Research on the Effect of Targeted RRR Cuts on Agriculture—Based on the VAR Model

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Abstract—In recent years, in order to adapt to the market mechanism and monetary structure defects in China, the People's Bank of China (PBC) has used structural monetary policy to adjust it several times. The aim of this study is to investigate the effect of structural monetary policy on agricultural development by taking targeted RRR cuts policy as an example. The relevant data was selected from the gross agricultural production, agricultural loans, and agricultural investment of China in the years from 2003 to 2017, using the VAR model to analyze the effectiveness of the targeted RRR cuts monetary policy. Results showed that the implementation of targeted RRR cuts is generally effective for agricultural development, having a significant role in promoting agricultural loans, agricultural investment, and the growth of gross agricultural production. Meanwhile, as time went on, its effect would weak. This study illustrates that it is necessary to guide financial institutions to follow the monetary policy, reform the financial operation mechanism, clarify the "target" of the policy, comprehensively use a variety of structural monetary policy tools, and closely cooperate with structural monetary policy and fiscal policy, as so to expand and promote the effect of structural monetary policy.

Keywords-Structural monetary policy; Targeted RRR cuts; Agriculture

1 INTRODUCTION

Agriculture is the foundation that supports the construction and development of China's national economy. For the better development of the agricultural economy, in 2014, the People's Bank of China (PBC) launched a series of structural monetary policies, including targeted RRR cuts (targeted requirement reserve ratio cuts) for rural commercial banks and cooperative banks to encourage more capital to flow into the agricultural sector.

Targeted RRR cuts, which have become an innovative monetary policy with structural adjustment function for the first time, is a central bank monetary policy for a certain financial sector or financial industry, with the purpose of reducing the deposit reserve ratio.

Many pieces of research have investigated the effects of structural monetary policy, but the evaluations are mixed. On the one hand, some scholars give positive evaluations. Ehlers proposed that Operation Twist (TO), the directional regulation policy, might have some influence on asset portfolio and would affect market fund price with predictable results.[1] Ma Li et al. believed that under the coordination of fiscal and tax policies, targeted RRR reduction can help increase credit supply to the agricultural sector.[2] On the other hand, some scholars held the opposite views. Li Qi thinks that the effect of the targeted RRR reduction policy was not obvious, and the

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incremental funds released did not precisely flow into vulnerable sectors.[3] Zhang Kefei and Wu Han thought that structural monetary policy tools could effectively promote agriculture in the short term, but the long-term effect is not significant.[4] Based on this, this study uses relevant data from 2003 to 2017, including agricultural GDP, agricultural investment, agricultural loans and other data. Through theoretical analysis of transmission allocation in the premise policy, VAR model (vector autoregressive model) is used to test and demonstrate the policy effectiveness. The goal of this study is to be able to contribute to the theoretical debate on the true effect of targeted RRR cuts policy, and help to look for measures to improve policy effectiveness.

2 MECHANISM ANALYSIS

2.1 Policy transmission analysis

The financial multiplier assumed a conclusive part in the transmission cycle of the strategy. (The cash multiplier is the proportion of the cash supply to base cash.) During the time spent market activity and course, the base currency is influenced by cash multiplier, which communicates and elevates the public authority's aim to change social and financial improvement by scaling liquidity. The engendering way is as per the following:

Carrying out designated RRR cuts - Statutory reserve diminishes - Cash multiplier enhances - Cash supply expansions in explicit areas - Financing loan fee diminishes - Financing cost diminishes - Venture expansion in explicit areas (like agribusiness, rural areas and farmers and other key or feeble areas of the public economy) - economy fills in these areas [5].

Furthermore, targeted RRR cuts can likewise influence individuals' expectations through signal impact, making more individuals accept and able to put resources into some specific areas and drawing in more market capital into the business.

Consequently, the execution of targeted RRR cuts strategy has extraordinary positive importance and amazing effect on lessening financing loan cost, expanding farming credits, expanding horticultural speculation and advancing agrarian monetary turn of events.

2.2 Analysis of the long-term effect of policy implementation

Albeit structural monetary policies can speed up monetary change and overhauling, the information shows that since 2012, the development pace of agriculture gross domestic product has been declining, alongside the development pace of farming advances and agrarian venture, with an enormous reach. Over the long haul, if the targeted RRR cuts are consistently executed, their positive effect on agricultural economic development will be continually debilitated.

There are three fundamental issues behind this close synchronous decrease:

Most importantly, because of the inadequate change of the financing cost market, China's loan fee control is fundamentally driven by the state, and the supply and demand of funds lack flexibility, which clashes with the market transaction standard. The unreasonable utilization of structural monetary policy prompts exorbitant capital inflow into the agricultural area, bringing about the misallocation of assets, which is impeding its turn of events.

Besides, monetary support represents a high extent in the development of horticultural speculation, and farming improvement depends a lot on the help of government approaches, bringing about the absence of autonomy and capacity to oppose chances.

Third, the problem of financial operation structure still exists. The pursuit of profit is the fundamental purpose of capital, which makes credit resources mainly flow to areas with good economic development and industries with high expected returns, rather than small and micro agriculture-related enterprises with high risks and low returns. Even with supportive policies like targeted RRR cuts, it is still difficult to solve structural problems in financial operations.

Based on the above analysis, it is still necessary to make a further accurate assessment of the effect of the targeted RRR reduction policy on agricultural development

3 EMPIRICAL ANALYSIS

3.1 Specification of Model

Based on the above analysis, this research selects the VAR model (vector autoregressive model) to empirically test the positive effect of directional RRR reduction policy on the agricultural economy. Thus, the model design of this paper is as follows:

$$Yt=\alpha+\Sigma\beta iY(t-i)+\varepsilon t \quad (1)$$

Where $E(\varepsilon t)=0$, $E(\varepsilon t, Y(t-i))=0$, $i=1, 2, 3, \ldots, p$; Yt is a homoscedastic stable linear random variable composed of vectors of $(n\times1)$, βi is the coefficient matrix of $(n\times n)$, $Y(t-i)$ is the i-order lag vector of Yt vector, and εt is the error term, which can be used as a random interference term.

3.2 the Selection and Course of Variables

3.2.1 Variable Selection and Description

With the development of the economy, the labor force usually shifts from the primary industry to the secondary and tertiary industries. The agricultural labor force in China also follows such an evolutionary path. The agricultural labor force is gradually draining away. Therefore, according to the C-d function Q=F (A, K, L), it can be seen that the implementation of targeted RRR cuts policy will increase agricultural loans and agricultural investment, that is, the increase of capital stock K. On the one hand, the increase of loans means that farmers have more funds to increase the input of agricultural factors, and the reduction of loan cost can restrain the rise of the cost of agricultural products, thus increasing agricultural output and agricultural income. On the other hand, the more investment in agriculture, the more funds for agricultural technology research and development, which promotes the research and development of new technologies, can also improve the total agricultural output. Therefore, based on Chu Erming and Cao Ce's research [6], this paper selected the correlation fluctuation among agricultural investment, agriculture loans and agricultural GDP to present the transmission effect of structural monetary policy of directional RRR cuts.

3.2.1.1 Agricultural loan (set as X1)

Refers to various loan funds issued by agricultural banks, credit cooperatives and other related agricultural financial institutions, generally used for agricultural production. The target of application and distribution is usually individual farmers, state-owned agricultural enterprises, collective agricultural enterprises.

3.2.1.2 Agricultural investment (set as X2)

Refers to the funds invested in agricultural development, improving the agricultural production environment, and enhancing the efficiency of agricultural intensification. It mainly comes from various self-raised funds, agricultural incentive funds from local government departments, and targeted agricultural budgets allocated by the central government.

3.2.1.3 Agricultural GDP (set as X3)

The total value of agricultural final products or services over a period of time (usually a year), reflecting the overall output of the agricultural sector during the period, is usually expressed in monetary terms.

3.2.2 Data sources

The relevant data used in this article are from the official website of the National Bureau of Statistics of China. In order to avoid possible heteroscedasticity in the process of data analysis, all data are logarithmic, and the corresponding logarithmic variables of x1, x2, and x3 after transformation are LNx1, LNx2, and LNx3, respectively.

The data used in the article is shown in Table 1.

Table 1 Changes in agricultural loans, agricultural investment, and the total agricultural output value from 2003 to 2017

Unit: 100 million yuan

YEAR	AGRICULTURE LOANS	AGRICULTURE INVESTMENT	AGRICULTURE GDP
2003	8.31	140.2	14870.11
2004	10.7	170.55	18138.36
2005	7.28	218.06	19613.37
2006	10.56	267.91	21522.28
2007	15.63	327.24	24444.68
2008	17.51	456.82	27679.94
2009	34.27	743.24	29983.81
2010	55.5	959.2	35909.07
2011	117.74	2334.2	40339.62
2012	149.06	3197.53	44845.72
2013	232.37	4027.89	48934.94
2014	287.81	5388.73	51851.12

2015	358.46	7849.34	54205.34
2016	414.61	20232.59	55659.89
2017	496.81	11833.31	58059.76

Source: National Bureau of Statistics of China

3.2.3 Empirical analysis based on VAR model

3.2.3.1 The Stationary Test of Time Series

Table 2 Stationary Test of Main Variables

VARIABLE	ADF-T	P-VALUE	STATIONARY
lnx1	-1.65764	0.7007	UNSTANBLE
D(lnx1)	-3.16025	0.0467	STANBLE
lnx2	-2.0094	0.5468	UNSTANBLE
D(lnx2)	-3.34714	0.034	STANBLE
lnx3	-2.97297	0.1817	UNSTANBLE
D(lnx3)	-4.86437	0.0031	STANBLE

According to Table 2, LNx1, LNx2 and LNx3, which represent logarithmic variables of agricultural loans, agricultural investment and agricultural GDP, fail to pass the stationary test, while the P values of first-order differential logarithmic variables D(LNx1) and D(LNx2) of agricultural loans and agricultural investment are all less than 0.05, indicating a stationary series. However, D (LNx3), whose P value is greater than 0.05, is not stable at 95% confidence level, calculates its second-order difference, and finally is stable at 90% confidence level, which is a stationary sequence.

3.2.3.2 Lag Length Selection

As can be seen from the above table, the data selected in this paper has a short time interval. In order to ensure accuracy, after repeated tests, the lag length of this study was finally selected as 1.

3.2.3.3 Stability Test

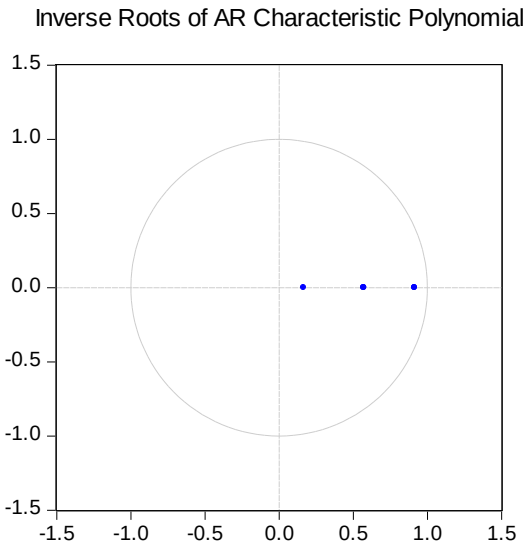

Figure 1 Unit circle and characteristic root of VAR model

Table 3 Results of Stability Test

Root	Modulus
0.915170	0.915170
0.570488	0.570488
0.165999	0.165999

According to Figure 1 and Table 3, all unit roots of the model are in the unit circle, and the structure is stable and well fitted. It can be judged that the VAR model established in this paper is stable.

3.2.3.4 Granger Causality Test

Table 4 Results of Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
LNX2 does not Granger Cause LNX3	12	2.55737	0.1685
LNX3 does not Granger Cause LNX2		6.86095	0.1319
LNX1 does not Granger Cause LNX3	12	5.13912	0.0449
LNX3 does not Granger Cause LNX1		2.07145	0.2227
LNX1 does not Granger Cause LNX2	12	2.31755	0.0427
LNX2 does not Granger Cause LNX1		0.24157	0.8641

According to Table 4, the test results show that granger causality is formed among agricultural loans, agricultural investment, and agricultural GDP.

3.2.3.5 Impulse-response Analysis

Figure 2, Figure 3, and Figure 4 respectively show the impulse response function of agricultural loans to itself, agricultural investment, and agricultural GDP. In the charts, the ordinate represents the response degree between variables in the impulse process, and the abscissa represents the number of lag lengths.

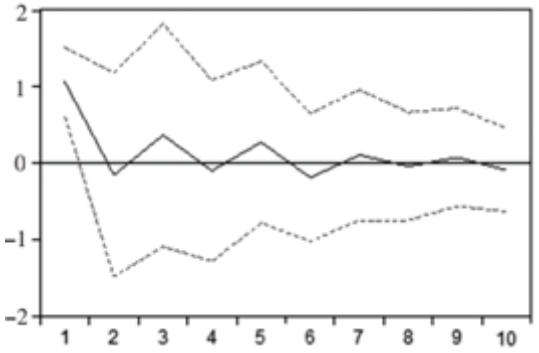

Figure 2 Shock of Agricultural Loans on Themselves

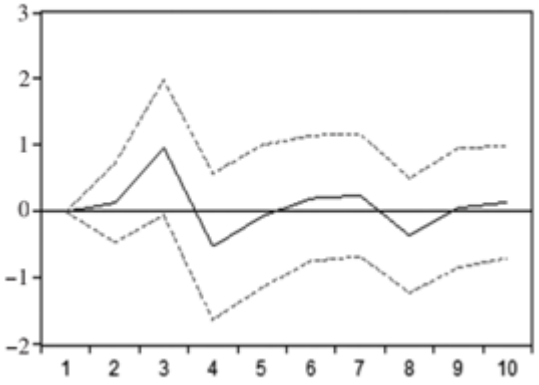

Figure 3 Shock of Agricultural Loans on Agriculture Investments

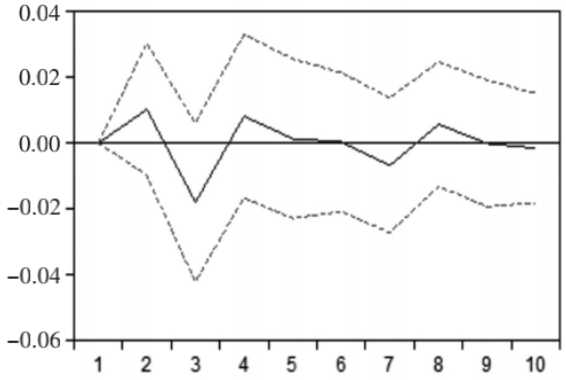

Figure 4 Shock of Agricultural Loans on Agriculture GDP

Firstly, the analysis of the situation in Figure 2 shows that the impact of agricultural loan shock on itself is in the same direction, reaching its peak in the first phase, then experiencing a period of fluctuation with a slight rise in the second, third and fourth phases, and finally converging with a decreasing trend in each phase and achieving equilibrium at the end.

Figure 3 shows that agricultural investment rose in the early stage due to the shock of loans, reached the highest level in the third stage, and then began to fluctuate and converge, which can indicate that the monetary policy of targeted RRR cuts had a certain positive impact on agriculture investment through loans.

As shown in Figure 4, loans have a positive promoting effect on agriculture in the first stage, while shocks after the third stage decline over time and eventually converge, indicating that the release of agricultural loans can promote products, but the effect is diminishing.

The charts above verify the previous point: targeted RRR cuts can produce positive effects to a certain extent, but the effects will weaken over time.

3.2.3.6 Variance Decomposition Analysis

According to the analysis of variance decomposition, the change of self-factors contributes the most to the change of agricultural GDP, but its contribution to itself tends to weaken. While other factors, agricultural investment and loan have little impact on agricultural GDP in the initial stage, and it is worth noting that the contribution rate of investment is much higher than that of loan, that is, the positive effect of the agricultural economy brought by targeted RRR reduction will be weakened in the long run.

4 CONCLUSION

This study examines the effects of targeted RRR cuts on agriculture using the VAR model based on the data of agriculture GDP, agriculture investment, and agriculture loans from 2003 to 2017. Through theoretical analysis and model operation, the result shows that targets RRR cuts have a certain positive effect on agricultural loans and investment, and thus have a positive effect on agricultural GDP, which can achieve the determined target of monetary policy in a short time.

However, the contribution of agricultural loans to agricultural GDP is not obvious. It gradually weakened over time, indicating that the liquidity released by the central bank has not been effectively allocated. In order to give full play to the policy effect of targeted RRR cuts, this research makes the following suggestions:

(1) Comprehensive use of multiple economic policies.

(2) Reform the financial operation mechanism and improve the effective loan supervision mechanism.

(3) Clarify policy "target" to ensure accurate implementation of policies.

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