Study on the Impact of Credit Rationing on Farmers' Welfare

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Abstract. Financial development is the core of modern economic development, but for a long time, the development of formal rural finance led by Agricultural Bank and Rural Credit Cooperatives has lagged behind, especially the problem of low degree of satisfaction of farmers' credit has become increasingly prominent, and it is extremely difficult for farmers to borrow from formal financial institutions. The widespread phenomenon of credit rationing in China's rural credit market has seriously restricted the role of rural financial institutions in supporting agriculture and the increase of farmers' welfare. This paper makes a regression analysis on the welfare status of farmers in China by using the balance between agricultural loans and deposits and loans of formal financial institutions as a measure index of credit rationing. It is believed that credit supply can improve the welfare of farmers and improve their lives.

Keywords: Rural financial market, Credit rationing, Farmer welfare.

1. Introduction

It is not difficult to find the importance of financial industry to the development of modern economy by summarizing the development experience of the world's economic powers. In the process of breaking the "dual economy" system and speeding up the urbanization process, the development of rural financial market is also an important and urgent problem that restricts the development of rural economy. Rural financial market has become an important part of modern financial market because it is directly related to the economic welfare of farmers and affects the growth of rural economy.

Martin (2004), Besley (1994) and Best (1987) put forward another viewpoint related to information asymmetry: the main reason for farmers to receive credit rationing is that they cannot provide recognized collateral to lenders such as financial institutions or that their estimates of the value of collateral are too different. Regular financial institutions in rural financial markets lack private information about farmers' economic status, personal quality, ability, and so on. Supervising the use of farmers' loans requires higher costs. In order to cope with the above situation, formal financial institutions will require individual farmers who apply for loans to have sufficient collateral assets, or direct credit rationing to farmers. By contrast, informal lenders can obtain information related to borrowers that formal financial institutions do not have. After establishing long-term cooperation, they have a better understanding of the credit situation and risk preferences of farmers. The supervision of the use of loans is low-cost and easy to accept more flexible collateral that farmers can provide.

Li (2012) statistics of 1000 household samples from 10 provinces in China show that 64.5% of households are allocated credit. Zhang (2013) collated the data of 20,040 households in 10 provinces in China. It shows that only 22.76% of the 30.78% of the households who have borrowed experience borrow from formal financial institutions [5]. Li (2014) used the two-column model to survey 1260 farmers in Shandong Province. The data showed that the proportion of farmers who received credit rationing from formal financial institutions reached 52% [6].

From the past operation of rural formal financial institutions, credit rationing alleviates the operational risks of financial institutions to a certain extent, but also restricts the improvement of the operational efficiency of rural formal financial institutions. From this point of view, how to find a breakthrough point to solve the problem of farmers' credit rationing, and how to improve the efficiency of their own operation while playing the role of supporting agriculture to solve the problem of farmers' fund shortage has become another problem to be solved in the reform of rural financial system.

2. Empirical Analysis

This part mainly conducts quantitative research and Analysis on the impact of credit rationing on farmers' welfare through empirical analysis. The income, consumption expenditure and housing investment of peasant households are taken as the measurement indicators of their welfare status, and the difference between the amount of agricultural loans and agricultural deposits of financial institutions is taken as the measurement indicators of credit rationing. This paper makes regression analysis on the welfare indicators of farmers and the supply of credit funds by using credit rationing measurement indicators. The long-term impact trend was analyzed by collating the regression results of co-integration test. The idea of analysis is to collect and sort out data, to establish models, to estimate parameters, to test econometrics and to draw empirical conclusions.

2.1 Index Selection and Data Processing

Firstly, the welfare indicators of peasant households are selected. In order to study the impact of credit rationing on farmers' welfare, this paper chooses rural residents' total income, total consumption expenditure and total residential investment from 1995 to 2017 as indicators of farmers' welfare.

Secondly, credit rationing indicators are selected. Since credit rationing mainly occurs in formal financial institutions in the rural loan capital market, this paper selects the difference between rural household savings and rural loans in formal rural financial institutions from 1995 to 2017 as a measure of credit rationing degree. At the same time, the explanatory variables selected by regression are also included in the explanatory variables. Including the total amount of farmers' loans and the total amount of township enterprises' loans.

Table 1. 1995-2017 Statistics on Farmer Welfare (hundred million)

Year	Total Income	TotalConsumptionExpenditure	Total residential investment
1995	5774.39	4918.96	641.57
1996	5996.17	5244.66	563.63
1997	6663.69	5601.32	796.77
1998	7865.3	6568.5	972.6
1999	10461.65	8712.13	1312.14
2000	13559.86	11262.15	1723.28
2001	16388.22	13376.04	2259.13
2002	17593.83	13612.68	2985.86
2003	17977.68	13224.07	3565.21
2004	18132.86	12940.84	3894.02
2005	18215.81	13500.83	3536.23
2006	18827.79	13852.63	3731.37
2007	19369.34	14351.82	3763.14
2008	20151.87	14934.45	3913.06
2009	22230.02	16538.89	4268.34
2010	24263.33	19048.97	3910.76
2011	26242.49	20697.11	4159.04
2012	29602.2	23049.24	4914.72
2013	33514.15	25770.82	5807.5
2014	35525.13	27530.05	5996.31
2015	39724.18	29407.71	7737.36
2016	43282.4	34279.85	6751.92
2017	49601.86	37942.49	8744.53

Data source: China Statistical Yearbook.

2.2 Model Empirical Test

In order to analyze the impact of credit rationing on farmers' welfare and the degree of impact, this paper establishes the following multiple regression model:

$$TIN = \alpha_{10} + \alpha_{11}PL + \alpha_{12}FL + \alpha_{13}SL + \varepsilon_{t,1} \tag{1}$$

$$TC = \alpha_{20} + \alpha_{21}PL + \alpha_{22}FL + \alpha_{23}SL + \varepsilon_{t,2} \tag{2}$$

$$TE = \alpha_{30} + \alpha_{31}PL + \alpha_{32}FL + \alpha_{33}SL + \varepsilon_{t,3} \tag{3}$$

Among them, the dependent variables TIN, TC, TE represent the total income, total consumption expenditure and total residential investment of rural residents respectively; the explanatory variable PL represents the total amount of loans from financial institutions to farmers, FL represents the total amount of loans from financial institutions to township enterprises, and SL represents the difference between deposits and loans of financial institutions to farmers.

The data involved in the analysis are all time series, because most of the time series data are non-stationary. In order to avoid the pseudo-regression of the model, we first use EViews 8.0 software to test the stationarity of the data series of each variable, so that we can determine the single integer order of each variable. Under the same single-integer order of each variable, the co-integration test was carried out to prove the existence of co-integration relationship.

In order to determine the stability characteristics of each variable series, this paper uses ADF unit root test method to test the 5% significance level of each time series. The test results are shown in Table 2.

Table 2. ADF Unit Root Test Results

Checked variables	Inspection methods	ADF	5%	conclusion
	(C,T,L)			
TIN	(C,T,1)	1.7405	-3.6329	Unstable
ΔTIN	(C,T,0)	-1.3671	-3.6449	Unstable
$\Delta^2 TIN$	(C,T,0)	-4.7878	-3.6584	Stable
TC	(C,T,1)	-0.3969	-3.6449	Unstable
ΔTC	(C,T,0)	-2.1555	-3.6449	Unstable
$\Delta^2 TC$	(C,T,0)	-4.3133	-3.6584	Stable
TE	(C,T,0)	3.5765	-3.6328	Unstable
ΔTE	(C,T,0)	-2.6358	-3.6449	Unstable
$\Delta^2 TE$	(C,T,0)	-8.8095	-3.6584	Stable
PL	(C,T,1)	7.3019	-3.6328	Unstable
ΔPL	(C,T,0)	-0.7356	-3.6449	Unstable
$\Delta^2 PL$	(C,T,0)	-5.4223	-3.6584	Stable
FL	(C,T,1)	-0.1517	-3.6449	Unstable
ΔFL	(C,T,0)	-1.106	-3.6449	Unstable
$\Delta^2 FL$	(C,T,0)	-6.3049	-3.6584	Stable
SL	(C,T,1)	-5.4589	-3.6736	Unstable
ΔSL	(C,T,0)	-1.9384	-3.6449	Unstable
$\Delta^2 SL$	(0,0, 1)	-3.0415	-1.9601	Stable

The conclusion column in Table 2 shows that neither the original sequence nor the first-order difference sequence of the above variables is stationary, but the second-order difference sequence of all variables has passed the stationarity test at the 5% significance level. It shows that all variables are second-order single-integer variables, which accords with the co-operation of all variables. Prerequisites for complete inspection.

Table 2 shows the results of ADF test for each variable. TIN, TC, TE and PL, FL and SL are all second-order monolithic sequences. Therefore, Johansen test can be used to determine whether the explanatory variables have a co-integration relationship with each dependent variable. Because Johansen test is carried out under the condition of the established VAR model, this paper chooses the optimal lag order of Johansen test based on the VAR model. On the one hand, if the lag time is too small to fully reflect the long-term changes of the model, on the other hand, if the lag time is too large, the degree of freedom of the model will be reduced, and then the credibility of the model estimation results will be reduced.

Table 3. Johansen test results

Testing variables	characteristic root	Trace statistics	5%	probability	conclusion
TIN	0.9315	72.2066	29.7971	0	Refuse
PL FL SL	0.6366	21.2756	15.4947	0.006	Refuse
	0.1021	2.0454	3.8415	0.1527	Accept
TC	0.6624	38.1054	29.7971	0.0044	Refuse
PL FL SL	0.545	17.4726	15.4947	0.0249	Refuse
	0.1238	2.5103	3.8415	0.1131	Accept
TE	0.8138	55.79	52.9152	0.0016	Refuse
PL FL SL	0.4228	20.4824	25.8721	0.2025	Accept
	0.3468	8.942	12.518	0.1839	Accept

As can be seen from Table 3, there is a co-integration relationship between the total income of rural residents, total consumption expenditure, total residential investment, rural household loans, loans from township enterprises and the difference between agricultural deposits and loans of formal financial institutions.

$$TIN = 7027 + 0.8160PL + 0.9871FL - 0.2971SL$$
$$(0.1591) \quad (0.4259) \quad (0.2097)$$
(4)

$$TC = 6199 + 0.3947PL + 0.5437FL - 0.3708SL$$
$$(0.1201) \quad (0.3215) \quad (0.0977)$$
(5)

$$TE = 9791 + 4.8643PL + 2.5140FL - 2.7631SL$$
$$(0.3467) \quad (0.9277) \quad (0.8147)$$
(6)

To evaluate the results of the first co-integration equation: Firstly, the parameter estimates of farmers' loans and township enterprises' loans are positive, indicating that both farmers' loans and township enterprises' loans have a positive impact on farmers' income. The coefficient estimate of agricultural deposit-loan balance of financial institutions is negative, which indicates that credit rationing has a negative impact on farmers' income. Secondly, the constant estimate value of 7027 indicates that when there is no relevant deposit and loan business between farmers and financial institutions, the income of farmers is 702.7 billion yuan, which is the daily operating income and wage income of farmers. An increase of 100 million yuan in agricultural loans will increase farmers' income by 0.816 billion yuan and that of township enterprises by 100 million yuan, which will increase farmers' income by 0.987 billion yuan. For every 100 million yuan reduction in the credit rationing balance, farmers' income increased by 0.297 billion yuan.

2.3 Empirical Conclusions and Analysis

Through co-integration test and estimating co-integration equation, the above empirical analysis studies the impact of long-term supply of credit funds and credit rationing on farmers' welfare, and uses impulse response function to predict the multi-period impact of variables. The content of peasant welfare covers income, consumption and housing. From the above empirical analysis, we can also see that in the long run, the supply of loanable funds has a positive effect on all aspects of peasant household welfare. Among them, the amount of agricultural loans has the most significant impact on peasant household investment. At the same time, the loan of Township enterprises has a positive effect on peasant households. The impact of household housing investment is also more significant, and the impact of housing investment is most obvious by the amount of loans. For farmers, the amount of funds needed for housing investment is large, and housing condition is an important factor to judge the welfare of farmers.

3. Conclusion

On the basis of combing the theory of credit rationing, this paper studies the phenomenon of credit rationing in China's rural areas, and conducts quantitative analysis and evaluation from the perspective of the impact of rural credit rationing on farmers' welfare. The conclusions are summarized as follows: Rural credit rationing loses farmers' welfare, leading to the shrinkage of welfare factors such as farmers' income, living expenditure, housing investment and so on. Through regression analysis, it is found that credit rationing will directly reduce the welfare level of farmers who receive credit rationing.

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