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Farmers' Choice and Informal Credit Markets in China

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Abstract

Informal credit markets are very active in many developing countries including China. Informal financial associations have become a major channel of borrowing. Using data from the 2006 Rural Household Survey, this paper investigates farmers' borrowings from both formal and informal sources with higher/lower interest, by looking into both demand and supply of loan. Consistent with the theory and previous studies, age follows an inverted U-shaped pattern in its relationship with the probability of borrowing from informal loan with higher interest. Our study shows that the impact of age disappears for the formal loan participation. In addition, high income and saving imply lower credit constraints. Moreover, household and county characteristics and financial conditions have a large and varying influence on farmers' borrowing behavior.

Keywords: *informal credit, financial constraints, China*

Farmers' Choice and Informal Credit Markets in China

Informal credit markets are very active in many developing countries including China. Although Chinese government has made efforts in developing the formal financial markets in rural areas, still, borrowing from informal channels reached up to 60% among farmers. Informal financial associations have become a major channel of borrowing, together with formal financial institutions.

Why farmers choose informal financial associations more than formal financial institutions? Some authors argue that it is due to the information asymmetry between formal financial institutions and farmers (Bell, Srinivasan and Udry 1997; Conning 1996; Hof and Stiglitz 1990). Farmers who need loans may have difficulties obtaining collateral or a guarantor, a requirement at formal financial institutions; therefore, they may not be able to borrow or may not borrow enough funds from these formal institutions. As a result, they have no choice but to turn to informal credit markets. Others think that high interest cost is an important factor affecting farmers' choice (Guirkinger 2008)of loan. Borrowings from relatives and friends, which is a much larger proportion of informal loans in rural China, may have lower or even zero interest rates (He 1999; Li and Li 2004). In addition, informal loans do not generally require written loan agreements and are more flexible in borrowing terms, therefore are lower in transaction costs (Wang 2005). Still others contended from the supply side, arguing that choices might be affected by risks to repay the loan. Lenders of informal loans tend to have more information on borrowers, for example, changes in their income, assets and consumptions, which enables the lender adjust loan terms accordingly to reduce default risks (Guirkinger 2008). Therefore, the objectives of the paper are two folds: 1) to explore farmers' participation in the formal credit market; 2) to empirically identify the determinants of informal credits used by farmers.

The paper is organized as follows. The next section provides a brief introduction of background of microfinance in China. Section 3 describes the model and relevant variables are discussed in section 4. Data are then described in the following section. Section 5 presents the estimation methodology and the last section discuss results and concludes the paper.

Microfinance in China

Shortly after 1949, all forms of private finance were banned including pawn brokering and ‘‘loan sharking’’ (Hsiao 1971; Tsai 2004). During the 1950s, China set up a network of rural credit cooperatives (RCCs), which acted mainly as fiscal institutions that funneled credit between the state and the people’s communes (Tsai 2004). Together with the re-established Agricultural Bank of China (ABC), RCCs started to function more as commercial banking institutions for financing in rural areas after the reforms in the late 1970s. RCCs became the only formally approved nonbanking financial institution, after the elimination of Rural Cooperative Foundations at the end of 1990s, to serve rural enterprises and households (Tsai 2004). Since then, central banking authorities injected approximately US$4 billion in recapitalization funds into the RCC system. As of mid-2003, RCCs accounted for 11.5% of total savings and 10.8% of loans extended by formal financial institutions, and a pilot reform scheme for decentralizing their management was underway in eight provinces (PD, November 30, 2003).

Chinese government did not provide subsidized loans directly to households until after the introduction of China’s National 8–7 Poverty Alleviation Plan in 1993. As part of the strategy to raise 80 million people out of poverty in seven years (i.e., during 1994–2000), the central government identified 592 poor counties where households would be directly targeted for subsidized poverty loans. In 1996 many counties adopted the Grameen Bank model of group lending whereby groups of five borrowers would mutually guarantee the repayment of their respective microloans in multiple installments (Bornstein, 1997; Holcombe, 1995; Khandker, Khalily, & Khan, 1995). These loans ranged from 1,000 to 2,000 RMB (US$120–240) and they continued to be subsidized at the official PA lending rate of 2.88%.

By 2000, the government had disbursed US$775 million worth of subsidized microloans (Tsien, 2001), and by 2002 nearly US$3.7 billion of the central government poverty-relief funds were going toward poverty-relief loans (Xinhua, March 2, 2002). As in the earlier

model of poverty lending, however, repayment rates in these government programs have been less than 60%. Meanwhile, the People's Bank of China (PBC) has been encouraging RCCs to extend microloans to rural households. As of 2002, the PBC reported that RCCs had extended a total of 78.9 billion RMB (US$9.54 billion) worth of microloans and that 25% of all rural households in the country had received such loans (CIIC, November 5, 2002).

Major forms of informal credit in rural China includes rotating savings and credit associations (ROSCA, or *hui* in Chinese). ROSCA involve relatively small groups of people, 5 to 10 members on average. Rural households pool monthly contributions and rotate the disbursal of the collective pot of money to each member (Tsai 2004). Other forms of informal finance exist in the names of mutual assistance societies (*huzhuhui* in Chinese) and cooperative savings foundations. These nongovernmental financial institutions have managed to operate above ground and serve private businesses by registering as social organizations.

Model

We set up estimation models that take into account the multistage decision process of household credit demand. First, we estimate separately the outcome of two decision processes: (i) the probability of borrowing bank loans, or formal credit market participation; and (ii) the probability of borrowing higher interest informal loans versus borrowing from relatives and friends. Then, we introduce the equations for the two decision process which are based on the "latent" demand and supply functions:

$$D = \alpha X + \varepsilon_D \qquad (1)$$

$$S = \alpha Z + \varepsilon_S \qquad (2)$$

A household's desired stock of debt depends on a set of explanatory variables, *X*, and can be represented by the latent demand function *D*. *D* is an unobservable or latent continuous random variable. *X* is a vector of variables that determines whether a person would desire to hold positive debt, and ε_D is a random error term. On the supply side,

although a household may want positive debt, she is subject to the lender's evaluation. S is an unobservable continuous random variable. Z is a vector of variables that affect the lender's decision to grant a loan or not and ε_S is a random error term.

We are only able to observe whether households have positive borrowings from the survey. We define variable and identify $d_1 = 1$ if a household borrowed from banks and $d_1 = 0$ if not. We exclude households who do not have any need in borrowing. We estimate a logit model with d_1 as a dependent variable. Second, we identify $d_2 = 1$ if a household borrowed informal credits with non-zero interest and $d_2 = 0$ if borrowing from relatives and friends with zero interest. We then fit a logit model to identify the determinants of the borrowing of informal credits.

Explanatory Variables

In this section we discuss the relevant variables in our models. On the demand side of credit market, age is one of the most important factors suggested by life-cycle theory. Young households and individuals are likely to have a high demand for debt because of their expectations for higher income and consumption in the future compared with their current low income levels. As their age increases, their income becomes higher which make them less likely to borrow; therefore, the relationship between the probability of borrowing and age is expected to have an inverted U shape according to the theory. The lenders, on the other hand, are likely to favor older borrowers as their ability to repay is higher. However, it has been found in literatures that in China age has a U-shape, the increasing portion is due to the increase in housing demand when young adults reach their marriage age. In order to capture this nonlinear relationship, we use both linear and quadratic terms of age as independent variables.

Income is another important factor. From the lender's point of view, not only determines

the repayment possibilities income but also expected income. In order to capture the effects of expected income, we use two sets of variables. The first one is educational dummies to proxy the expected income profile, following our assumption that the probability of obtaining a loan will be higher for individuals with higher education levels. Our educational dummies represent individuals who have finished at the elementary, secondary, high school, and some college. The other is sources of income, i.e., income from agriculture, non-agriculture, wage and others. It is expected that lenders would prefer lower income volatility which implies default risk.

The relationship between current income and debt is, however, not certain. Normally, the higher the current income, the smaller the amount of loan demanded. However, the amount of debt demanded may become larger as current income increases, especially if the increase is triggered by a permanent income shock. Therefore we use both the current income and savings in order to capture the relationship.

Other socioeconomic variables that are thought to affect debt supply and demand include family size, gender, and labor market status. Individuals in a large family are more likely to borrow as a large family is more likely to have a higher dependency ratio. To capture the effect of gender, the percentage of males in the household is included in the analysis. On labor market status, we use the percentage of people migrating to work outside as a proxy. Migrant workers may be more likely to demand loans and less likely to be rejected by the lenders.

We include variables for population density, rural population percentage and banking environment situations in counties because the economic development level in the residence area may also affect both the demand and supply of credits. The poverty rate is higher in general in the rural area and the more dense people live, credit rationing may be more severe given constant supply. In areas of better developed environment where banks have affluent funds, lenders may be more inclined to supply credits.

Data

The data used for this analysis were obtained from the 2006 Rural Household Survey conducted by People's Bank of China. The survey was designed to examine credit situation and financial demands by farmers in rural China. It initially contained data for 20,040 households covering 263 counties in 10 provinces. The 10 provinces covered are Jiangsu, Fujian, Jilin, Anhui, Henan, Hunan, Inner Mongolia, Sichuan, Guizhou and Ningxia. The survey contains information on loan situation in addition to household demographics, saving and income information. County-level characteristics are obtained from *Social and Economic Indices Yearbook* by the National Statistical Bureau of China (NSBC). After excluding observations with missing values for our explanatory variables, a sample of 19,079 remained for analysis.

Table 1 describes the definitions and sample statistics of all variables. About 87% of the sample (or 15,454 households) reported that they are in need of borrowings in their life for agricultural production, which we used as our sample to study the choice of bank loans and informal credit by farmers. Among these households, 18% received loans from banks in 2006 and 7,609 households reported borrowing from informal sectors during the year. The first dependent variable *formal* is defined as equal to 1 if borrowing from banks. The second dependent variable *informal* is defined as equal to 1 if borrowing at non-zero interest in the informal sector and defined as equal to 0 if borrowing in the informal sector without paying any interest.

A typical household in our sample has 4 people, 53% male, 19% students and averaged at 39 years old. Total household income in 2006 is around 20,630 RMB. About 65% of the sample obtains their income from agricultural activities, 8% from non-agriculture, 25% from wages and the rest 2% other sources. About 11% of the sample attended elementary school, 52% did not finish junior high school, 32% have a high school degree, and the rest (5%) have some college or more. 29% households have credit line granted by RCCs. 52% of the

households have savings and their desired amount of borrowing is averaged at 2,674RMB given the current rate and other conditions, for example, collaterals and guarantors.

As for the borrowing preferences, 37% of the households report that they prefer to borrow from banks and the rest prefer to borrow from informal sectors, either at zero or higher interest rates. 29% are willing to take higher interest of borrowing in time of emergency and 65% are willing to do the same if they are able to get more borrowings.

As for the county level information, population density is about 102.37 households per square meters, the ratio of loan to savings is about 1.27 and the rural population is around 74% of the total population on average.

Results

Table 2 shows the results of logit estimations on the probability of formal credit market participation and the corresponding marginal effects. Table 3 shows the results on the probability of borrowing from higher interest informal credit versus borrowing from relatives and friends at zero or very low interest.

The probability of formal credit market participation is a concave function of age, but the coefficients for age and age-squared are not significant at 10% confidence level. However, age has an inverted U-shape when farmers choose informal credit with higher interest rate following the life-cycle hypothesis. It is estimated that the threshold age in our sample is around 38, beyond which the probability declines with the increase in age. The inverted U-shape could be driven by the supply side as lenders in the informal credit market might prefer to grant loans to middle-aged individuals because these people generally have more stable income streams, which leads to lower default risk.

As expected, income has a significant positive effect on the borrowing of bank loans. When people have savings and even if current income is lower, individuals tend to borrow less. Although we expect that the relationship between education level and credit market

participation will be positive, our results show that the relationship is not significant.

None of the coefficients of education variables are significant in both formal and informal credit market participation. One possible explanation is that lenders may not think education level as an indicator for permanent income and, therefore, may not include it in their decision factors. The second possible explanation is that, although educated individuals have higher permanent income, they also request much more debt than individuals with lower education.

Family size does not seem to have a significant effect on the borrowings from both credit markets. Larger family size implies higher credit needs, however, it may due to the fact that they are more likely to be frugal so that we do not observe excessive borrowing from larger families.

Males and females do not significantly differ in their probability of participation. The probability of credit market participation does not differ significantly for both migrant and non-migrant workers. It may due to the fact that the remittances, income from migrant workers, are already included in the total income variable.

Sources of income seem to play an important role in determining the demand for formal and informal credits. For households whose income are mainly from wages, they tend to borrow less in both markets, which corresponds to their less need of loans for consumption smoothing from an unexpected shock due to their relatively stable income. For households whose main incomes are from non-agriculture, or business activities, their demand for informal borrowings tend to be higher than households with incomes mainly from agriculture. This is not unusual because households who rely on business revenues need to borrow more from the informal market with higher interest in order to finance their business activities. The amount that these households borrow might be significantly large so that it may not be available for borrowings from relatives and friends.

County-level characteristics are significant in both formal and informal credit markets. The less populated the county is the less the rural population and consequently the more borrowing from bank loans. In addition, better banking environment promotes borrowing from bank loans. More populated in rural and total population may denote how severe credit rationing might be given the limited supply and a bettering banking environment. This may help relieve the tightness of the situation. However, total population density and rural population do not seem to explain why farmers choose higher-interest credits in the informal credit markets.

Conclusions

This paper examines the determinants of farmers' credit market participation in formal and informal credit markets in China in 2006. The data show that about 86% of rural households are in debts, among which 40% obtained their loans from informal markets and 16% from banks. Our models corrected for selection bias are used to investigate the determinants.

The empirical results on the determinants of credit demands help shed light on lending criteria or the factors underlying the credit-scoring model. Consistent with the theory and previous studies, our research shows that the relationship between the probability of credit market participation and age follows an inverted U-shaped pattern. As expected, high income and saving imply lower constraints. Education variables are found to have no significant effect on the borrowings. County institutional settings have significant effects on the demand for credits in both formal and informal markets.

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Table 1 Sample Statistics

Variables	Mean	Std. Dev.
households in need of borrowings	0.81	0.395
households borrowing from banks	0.18	0.388
households participating in informal sector	0.15	0.361
average age	39.32	7.158
percentage of male in the household	0.53	0.149
percentage of students in the household	0.19	0.189
off-farm employment percentage	0.16	0.194
household size	4.07	1.255
total income	20630.28	17314.770
elementary school and below (reference)	0.11	0.308
junior high school	0.52	0.500
senior high school or professional school	0.32	0.467
associate degree and above	0.05	0.222
Banks in village	0.41	0.493
have vehicles	0.79	0.410
distance to closest banks	1.55	3.702
income mainly from agriculture (reference)	0.65	0.477
income mainly from non-agriculture	0.08	0.273
income mainly from wage	0.25	0.430
income from other resources	0.02	0.155
have saving	0.52	0.500
know about the small loan programs	0.68	0.468
credit line if any by RCCs	0.29	0.455
amount desired relative to income	0.18	0.882
percentage of collateral required in bank loans	0.16	0.250
percentage of required extra cost in bank loans	0.08	0.168
bank loans preferred	0.37	0.484
informal activities in village	0.73	2.202
willing to take higher rate if emergency	0.29	0.455
willing to take higher rate if getting more loans	0.65	0.478
county-level population density	102.37	84.646
county-level loan to saving ratio	1.27	4.518
county-level rural population percentage	0.74	0.129

Table 2 Borrowing from Bank Loans Estimation Results and Marginal Effects

	Estimated Coefficients	Marginal Effects
Age	0.018	0.002
	(0.035)	(0.004)
Age^2	-0.0004	-0.00004
	(0.0004)	(0.00005)
Percentage of male in the household	0.225	0.027
	(0.180)	(0.021)
Percentage of students in the household	0.209	0.025
	(0.165)	(0.020)
Off-farm employment percentage	0.032	0.004
	(0.226)	(0.027)
Household size	0.039	0.005
	(0.028)	(0.003)
Total income	0.183*	0.022*
	(0.095)	(0.011)
Junior high school	-0.052	-0.006
	(0.090)	(0.011)
Senior high school or professional school	0.010	0.001
	(0.110)	(0.013)
Associate degree and above	0.117	0.014
	(0.158)	(0.019)
Banks in village	0.009	0.001
	(0.126)	(0.015)
Have vehicles	-0.099	-0.012
	(0.095)	(0.011)
Distance to closest banks	-0.0061	-0.001
	(0.012)	(0.001)
Income mainly from non-agriculture	0.164	0.020
	(0.130)	(0.016)
Income mainly from wage	-0.264***	-0.031***
	(0.094)	(0.011)
Income from other resources	-0.180	-0.021
	(0.228)	(0.027)
Have saving	-1.036***	-0.123***
	(0.102)	(0.013)
Know about the small loan programs	0.568***	0.068***
	(0.112)	(0.013)
Credit line if any by RCCs	1.293***	0.154***
	(0.163)	(0.019)
Amount desired relative to income	0.221***	0.026***
	(0.084)	(0.010)
Percentage of collateral required in bank loans	-0.070	-0.008
	(0.291)	(0.035)
Percentage of required extra cost in bank loans	0.783**	0.093***
	(0.306)	(0.036)
Informal interest	0.032	0.004
	(0.022)	(0.003)
Bank loans preferred	0.744***	0.089***
	(0.104)	(0.013)
County-level population density	-0.006***	-0.001***
	(0.001)	(0.000)
County-level loan to saving ratio	0.023***	0.003***
	(0.005)	(0.001)
County-level rural population percentage	-2.014**	-0.240**
	(0.990)	(0.117)
Province fixed effects	Yes	

Table 3 Borrowing from Informal Credit Estimation Results and Marginal Effects

	Estimated Coefficients	Marginal Effects
age	0.133**	0.015**
	(0.062)	(0.007)
age square	-0.002**	-0.0002**
	(0.0008)	(0.0001)
percentage of male in the household	-0.151	-0.017
	(0.297)	(0.033)
percentage of students in the household	-0.375	-0.042
	(0.246)	(0.028)
off-farm employment percentage	-0.498	-0.056
	(0.332)	(0.037)
household size	0.033	0.004
	(0.041)	(0.005)
total income	0.086	0.010
	(0.105)	(0.012)
junior high school	0.102	0.011
	(0.159)	(0.018)
senior high school or professional school	-0.060	-0.007
	(0.175)	(0.020)
associate degree and above	0.062	0.007
	(0.220)	(0.025)
income mainly from non-agriculture	0.420**	0.047**
	(0.179)	(0.020)
income mainly from wage	-0.267**	-0.030**
	(0.124)	(0.014)
income from other resources	0.057	0.006
	(0.313)	(0.035)
amount desired	-0.007	-0.001
	(0.030)	(0.003)
informal credit available	0.535***	0.060
	(0.157)	(0.017)
county-level population density	-0.002	0.0002
	(0.002)	(0.000)
informal interest	0.168***	0.019***
	(0.029)	(0.003)
county-level rural population percentage	0.518	0.058
	(0.821)	(0.092)
county-level loan to saving ratio	0.021***	0.002***
	(0.003)	(0.0003)
willing to take higher rate if emergency	-0.729***	-0.082***
	(0.239)	(0.027)
willing to take higher rate if getting more loans	-0.514**	-0.058**
	(0.234)	(0.027)
Province fixed effects	Yes	

Standard deviations in parenthesis. ***Significant at 1% level; **Significant at 5% level; * Significant at 10% level.