative and transportation channels of “China-EU railway”, the existing railways in Luzhou have been connected to the Chongqing-Sinkiang-Europe International Railway, by which the first batch of imported high quality timbers had been transported from Siberia of Russia in 2018 and high grade bulk commodities had been imported from Kazakhstan, Turkmenistan and other Central Asian countries. Besides, a National Pavilion of the Belt and Road has been built newly in the South Sichuan Port-vicinity Area for commodity display. In the future, it is still necessary to expand the “quantity”, “scale” and “product structure” of imports, import large quantities of high-quality agricultural products such as grain, timber, stone and steel, and sign strategic cooperation agreements with the main enterprises of importers to ensure the high quality and stability of supply of goods.

Secondly, the advantages of Luzhou as a port city and the foundation for the South Sichuan Port-vicinity Pilot Free Trade Zone should be brought into full play. In the future, efforts should be made to increase imports so as to ensure the warehousing and transportation of warehouses such as Southwest Food Valley, designated grain import ports, bonded logistics centers (B type) and so on.

It is also necessary to expand the imported varieties, import quality red wine from Australia, high-quality stone materials and steel from Africa and America, so as to enrich the trading varieties and sources of future commodity trading market.

Thirdly, the south open passageways, especially Pan Asian South Railway should be made full use of to import featured products from South Asia and Southeast Asia, including special liquor, special building materials and special Chinese medicinal materials through railway ports such as Mohan, Ruili, Hekou and the border markets via Yunnan Province.

Fourthly, the existing economic hinterland of Sichuan, Yunnan, Guizhou and Chongqing should be consolidated to make good use of its economic resources. At present, the local grain in Luzhou City is basically dependent on imports. Moreover, in the short term, the volume and tonnage of imported grain through the "China-EU railway" and the port of Luzhou are limited. This opportunity can be used to create an industrial park with the help of the signing of cooperation agreements with the cities of Sichuan, Yunnan, Guizhou, Chongqing and the key cities of the gateway, or relying on the advantageous resources of the locals, as a production and supply base outside the market.[13] It is also necessary to expand railway and highway network transportation, increase the timeliness of supply, revitalize the existing "stock", and indirectly make up for the scarcity of supply through the improvement of supply speed.

In conclusion, the commodity trading market is very conducive to the economic development of the pilot free trade zone. In particular, the large volume and amount of transactions will help to revitalize the flow of commerce and trade, and promote the commerce circulation and transportation. Moreover, it is very beneficial to the area where the waterway transportation is based on the port area in southern Sichuan. The spot market of commodities should be constructed actively and the futures market in the future should be planned forward-looking, and a number of wholesale markets should be constructed to supplement it. Only in this way can the pilot free trade zone lead the economic development of high quality through market liberalization.

Acknowledgement

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