The Influence of Monetary Policy and Fiscal Policy on the Rural Residents' Consumption

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Abstract This paper conducts an empirical analysis of influence of fiscal expenditure supporting agriculture monetary supply on rural residents's consumption by adopting a vector auto-regression model, based on the data from 1978 to 2011. The study indicated that: in the short term, fiscal policy is the Granger reason of rural residents' consumption, monetary policy is not the Granger reason of rural residents' consumption; in the long term, the comprehensive function of fiscal policy and monetary policy has a great influence on the of rural residents' consumption. Under the background of Economic Transition and Urbanization, Expanding Domestic Demand is the slogan. We should coordinate fiscal policy and monetary policy to promote the rural residents' consumption.

Key words Rural residents' consumption, Fiscal policy, Monetary policy, Vector auto-regression model

1 Introduction

Expanding domestic demands, especially promoting consumers' demands and consumption abilities, which is the major strength to accelerate economic development in China. To improve rapidly income and the consumption level of rural residents is the key to stabilize the economy in long term, and it's also a significant way to transform economic development mode. There are more than 7 hundred million farmers in China, however, their consumption structure is still not reasonable, and the consumption level should be highly improve ether. While China covers a vast area, the economic development is unbalance. Rural residents have huge potential for making the transition from having only adequate food and clothing to the well-off rural residents, no matter on market capacity or future development. It is a priority for our government to draft macroeconomic policies which transform form potential consumption to reality of rural residents, encourage to consumption structure upgrade and reasonable consumption. As a result, what's the influence of our macroeconomic policies on per capita consumption level of rural residents is the main matter to settle.

At present, most of the scholars agree the mainstream views on the relationship between monetary policy and consumption as follow: (1) In the Absolute Income Hypothesis, John. M. Keynes considers that the current consumption expenditure of residents is determined by their current disposable income. On the premise of price stickiness, once the money supply increases, people would hold more. And in that case any increase will lead to immediate consumption rising. (2) Depending on Relative Income Hypothesis of J. S. Duesenberry, the consumers' behaviors are affected not only by consumers' own revenue, but also by the people around, namely "ratchet effect" and "demonstration effect". (3) According to the Permanent Income Hypothesis of Milton. Friedman, he puts forward that short-term monetary shocks just result in the temporary change of income, and the brief impact on consumption. But in the long run, family permanent consumption decision and permanent income would form a fixed ratio. (4) Based on Lifecycle Theory, Franco. Modigliani believes that consumers would distribute all the lifetime income in each consumer phase in order to achieve utility maximization in their life. (5) Precautionary Saving Theory refers to consumers who belonging to risk aversion reduce consumption and increase saving to prevent indetermination. That is to say, the predictability and stability of monetary policy has greater stimulation to consumption than expansion or deflation policy. (6) Buffer-stock Saving Theory proposed by Carroll.

On the relationship between fiscal policy and consumption, according to the traditional Keynesian theory, the public finance expenditure will drive the growth of output by multiplier effect. Further more, it will motive residents' consumption by consumption function. Some economists have added new variables to the neoclassical DSGE model. And they have got a conclusion that the public finance expenditure is likely to increase or reduce the residents' consumption. At the same time, another part of scholars have introduced the non-neutrality of money and short-term price stickiness that is on the basis of the Keynesianism into DSGE model. Then, they put forward to more government expenditure will squeeze into the private consumption by analyzing with the neoclassical comprehensive framework.

Domestic scholars have start late in rural residents' consumption, but some scholars who have established in this area. Sun Jiangming and Zhong Fu ning (2000) thought that the low level of income distribution gap is the main factors that restrict consump-

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tion of rural residents[1]. Wan Guanghua, etc. (2001) thought that China's low consumption growth and domestic demand caused by liquidity constraints and uncertainty[2]. Shi Qinghua, etc. (2005) pointed out that because of the lag of security system in rural areas, the rural residents' expect to uncertainty forecast is increasing, precautionary savings increase, thus inhibiting current consumption[3]. Zhao Jinwen and Gao Hui (2004) through the conduct of monetary policy for decades has been simulated empirical tests conducted, the results showed that: the money supply effect on consumption significantly[4]. The analysis made by Chen Xuebin, etc. (2005) pointed out that both income uncertainty and risk awareness is rising, resulting increase in precautionary savings, so it's leading to China's consumer have lower sensitivity to savings interest rates, monetary policy drop[5]. Hu Yonggang and Yang Zhifeng (2009) study through SVAR method pointed out that China's Fiscal Expenditure on rural output and consumer spending is squeezed into[6]. Huang Wei and CongShuHai (2011) found out that in provincial panel data study : impact on the residents' consumption expenditure policy is superior to the revenue policy, and the impact on rural residents' consumption expenditure policy more effective mainly because of short-term income elasticity of rural residents have higher Short-term income elasticity[7].

While scholars have respectively researched the influences about the consumption of monetary policy and fiscal policy, they did not consider the influence on consumption of rural residents. According to some relevant data, such as the broad money supplies, fiscal agricultural expenditures and per capita consumption expenditure of rural residents, this paper considers the influence both of monetary policy and fiscal policy on the farmers' consumption with empirical study.

2 The empirical method and variable selection

This paper talks over the influence of monetary policy and fiscal policy on farmers' consumption. Establishing vector auto-regression model (VAR) and vector error correction model (VECM) on the basis of existing research achievement of scholars both at home and abroad. Besides, the paper adopts some test methods to analyze how the monetary policy and fiscal policy affect farmers' consumption, such as co-integration test, Granger causality test, impulse responses analysis and variance decomposition, etc.

2.1 Model specification

2.1.1 VAR model. OLS method is generally adopted in the traditional econometrics, which is base on stationary variable. If the variables are non-stationary time series data, continuing to use OLS method would cause spurious regression. And the results are incredible. Therefore, the paper adopts VAR method so as to avoid the spurious regression. VAR model, which regards each endogenous variable as a function of the lagged values of all the endogenous variables in system. And the vector auto-regression model will be formed when extending single variable to the multivariate. Formula (1) and formula (2) are both VAR model. Assuming that $\{y_t\}$ and $\{x_t\}$ are affected by the present and past of each other, and they are stationary too. This model plays a mainly part in feedback for reflecting dynamic relations between $\{y_t\}$ and $\{x_t\}$.

$$y_t = \alpha_{10} - \alpha_{12}x_t + \beta_{11}y_{t-1} + \beta_{12}x_{t-1} + \varepsilon_{yt} \quad (1)$$

$$x_t = \alpha_{20} - \alpha_{21}y_t + \beta_{21}y_{t-1} + \beta_{22}x_{t-1} + \varepsilon_{xt} \quad (2)$$

Thereinto, ε_{yt} and ε_{xt} obey write noise that cosmist of zero-mean and the variance of σ_y^2 and σ_x^2 as well as independence. Then, ε_{yt} and ε_{xt} correspond to the Pulsed Value of $\{y_t\}$ and $\{x_t\}$.

2.1.2 VECM model. Essentially, the VECM model adopted in this paper is a VAR model that containing Cointegration constraints. So, showing formula (3):

$$\Delta y_t = \theta EC_{t-1} + \sum_{i=1}^{p} \Gamma_i \Delta y_{t-i} + \varepsilon_i \quad (3)$$

Thereinto, $y_t = [LNRXF, LNRCZ, LNM2]$, Γ_i is coefficient matrix. ε_i is random error vector. EC_{t-1} is error correction term, which represents a long-run equilibrium relationship among each variable. θ represents adjustment speed that adjust deviation to equilibrium state. The coefficient of each variable reflects the situation how short-term fluctuations of different variables impact the explained variables.

2.1.3 Variance decomposition. Variance decomposition means splitting MSE of VAR model into different variable shocks, and then analyzing the degree of influence. As formula (4):

$$Y_t = B + \sum_{i=1}^{p} \Gamma_i y_{t-i} + \varepsilon_i \quad (4)$$

B is a constant vector, and the other symbols similar to formula (3). The forecasting error of s phase of the model:

$$Var[Y_{t+s} - E(Y_{t+s} \mid Y_t, Y_{t-1}, Y_{t-2}, \Lambda)] = \varepsilon_{t+s}\Psi_1\varepsilon_{t+s-1} + \Psi_2\varepsilon_{t+s-2} + \cdots, \Psi_{s-1}\varepsilon_{t+1} \quad (5)$$

Mean square error:

$$MSE = \Omega + \Psi_1\Omega\Psi_1\Psi + \cdots + \Psi_{s-1}\Omega\Psi_{s-1} \quad (6)$$

Including Ψ is determined through coefficient matrix Γ_i and constant vector B. Ω is a covariance matrix of formula (6) According to formula, the formula splitting MSEP (squared error of pre-diction) of each endogenous variable into the contribution of structural shocks in the model. Then, working out the significance for every variable shock, namely, the contribution ratio in total contribution. Consequently, this paper judges the degree of causal relationship based on this ratio.

2.2 Variable selection and data sources The explained variable selected by this article is per capita living expenditure of countryside inhabitant (XF). And the explanatory variables include (1) the monetary policy, with the broad money supply (M2) to represent. (2) The input of fiscally supporting-agriculture policy, represented by finance spending in agriculture (CZ). Nominal variables XF and CZ are converted into real variables by means of CPI (regarding 1978 as base period). Then, two variables are remarked by RXF and RCZ. M2 has no need to deal with. And, in order to eliminate the heteroscedasticity, we take the natural logarithm of each variable, remarked by LNRXF, LNRCZ and LNM2.

This paper selects sample data from 1978 to 2011. Data sources include China Statistical Yearbook (2011), China Compendium of Statistics 1949 – 2004, China Financial Yearbook (2011), China Rural Statistical Yearbook (2011) and the database of International Monetary Fund (IMF).

3 The empirical results and analysis

3.1 Unit root test Since regression analysis and Granger test both require stationary in time series. In order to avoid the spurious regression, the article uses ADF unit root test advanced by Dickey and Fuller to test the stationarity of explanatory variables and explained variables. Results are shown in Table 1. As LNRXF、LNRCZ and LNM2, their ADF statistics are all greater than critical value. Then, the ADF statistics will pass the test after using first order difference. It shows that LNRXF、LNRCZ and LNM2 are all first order Integrated Series.

3.2 Johansen co-integration test While two or more time series are non-stationary, there may be some smooth linear combination among the series. Then, there is a long-term and stable relationship between variables, namely, the co-integration relationship. The paper adopted Johansen test that has been widely applied. Firstly, we should determine the structure of VAR before testing. Next, we can determine that lagged differences are two after considering AIC, SC, LR and Q statistic. Then, establishing VAR(2) model. The test results are as shown Table 2.

Table 1 Unit root test

Variables	Test form (c,t,k)	ADF statistic	critical value at 10%	Whether stationary
LNRXF	(c,t,0)	-1.416 693	-3.209 642	Non-stationary
D(LNRXF)	(c,0,0)	-2.729 126	-2.617 434	stationary
LNRCZ	(c,t,0)	-0.971 745	-3.209 642	Non-stationary
D(LNRCZ)	(c,t,0)	-6.340 549	-3.212 361	stationary
LNM2	(c,t,0)	-0.899 734	-3.212 361	Non-stationary
D(LNM2)	(c,t,0)	-3.644 183	-3.212 361	stationary

Table 2 The result of Johansen co-integration test

H_0: Number of co-integration equation	Trace Statistic			Max – Eigenvalue Test		
	Statistic	Critical value at 5%	Pro. **	Statistic	Critical value at 5%	Pro. **
None *	63.724 37	35.192 8	0.000 0	36.608 4	22.299 7	0.000 3
At most 1 *	27.116 02	20.261 9	0.004 8	18.581 9	15.892 1	0.018 5
At most 2	8.534 149	9.164 55	0.065 8	8.534 15	9.164 55	0.065 8

Note: " * " indicate that we reject the null hypothesis with significant level at 5%

Table 2 shows there are more than one co-integration relationship among LNXF, LNCZ and LNM2. The long-term Cointegration equation consist of per capita living expenditure of countryside inhabitant, the broad money supply and finance spending in agriculture. As follows:

$$LNRXF = 0.3394LNRCF + 0.0365LNM2 + 3.1979 \quad (7)$$

By formula (7), there is a long-term equilibrium relationship among each variable from 1978 to 2011. Besides, the broad money supply (LNM2) and finance spending in agriculture(LNCZ) both form a positive correlativity with per capita living expenditure.

3.3 Granger test While, there is remarkably correlative on some of economic variables. They may not have meaning. And, there is no correlativity within variables when there is no causal relationship. Therefore, the article adopts Granger Test to examine the causal relationship between variables. The results as shown in Table 3. Granger is defined as: With the condition that contains past information of variable x and y. The prediction result of variable y is superior to that result only by past information. That is to say, variable x contributes to explaining future change of variable y. Then, we believe that variable x is the Granger cause of variable y.

As shown in the table, LNRCZ and LNRXF are the Granger causal relationship. It indicates that more finance spending on agriculture could effectively improve the consumption ability of rural residents. However, LNM2 is not the Granger cause of LNRXF. LNRXF is not the Granger cause of LNM2 either. And it indicates that greater broad money supply (namely, monetary policy) impact the consumption of rural residents limitedly.

3.4 Pulse response analysis Granger causality can only explain whether there is a causal relationship between variables. However, we can not analyze the effect of one variable on another. Dynamic analysis of the VAR model generally adopts the orthogonal impulse response function. And, the orthogonal function is completed by using Cholesky decomposition. But as we know, the consequences of Cholesky decomposition are strictly dependent on the order of variables in the model. So this paper adopts the generalized impulse response function that Koop (1996) has raised to further define the relationship among broad money supply (LNM2), finance in agricultural expenditure (LNCZ) and per capita consumption of rural households (LNXF).

Table 3 Granger causality

Null hypothesis	Sample size	F-statistic	Prob.	Whether to accept
LNRCZ not the Granger reason of LNRXF	32	5.9583	0.0072	reject
LNRXF not the Granger reason of LNRCZ		10.6959	0.0004	reject
LNM2 not the Granger reason of LNRXF	32	0.4188	0.6620	accept
LNRXF not the Granger reason of LNM2		2.1755	0.1331	accept

As shown in Fig. 1, because the VAR model is stationary, the impulse response will eventually converge in theory. But within ten lag period, the impulse response of LNXF on the LNCZ did not reach the peak. That is to say, the influence of fiscal agricul-

tural expenditure on per capita consumption of rural households keeps persistence and hysteresis. Therefore, finance in agriculture expenditure has a significantly positive effect on increasing per capita consumption of rural households. And the impact of broad money supply on per capita consumption of rural households tends to converge after three lag period. Namely, the impact is just limited and short-term.

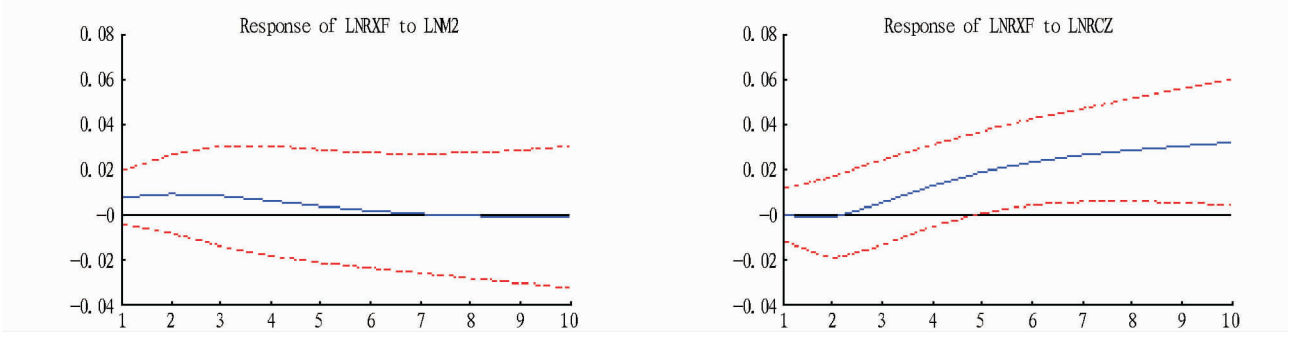

Fig. 1 Pulse response analysis

3.5 Vector error correction model While the co-integration test has shown that there is a long-term equilibrium relationship among LNXF, LNCZ and LNM2. Whether if this relationship is causality, should test further. This paper adopts Granger causality test for the 3 time series depend on the error correction model (VECM). Just as well we must define the lagged differences before establishing VECM model. Generally, the lagged differences of VECM model is equal to that finally lag order of VAR model minus 1. We have got that the lagged differences of VAR model is two as above. So we set up VECM model on the basis of the lagged differences to one. The model is as follows:

$$\Delta LNRXF_t = 0.173\,7LNRXF_{t-1} - 0.011\,0LNRCZ_{t-1} - 0.078\,6LNM2_{t-1} + 0.492 - 0.140\,5\Delta EC_{t-1} \quad (8)$$

The results showed, the elasticity that finance spending on agriculture and the broad money supply with per capita consumption of rural households respectively are 0.01 and 0.07, which means that there is a short-term dynamic relationship among three variables. At the same time, the error correction coefficient is -0.14, corresponding with the reverse correction mechanism. The co-integration relationship has stimulated the current per capita consumption of rural households, whose effect is 0.14. This conclusion also suggests that keeping co-integration will drive farmer's consumption.

3.6 Variance decomposition analysis The impulse response function describes how the shock to one endogenous variable affects another. And the variance decomposition is to further evaluate the significance of different structural shocks through analyzing the contribution of structural shocks on endogenous variable change (by variance). Therefore, variance decomposition discover the important information of the each random disturbance affect themselves by the variances which in VAR model.

Table 4 shows that the effect of LNRCZ on LNRXF has reached the maximum in the tenth stage, as 31.26%. The result indicates that the effect is significant and long-term. Table 5 suggests that LNRXF and LNM2 both have effects on LNRCZ, namely, the rural residents' consumption and money supply will influence the fiscal expenditure for agriculture. Table 6 shows, the effect of LNRXF on LNM2 is not significant, but LNRCZ will affect LNM2. That is to say, the broad money supply is mainly affected by the self.

Table 4 The variance decomposition results of LNRXF

Period	S. E.	LNRXF	LNRCZ	LNM2
1	0.034 066	100.000 0	0.000 000	0.000 000
2	0.057 209	98.964 65	0.714 631	0.320 719
3	0.074 943	95.727 23	3.258 390	1.014 380
4	0.089 228	90.462 82	7.502 262	2.034 914
5	0.101 617	84.143 10	12.575 05	3.281 847
6	0.112 929	77.793 23	17.589 74	4.617 028
7	0.123 512	72.044 32	22.034 78	5.920 897
8	0.133 505	67.125 91	25.755 09	7.119 000
9	0.142 975	63.028 13	28.792 96	8.178 910
10	0.151 973	59.642 21	31.261 41	9.096 385

Table 5 The variance decomposition results of LNRCZ

Period	S. E.	LNRXF	LNRCZ	LNM2
1	0.112 113	2.289 775	97.710 22	0.000 000
2	0.171 734	6.647 811	89.515 50	3.836 691
3	0.221 446	12.284 38	78.583 89	9.131 731
4	0.267 287	17.104 41	69.473 66	13.421 93
5	0.310 240	20.298 31	63.247 79	16.453 90
6	0.350 476	22.046 31	59.361 23	18.592 46
7	0.388 221	22.809 80	57.025 07	20.165 13
8	0.423 734	22.998 70	55.625 80	21.375 50
9	0.457 250	22.892 96	54.766 12	22.340 92
10	0.488 971	22.658 83	54.211 16	23.130 01

Table 6 The variance decomposition results of LNM2

Period	S. E.	LNRXF	LNRCZ	LNM2
1	0.050 417	1.834 532	4.937 919	93.227 55
2	0.094 590	1.576 660	6.756 235	91.667 11
3	0.137 153	1.680 014	8.724 278	89.595 71
4	0.177 683	1.978 200	10.616 38	87.405 42
5	0.216 109	2.367 622	12.274 80	85.357 58
6	0.252 404	2.772 963	13.640 22	83.586 82
7	0.286 575	3.148 364	14.723 29	82.128 34
8	0.318 688	3.473 484	15.567 26	80.959 26
9	0.348 865	3.744 727	16.222 49	80.032 78
10	0.377 267	3.967 003	16.734 24	79.298 75

4 Research conclusions and the policies

In the paper, we analyze the influence of money supply and finance expenditure for agriculture on consumption of rural residents though adopting a series of empirical research method, such as VAR model, co-integration test, Granger causality test, impulse response analysis and variance decomposition and so on. Then, we get some conclusions as following. (1) There is a long-term equilibrium relationship between the comprehensive effect of the monetary policy as well as fiscal policy and rural resident consumption. (2) Finance expenditure for agriculture has a long-term impact of the rural residents' consumption, and the money supply has a short-term impact of rural residents' consumption. (3) The impact of fiscal policy on the consumption of rural residents is far greater than monetary policy. In conclusion, the causes of above results are as following. (1) Finance expenditure for agriculture has a long-term effect on the consumption of rural residents, which indicate that Chinese government can intervene heavily in the economy. (2) Rural residents are not sensitive to monetary policy due to some reasons, including incomplete social security system, commercial network with few and unreasonable layout. Besides, the vast majority of farmers are risk averter.

Above conclusions show that the problem is that the consumption level of rural residents improves slowly has directly restricted expansion of domestic demand and the way of economic development, which has become an obstacle we must overcome. Therefore, we must take example by domestic and international development experience, and then develop scientific policies to expand the consumption demand of rural residents and guide scientific consumption behavior.

The details are listed as follows: (1) We should improve the monetary circulation mechanism and keep slow exchange-rate appreciation. (2) We can improve the transfer payment and tax subsidies for rural residents as well as the social security system, so that motivate rural residents to form better consumption expectation. (3) To pay close attention to the cooperation between monetary policy and fiscal policy. At the same time, it is important that price instruments should match quantity instruments. And long-term policies should adjust to short-term policies. (4) In order to optimize the pattern of national income distribution, our country should enhance farmers' vocational skills as well as profitable abilities, and use various channels to increase rural incomes. (5) Adjusting the consumption policies about rural residents and the layout of commercial network in rural area to create new consumption patterns. (6) Advocating the scientific, civilized and rational consumption view.

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