Credit in Rural China: Why is It Hard to Get, and How to Make It More Available

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Abstract: Agricultural development and social welfare in rural areas is directly affected by the availability of credit. This paper is examines the rural households' explicit and implicit demand for credit and empirically investigates the credit rationing that occurred in China. Five different types of credit rationing were investigated that affected 52.16 per cent of sampled households. Respondents' wealth characteristics and risk reducing strategies including insurance and involvement in farm cooperatives appears to be effective in reducing their exposure to credit rationing.

1. Introduction

The availability of credit in rural areas directly affects agricultural production, poverty levels, household income growth and social welfare[4-6]. In many developing countries, rural credit markets do not function well enough to allocate resources efficiently, diversify risk or provide sufficient financial support to agricultural production. The inability of rural credit markets to reach their full potential is common in less developed countries [1].

Formal institutions and informal associations provide farmers access to credit. Formal financial institutions have a significant advantage due to their capital reserves and larger operational scale in credit markets, but they are not able to obtain comprehensive information about the quality of agricultural borrowers in rural areas [2]. In addition, the lack of appropriate collateral and guarantors results in higher interest rates and transaction costs, especially for the poor[3]. Informal financial associations do not experience the asymmetric information that challenge formal institutions because they have access to more information about borrowers, lower transaction costs, and more flexible mortgage guarantee mechanisms[7]. This paper examines credit rationing in rural households in Shaanxi, China in order to determine to identify the factors that affect credit rationing and develop strategies to improve rural credit markets.

2. Data and Description Analysis

The data used in this paper was drawn from two counties, Qian Yang and Yang Ling, in Shaanxi, China, in July 2019. Two townships were selected in each county, and then two villages were randomly selected in every township as locations in which to field the survey. We surveyed 352 rural households about their agricultural production, other household activities, and their liabilities including their demand for and source of loans. A total of 324 valid questionnaires were obtained, with 28 responses being excluded because they were incomplete or contained illogical responses.

2.1 The Local Financial Market

Of the 324 rural households that responded to the survey, 104 borrowed funds from 2016 to 2018, taking out a total of 124 loans. As Table 1 indicates, 60 of these loans originated from social networks such family and friends, while 41 loans originated from the RCCs loans, and 23 loans

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originated from banks. The vast majority of personal loans, 80.33 per cent, were spent on personal expenditures. Business expenditures that were debt funded primarily came from RCCs, 47.37 percent, and banks, 36 percent, with the majority of these funds being used for agricultural businesses.

Table 1 Amounts of Funds Borrowed for Personal and Business Expenditures by Credit Source.

	RCCs	Banks	Friends and Relatives	Total
Total Number of Loans	41	23	60	124
Total Amount Borrowed ($)	296802.33	196947.67	188299.42	682049.42
Use of Funds:(%) Personal Expenditures Education Medical Housing	 52.63 12.19 19.51 26.83	 64 39.13 13.04 26.09	 80.33 21.67 23.34 25	-
Business Expenditures Agricultural businesses Other Types of Businesses	47.37 31.71 7.32	36 21.74 13.04	19.67 8.34 10	

Source: survey data.

2.2 Analysis of Credit Demand and Credit Rationing Mechanism

As Figure 1 indicates, 104 respondents indicated that they had applied for credit and their demand was partially or fully satisfied and this group accounts for the explicit demand for credit. Twenty-seven respondents did indicate that they applied for credit and were denied. Among the remaining 193 respondents that never applied for credit, 110 indicated that they did not need the credit and 83 households needed credit, though they did not apply. Therefore, 214 respondents of the sample accounts for the explicit and implicit demand for credit.

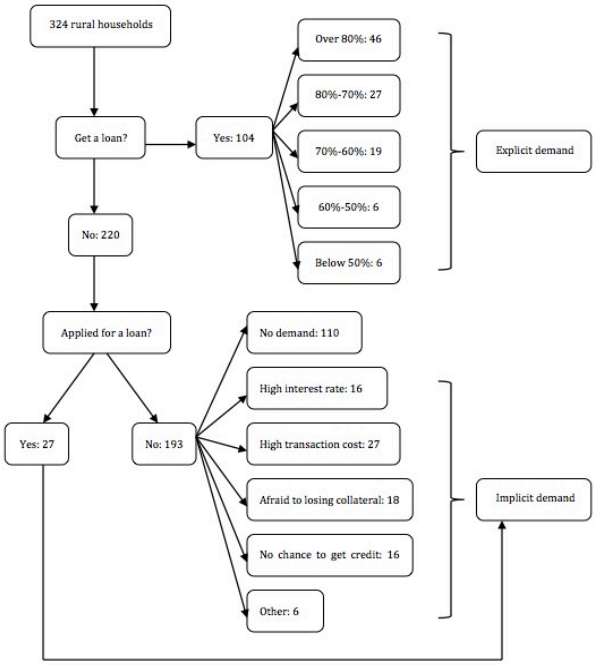

Fig.1 Credit Demand and Rationing among Respondents

In the case of quantity rationing, the 104 respondents that actually received credit were asked to identify how much of their initial debt request was funded. If over 80 per cent of the request was funded, then we concluded that no rationing occurred. As Figure 1 indicates, 46 respondents were not subject to quantity rationing, while 58 or 17.9 per cent were subject to partial quantity rationing.

The 83 respondents that indicated that they had a demand for credit and did not apply for a loan were queried about why they did not apply. As Table 2 indicates, 16 felt the interest rate is too high and therefore were subject to price rationing; 18 felt that the conditions of the loan made repayment difficult and/or that their collateral was at risk, and therefore were subject to risk rationing; 27 felt

the transaction costs were too high and therefore were subject to transaction cost rationing; and 16 self rationed because they did not feel that they would be able to qualify for a loan.

Table 2 Credit Rationing Reported by Survey Respondents by Type

Type	Total	Quantity rationing	Price rationing	Risk rationing	Transaction cost rationing	Self-rationing	Other
Number	168	85	16	18	27	16	6
Percentage	52.16	26.23	4.94	5.55	8.33	4.94	1.85

Source: survey data.

3. Theoretical Model and the Determinants of Credit Rationing

In this paper, credit rationing is described by the following model:

$$Y = f(IC, HC, \mathrm{LH})$$

where IC is a vector of individual characteristic, HC is a vector of household characteristic and LH is loan history.

The age of the head of a household is hypothesized to affect this individual's credit demand with young and middle aged adults that have a higher tolerance for risk. In addition, women are hypothesized to be more risk aversion than men. People with more education are hypothesized to be more likely to have access to better employment opportunities, more profitable businesses, financial products and insurance, higher social status and wealthier social networks.

A household's characteristics may also affect the demand and supply of credit. A positive correlation is expected between the number of household members that are employed or work in the business and its capacity to generate income. The area of cultivated land contributes to a household's wealth and productivity. Households with family and friends employed at banks, insurance companies and the government are expected to have more information about how to obtain credit. A household that has experienced a major increase in their expenses in the past three years is hypothesized to decrease a household's ability to repay a loan. The number of insurance policies purchased by the household might affect risk rationing and self-rationing. In general, membership in farmer's cooperative organizations increases rural households demand for credit and may reduce risk rationing.

Fixed assets levels reflect wealth levels, and impact the demand for credit and repayment capacity. Households' expenditures and the percentage of agricultural income are also expected to influence credit rationing. Households with a large percentage of expenditures relative to their income are more likely to demand a larger amount of credit, while the percentage of agricultural income could illustrate the differences between agricultural households and nonagricultural households. For loan experiences of respondents, we distinguish between those with no loans, formal loans and informal loans using dummy variables.

As table 3 shows, we excluded the 110 respondents with no demand for credit and six other respondents that experienced credit rationing for other reasons, leaving information from 208 respondents that were analyzed in the empirical model.

Table 3 Socio-Economic Characteristics of Respondents with Demand for Credit

Variables	Definition and range	Means (Standard deviation)	Range
Age	Age of household head or family decision maker.	50.18 (13.55)	13-87
Gender	Age of household head or family decision maker. Female=0; Male=1	0.55 (0.49)	
Education	Never went to school=1; Completed elementary school=2; Completed junior high school=3; Completed senior high school or equivalent level=4; Completed college degree =5	2.70 (1.02)	

Labourers	Number of working and/or employed people in household	2.95 (1.26)	0-7
Land (mu)	Land area owned by household	9.056 (40.22)	0-700
Members	Number of employed family members that participated in the credit application.	0.2 (0.45)	
Change	Needed credit in past three years. No=0; Yes=1	0.49 (0.501)	
Insurance	Number of insurance policies held by household	1.68 (1.11)	
Organisation	Participate in any farmer's cooperative organisations. No=0; Yes=1	0.09 (0.29)	
Income ($)	Household income in 2015.:	6909.59 (24308.02)	43.47-420289.86
Expense ($)	Household expenditures in 2015	4157.75 (11500.71)	57.971-178260.87
A-percentage (%)	Percentage of agricultural income in total household income:	29.39 (31.502)	0-100
Assets ($)	Value of household's fixed assets	15652.17 (118763.29)	434.7826 - 2137681.16
Formal	Have formal loans No=0; Yes=1	0.19 (0.39)	
Informal	Have Informal loans No=0; Yes=1	0.19 (0.39)	

Source: survey data.

A multinomial logit model was used to investigate the effects of each independent variable on each type of credit rationing. The dependent variable y equaled to 0, 1, 2, 3 4, or 5 depending on whether no rationing, quantity, price, risk, transaction cost rationing or self-rationing occurred, respectively. Thus, $y_i = j$ is an unordered categorical variable with j categories of options that are mutually exclusive and not sequential. The vector for the characteristics of the respondents is that is expected to influence credit rationing.

The multinomial logit model is:

$$P(y_i = j|x) = \begin{cases} \dfrac{exp(x'_i\beta_j)}{1 + \sum_{k=1}^{5} exp(x'_i\beta_k)} & (j = 1,2, \dots ,5) \\ \dfrac{1}{1 + \sum_{k=1}^{5} exp(x'_i\beta_k)} & (j = 0) \end{cases}$$

where x_i is the vector for the characteristics of the respondents and β is the vector of parameters of x_i, and β is based on change in the no rationing category. The relative risk ratio (RRR) is the ratio between the base, no rationing category and other categories. The sum of the probability for no rationing $P\ (y = 0)$ and other five types of credit rationing as *j* goes from 1 to 5 equals 1. For any given x, the probability distribution of y is:

$$\begin{cases} P(y = 0|x) = F(x, \beta) \\ P(y = 1,2 \dots 5|x) = 1 - F(x, \beta) \end{cases}$$

The functional form of $F\ (x, \beta)$ is a logistic cumulative distribution function, which can be expressed as:

$$P(y = 0|x) = F(x, \beta) = \frac{exp(x'\ \beta)}{1 + exp(x'\ \beta)}$$

Since the probability of $p = P\ (y = 0)$, and $1 - p = P\ (y = 1,2 \dots 5)$, the RRR is the probability ratio between the no rationing base and the other types of rationing in order to estimate their probability given x_i. This ratio is:

$$\frac{p}{1 - p} = exp(x'\ \beta)$$

First the degree of correlation between the variables was investigated to determine if

multicollinearity existed in the data. Significant positive correlation was found between age and education, land and income, expense, percentage of agricultural income and assets. Income, expenses and asset values are correlated with each other. Therefore, the respondent's age, amount of land owned and total value of assets owned were dropped, since these variables had a relatively small amount of correlation coefficient with dependent variable.

Table 4 Estimated Parameters And Rrr from Multinomial Logit Model

	Quantity rationing		Price rationing		Risk rationing	
	Coefficient	RRR	Coefficient	RRR	Coefficient	RRR
gender	0.189	1.208	0.778	2.177	-0.065	0.937
education	0.214	1.238	0.503	1.653	-0.287	0.750
laborers	0.002	1.001	-0.396	0.673	-0.428	0.652
member	0.886	2.425	-0.751	0.472	0.254	1.289
change	-0.229	0.795	0.308	1.361	-0.252	0.777
insurance	0.156	1.168	0.963**	2.619	0.559	1.749
organisation	0.875	2.399	1.262	3.531	2.951**	19.133
income	-1.74E-05**	0.999	-3.2E-05*	0.999	-1.88E-05*	0.999
expense	9.24E-06	1.000009	4.67E-05**	1.00005	4.31E-05*	1.000043
a-percentage	-0.002	0.998	-0.021	0.978	-0.011	0.989
formal	-0.744*	0.475	-19.565	3.18E-09	-19.728	2.71E-09
informal	-0.563	0.569	-18.542	8.86E-09	-18.913	6.11E-09

	Transaction cost rationing		Self-rationing	
	Coefficient	RRR	Coefficient	RRR
gender	-0.453	0.635	-1.776*	0.169
education	-0.067	0.935	-0.548	0.578
laborers	-0.074	0.929	-0.139	0.870
member	1.511*	4.531	0.989	2.690
change	0.430	1.538	0.062	1.063
insurance	-0.240	0.787	1.492***	4.446
organisation	1.843	6.317	3.681**	39.683
income	-1.22E-05	0.999	-1.61E-05	0.999
expense	2.75E-05	1.00003	3.91E-05**	1.000039
a-percentage	-0.011	0.989	-0.012	0.989
formal	-18.929	6.01E-09	-19.697	2.79E-09
informal	-18.715	7.45E-09	-19.189	4.64E-09

Number of observations: 208 prob>χ^2: 0.0000 LRχ^2(60) : 231.11
Log likelihood: -210.19522 R^2: 35.47

Source: survey data. *Notes:* ***, **, * indicates significance at the 1, 5 and 10 per cent levels respectively.

The Table 4 presents the regression results for a multinomial logit model that estimated the effect of various factors on credit rationing and the resulting RRR. Gender and education are negative effect on risk, transaction cost rationing and self-rationing. Gender is significant for self-rationing, which means being a male head of household has positive impact on quantity rationing and price rationing, while being a female head of household has positive impact of risk rationing, transaction cost rationing and self-rationing. Education had a negative impact on risk, transaction cost and self-rationing and a positive impact on quantity and price rationing, as expected, though this effect was not significant.

In the case of household characteristics, the number of working and/or employed people in the household had a positive impact on for all types of credit rationing except quantity rationing. This result is as expected, though the coefficients are not significant. The negative impact of the change variable on quantity and risk rationing reflects this. Having family members, relatives and friends working in financial institutions or government had significantly positive impact on transaction cost rationing at a 10 per cent level of significance. Respondents with significantly larger amounts of insurance were 96.3 and 149.2 percent more likely to face price and self-rationing. Being a member of a cooperative organization had a positive effect on all types of credit rationing, and is significant for risk and self-rationing at the 5 per cent level of significance. Annual household income had a

significant negative impact on quantity, price and risk rationing at the 5 and 10 percent level of significance, respectively. Household expense was significant for price and self-rationing at the 5 per cent level, and on risk rationing at the 10 per cent level. The formal credit experience is negatively significant on quantity rationing at 10 per cent level.

4. Conclusions and Policy Implications

This paper investigates about the demand for credit by rural households' in Guanzhong Plain in Shaanxi province, China and the credit rationing they may have experienced. Rural households have an implicit and explicit demand for credit. While financial institutions play a significant role in determining the explicit demand for credit, the implicit demand for credit is expected to have a more pronounced effect on credit rationing and is more difficult to investigate. Of the 324 rural households that responded to a survey, 66% of them had an explicit and implicit demand for credit and 52.16% of them experienced various types of credit rationing. Five types of credit rationing have been identified. Twelve factors that may impact a household's experience with credit rationing were investigated using a multinomial logit model that estimated the probability that each type of rationing occurred.

Therefore, increasing the rural incomes is expected to be the most effective way to reduce credit rationing. At the same time, financial institutions that serve rural areas should develop the appropriate financial products, such as personal loans, and services, such as credit counseling, in order to satisfy the demand for credit. Insurance and farmers cooperatives appear to be useful in reducing credit rationing. An effective insurance system, especially one that provides agricultural insurance, could assist in addressing price rationing and self-rationing. Farmer's cooperatives organizations could assist in addressing risk rationing and self-rationing, while at the same time easing the asymmetry in information found between formal financial institutions and rural households.

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