The Measurement Study on Impact Factors of Xinjing Agricultural GDP

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ABSTRACT: In this paper, empirical analysis of the relevant factors from Xinjiang's agricultural output is conducted and used Eviews software from agricultural machinery power (MW), agricultural chemical fertilizer (tonnes), agriculture (person) practitioners, effective irrigation area (thousand ha) and food production (tons) of these factors to econometric analysis of factors affecting agricultural output in Xinjiang. In order to identify factors that affect agricultural output in Xinjiang and its relevances.

The Problems

Since the western development, Xinjiang, the country's total agricultural output value of agricultural output in the proportion of about 3%, and the upward trend, which shows that the proportion of the country's total agricultural Xinjiang gradually increasing, which requires the State must take in Xinjiang do a good job of agriculture, the development of the country's total agricultural output value up about 3% of the region, which is conducive to the development of Xinjiang, but also conducive to China's agricultural development and the consolidation of the status. In this paper, a method of data analysis to find factors that affect agricultural output in Xinjiang and its relevance.

The Establishment of the Model

Factors affecting agricultural output are many, how to select the appropriate factors, data processing and analysis have a great impact [2], the purpose of this paper is the following from several factors which identify the impact of agricultural output in Xinjiang factors relevant extent, therefore, the paper selected agricultural machinery power (MW), agricultural chemical fertilizer (tonnes), agriculture (person) practitioners, effective irrigation area (000 ha) and food production (tons) these and other factors to study the effects on Xinjiang agricultural output.

So we set up the regression equation:

Including: Agricultural output value (million)

Agricultural machinery power (MW)

Of Chemical Fertilizers (tonnes)

Agriculture (person) employees
To effectively irrigated area (000 ha)
To food production (tons)
Random error term

The Practice Analysis

Table 1. 1990--2014 Xinjiang agricultural output and Statistics of various factors

Year	Agriculture（10Thousand）	Agricultural machinery total power (MW)	Chemical Fertilizers (tonnes)	Agricultural workers (people)	Effective irrigation area (000 ha)	Food production (tons)
1995	2890000	599.8165	62.20183	2866972	2550.459	6699083
1996	2796437	585.0298	64.69731	2668586	2378.457	6848925
1997	3068444	601.2969	68.77123	2748633	2388.282	6811470
1998	3086634	614.0601	68.20235	2740045	2377.226	6665664
1999	2604454	622.1269	59.83694	2728681	2341.685	6407510
2000	2740496	652.5525	60.20054	2691542	2352.002	6146232
2001	2534959	641.7315	60.53248	2656017	2280.396	5784377
2002	2368874	601.7904	54.89172	2435942	1988.539	5703205
2003	3118789	629.1195	58.61618	2473972	2006.8	5178430
2004	3236193	658.4844	62.33577	2482748	1952.165	5206356
2005	3382322	636.3545	61.1923	2292838	1818.91	4979453
2006	3396348	633.0424	63.33072	2195394	1765.847	4777339
2007	3661988	609.0209	62.80244	2171705	1654.646	4139909
2008	3535758	620.2231	67.13522	2102022	1610.749	4098450
2009	3765459	629.9296	65.49414	2039579	1540.223	4827207
2010	4860659	580.2502	59.16526	1642577	1313.779	4060375
2011	4581194	572.4334	58.52142	1600752	1237.645	3901959
2012	4604520	541.2441	52.9726	1482591	1107.586	3499435
2013	6730280	574.1465	53.87162	1342275	1168.319	3607403
2014	6667318	568.1703	57.58061	1251844	1180.302	3379355

For the time series we must first examine its smoothness, with EG two-step method to examine whether there is a cointegration relationship between them. First, by using the ADF test, stability test of each sequence.

Augmented Dickey-Fuller Unit Root Test on LNY

Null Hypothesis: LNY has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.234414	0.9674
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNY)
Method: Least Squares
Date: 03/25/16 Time: 12:35

Figure 1. ADF analysis chart Xinjiang agricultural output lny sequence

From the test results of FIG. 1 view, at 1%, 5%, 10% three significant level, the critical value of the unit root tests were -3.831511, -3.02997, -2.655194 = 0.234414 is greater than its corresponding critical value and thus can not reject H0, show that agricultural GDP Xinjiang y sequence is a unit root, the non-stationary series.

Augmented Dickey-Fuller Unit Root Test on D(LNY)

Null Hypothesis: D(LNY) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=4)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.939839	0.0011
Test critical values:	1% level	-3.857386	
	5% level	-3.040391	
	10% level	-2.660551	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 18

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNY,2)
Method: Least Squares
Date: 03/25/16 Time: 12:37

Figure 2. The difference sequence ADF analysis chart of Xinjiang agricultural output lny

From the test results of FIG. 2 view, at 1%, 5%, 10% three significant level, the critical value of the unit root tests were -3.857386, -3.040391, -2.660551, -4.939839 = smaller than its corresponding critical values to reject H0, show that agricultural GDP of Xinjiang y first-order difference sequence there is no unit root for smooth series.

We can use the same method, testable $\ln X_1$, $\ln X_2$, $\ln X3$, $\ln X_4$, $\ln X_5$ the case of $\ln X_1$, $\ln X_2$, $\ln X3$, $\ln X_4$, $\ln X_5$ are integrated of order one sequence.

In order to analyze whether the cointegration relationship between GDP and agricultural production in the Xinjiang $\ln X_1$, $\ln X_2$, $\ln X3$, $\ln X_4$, $\ln X_5$, we do first return to six variables, then the regression residuals stability.

Dependent Variable: LNY
Method: Least Squares
Date: 03/25/16 Time: 13:17
Sample: 1995 2014
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	33.18338	5.557732	5.970670	0.0000
LNX1	0.236628	0.604476	0.391460	0.7014
LNX2	0.905595	0.325507	2.782103	0.0147
LNX3	-1.875755	0.354553	-5.290474	0.0001
LNX4	0.637453	0.429452	1.484341	0.1599
LNX5	-0.049115	0.358828	-0.136877	0.8931

R-squared	0.940010	Mean dependent var	15.07400
Adjusted R-squared	0.918586	S.D. dependent var	0.294736
S.E. of regression	0.084098	Akaike info criterion	-1.870353
Sum squared resid	0.099014	Schwarz criterion	-1.571634
Log likelihood	24.70353	Hannan-Quinn criter.	-1.812040
F-statistic	43.87482	Durbin-Watson stat	2.072430
Prob(F-statistic)	0.000000		

Figure 3. Regression results

Figure 3 can be drawn from the estimated regression model is:

Lny=33.18338+0.236628lnx1+0.905595lnx2-1.875755lnx3+0.637453lnx4-0.049115lnx5+et

From the test results in FIG. 4 view, at 1%, 5%, 10% three significant level, the critical value of the unit root tests were -2.692358, -1.960171, -1.607051, -4.930246 = smaller than its corresponding critical value indicates that there is no unit root residuals, in order to smooth the number of columns. Therefore, there is cointegration, indicating the presence of long-term equilibrium relationship ln, ln, ln, ln, ln and lny between lny and ln, ln, ln, ln, ln. Although the long term model is balanced, but the imbalance may occur in the short term, through error correction model Y and ln, ln, ln, ln, short-term and long-term changes ln linked. Structure error correction model are as follows:

$\triangle$ lny = a + b1 Δ lnX1 + b2 Δ lnX2 + b3 Δ lnX3 + b4 Δ lnX4 + b5 Δ lnX5 + ε t

Dependent Variable: DLNY
Method: Least Squares
Date: 03/25/16 Time: 13:27
Sample (adjusted): 1996 2014
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.048045	0.036727	-1.308157	0.2153
DLNX1	2.174984	1.046568	2.078207	0.0598
DLNX2	0.838710	0.329860	2.542626	0.0258
DLNX3	-2.309384	0.368801	-6.261876	0.0000
DLNX4	0.295507	0.752455	0.392723	0.7014
DLNX5	-0.483144	0.257620	-1.875408	0.0853
ET(-1)	-1.107792	0.243123	-4.556515	0.0007

R-squared	0.836162	Mean dependent var	0.043998
Adjusted R-squared	0.754243	S.D. dependent var	0.132871
S.E. of regression	0.065869	Akaike info criterion	-2.324973
Sum squared resid	0.052065	Schwarz criterion	-1.977022
Log likelihood	29.08724	Hannan-Quinn criter.	-2.266086
F-statistic	10.20717	Durbin-Watson stat	1.937618
Prob(F-statistic)	0.000400		

△ lny=-0.0488+2.1750 Δ lnX1+0.8387 Δ lnX2-2.3094 Δ lnX3+0.2955 Δ lnX4-0.4831 Δ lnX5-1.1078

t =(-1.3082) (2.0782) (2.5426) (-6.2619) (0.3917) (-1.8754)(-4.5565)

R^2 = 0.8362 DW=1.9376

From the above equation model shows that, on a total power of agricultural machinery in Xinjiang every 1% increase in the current agricultural output in Xinjiang will increase 2.1750 percent; on an agricultural chemical fertilizer every 1% increase in Xinjiang, Xinjiang period the agricultural output will increase 0.8387 percent; agricultural workers on a 1% rise in Xinjiang, the current reduction in agricultural output in Xinjiang is 2.3094%; on an effective irrigation area of Xinjiang every 1% increase in the present Xinjiang agricultural output will increase 0.2955 percent; food production on a 1% rise in Xinjiang, the current reduction in agricultural output in Xinjiang is -0.4831%.

Relevant Suggestions

Based on the final results of the model can be found in factors which affect agricultural output value of Xinjiang's total power of agricultural machinery is the most significant and second factors more significant is the number of agricultural workers, and finally the application amount of agricultural fertilizers. According to the existing problems, it can give the following advice.

The results can be seen in agricultural workers, rural surplus labor exists portion, therefore, need to be appropriate to transfer these surplus labor out, this is the rational use of human resources on the one hand but also to reduce the pressure on agriculture, rural areas and farmers, this will not only achieve a stable development of the

agricultural output has also realized the rational use of human resources, in favor of resources in the whole region of the rational allocation.

Agricultural Mechanization in Xinjiang agricultural output the most significant, and therefore we must increase investment in agricultural mechanization, modern society is a science and technology, mechanization of society, the use of mechanized power can significantly increase agricultural output, optimize and increase agricultural mechanization, and efforts to improve the level of mechanization of agricultural production in Xinjiang.

The application of fertilizers on agricultural output in Xinjiang more significant, therefore, to a reasonable application of fertilizer, including fertilizer procurement, transportation as well as preservation, agricultural production should be appropriate to increase the amount of fertilizer applied, in order to increase Xinjiang agricultural output, an appropriate increase in a certain amount of chemical fertilizer could increase agricultural output in Xinjiang, but cannot exceed a certain limit, otherwise prone to unnecessary waste and pollution.

In summary, to raise the overall level of development of Xinjiang's agricultural output, we must increase agricultural mechanization investment, transfer of rural surplus labor force, a reasonable application of chemical fertilizer, so you can drive the development of other related industries, the consolidation of Xinjiang Agricultural on the basis of status and improving their life satisfaction.

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REFERENCE:

[1] Region of Xinjiang Bureau of Statistics, National Bureau of Xinjiang Statistical Yearbook [M]. Beijing: China Statistics Press, 2013.

[2] Zheng Tingting. Factors Agricultural Output Analysis and Model Test [J]. Managers. 2010 (11).

[3] Zhang Jianhong. Agricultural Industrial Structure Adjustment Impact on Farmers' Income Empirical Analysis [J]. Economic Perspectives (Under). 2009

[4] Li Guozhang, Zhou Qi. Factors Affecting China's Agricultural Output Value Of [J]. Statistics and Decision 2007 (22)

[5] Feng Hongxing, Pu Chunling, Liu Xinping. Agricultural Industrial Structure Adjustment [J]. Modern Agricultural Sciences. 2008

[6] Zhang Zhenhua, Liu Weihua. Promoting Agricultural Industrialization Thought Process [J]. Reclamation Economy .1998 (03)

[7] Baidu Encyclopedia and Baidu Library www.Baidu.Com, Wenku.Baidu.Com

[8] Zeng Yu, Liu Jianfu. On The Issues of Sustainable Agricultural Development in Xinjiang [J]

[9] Li Zinai, Pan Wenqing. Edited Econometrics Beijing: Higher Education Press, 2010.3.

[10] Jia Jun Ping, He Xiaoqun, Jing Yongjin. Statistical Editor (Fourth Edition) Beijing: Renmin University of China University Press, 2009.