Sveriges lantbruksuniversitet
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Department of Economics

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Abstract

This paper tries to answer why certain households choose not to participate in the village development fund in the poverty stricken areas of China and takes advantage of the data from evaluation survey of the implemented financial project in Henan and Sichuan Provinces of China in 2009. The Probit model, Tobit model and Multinomial Probit model are used to explore the determinant factors that influence the participation decision in the village development fund of the villagers, the amount participating households borrowed from the fund and the borrowing behaviors among the main lending sources respectively. The paper finds that households with younger or older householders, low household wealth level, less times participating in the earlier stage promotion activities, low cognitive level of the formal financial markets and no cadre have higher probability of self-constraint and precautionary behaviors in relation to participating in the village development fund. Household has craftsman, has cadre, has high cognitive level of the formal financial market and from Wangcang County borrows more from the fund while household with highest education level borrows least. Cognitive level of the formal financial markets affects borrowing behaviors from all the lending sources; householder's age and education level, household size, households' wealth, households with craftsman/migrant worker/cadre, the amount of money can be borrowed from the private lenders and County dummy affect borrowing behaviors from specific lending sources significantly. Thus, complete the interrelated insurance market for borrowers, guarantee the nine-year compulsory education in the rural areas, choose appropriate promoting time , strengthen the rural medical insurance system and education loan mechanism help reduce the self-constraint behavior. Also, technical training encourages households borrow for investment demand. Building effective local connections with markets is essential for carrying out income generating activities. Finally, the cognitive level of financing activities and financial markets is cultivated through participating in the village development fund; with the increment of the household income level, the access to the RCCs will be easier for the rural villagers.

Table of Contents

List of Figures

List of Tables

Chapter 1 Introduction

1.1 Problem background

In China, rural credit markets are mainly separated into an informal and a formal credit market. Informal credit forms mainly include borrowing from friends, relatives, neighbors or colleagues, other informal credit forms include borrowing from moneylenders, pawnshops, and private money houses, some of which are illegal (Tsai, 2004). Formal credit institutions include Agriculture Bank of China (ABC), Agricultural Development Bank of China (ADB), Rural Credit Cooperatives (RCCs) and Rural Postal Savings. According to the phases of rural finance in china, the reforms in 1994 and 1996 failed to make rural financial market more competitive (Zhang et al, 2010). On the contrary, the reforms led to gradual withdrawal of the ABC from rural lending and the collapse of rural cooperative foundations and other informal financial institutions, and the Chinese rural institutional lending markets have become dominated by RCCs (Zhang et al, 2010). Zhang et al (2010) point out acute problems also exist regarding the RCCs: with limited capital and functions, the RCCs are very vulnerable and difficult to expand; as legal entities that should be responsible for their own performance and risk, RCCs confront an adverse environment in poverty stricken areas. They must continue to fulfill policy functions and maintain social stability even in the face of persistent losses, and most of them are already insolvent due to legal constraints, transaction costs, clearing and settlement conditions (Zhang et al, 2010).

Due to the high operational costs such as those related to screening, monitoring and enforcement; as well as high financial risk, which due to moral hazard, few assets for collateral and client's income stability; and low returns because of the interest ceilings set by the government (Dong, F.X. et al, 2010), rural households will encounter rigid evaluation when applying for the loans from the RCCs and always the requirements such as collateral or guarantee should be met. Thus, the households with relatively less collateral or simpler social relationships are credit rationed in the formal credit market.

Also, from the demand side, the insurance market is either totally missing or incomplete in rural China, which hinders the borrowing behavior of rural households. Boucher and Guirkinger (2007) found imperfections in insurance markets may explain non participation phenomenons in financial markets. Also it is further supported by Richter (2008) that the risk of default and increased variability of income decrease expected utility with a loan and result in voluntarily withdrawing from the credit market, so the imperfections in the insurance market accentuate imperfections in the credit market. In addition, Guirkinger (2008) puts forward if lenders themselves operate in a risky environment and lack access to insurance, they may be risk averse and offer contracts that pass on more risk to the borrower than is strictly necessary to overcome information asymmetries.

So with the interaction of the lenders and borrowers sides in reality, rural finance in China has severe problems that need to be solved. The rural financial reform is underway currently, many pilot financial programs have been implemented in the past years to explore the efficient way of operating rural financial institutions in different regions of China.

1.2 Problem and research objectives

For the incompleteness of financial markets in rural China, the Chinese government implemented the project TCC5[1] in the poverty stricken counties in 2006. The project TCC5 is the project for village development fund, which had its trial run in the impoverished counties in Sichuan and Henan Provinces from the end of 2006. The households who take advantage of the project should pay for a certain amount of entrance fee[2] first, and the final loan amount can be 10 times the initial entrance fee at the most. The term of payback is normally six to ten months, but no longer than 12 months. The borrower should start to repay the debt monthly from the third month after he or she borrowed from the fund. The interest rate is fixed by the whole community who participate in the fund. Normally the interest rate is from 7.2% to 9.6% annually. The money borrowed can only be used for income generating projects. Firstly, households should join a mutual help group, then members in the group take

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[1] TCC5 refers to the fifth phase subproject of the China Economic Reform Implementation Project, which is supported by the World Bank. In this thesis, TCC5 refers particularly to the "operation mode of the rolling development fund research and pilot projects in rural villages".
[2] The upper limit for the entrance fee is 500 CNY.

turns to borrow money and no more than 3 households can borrow money simultaneously. The poorest households always have the priority of borrowing from village development fund. Households in the same group supervise and help each other. The development fund aims at making up for the gap between the supply of formal credit market and credit demand of rural households, helping those households with extra productivity but without enough money.

As an investigator, I participated in the investigation in February 2009, which aimed at evaluating the effect and running operations of the village development fund of the project TCC5. During interview with the households, I found that part of the households choose not to participate in the development fund even when they were in demand for money. While, part of the households treated the development fund as kind of option for borrowing, they didn't borrow from the fund but they still paid for the entrance fee and participated in the village development fund. Almost 80% of the households in the two counties chose to participate in the village development fund, while the remaining households chose not to participate. Are those chose not to participate really don't need the fund or are there some other reasons that need to be investigated? This is the main concern of the thesis. Also, since the detailed borrowing behaviors of the interviewed households within the year 2007 and 2008 are available, the general borrowing behaviors of the household will be further analyzed and will be treated as the supplementary support for exploring the participation decision of household in the village development fund.

Credit rationing is a very popular phenomenon in the rural areas of China. Households are not able to borrow enough money from formal financial sectors. However even with the village development fund, I found sometimes there are self-constraint borrowing behaviors for certain households. In the thesis, I will take advantage of the data from the questionnaires, try to find the determinants of the rural households' borrowing behaviors and provide policy implications to help better targeting the poor households in the financial projects in future.

The specific objectives of the thesis are mainly four parts as follows: (1). According to the detailed borrowing records of households, summarize the features of borrowing situation in

the research areas and compare the core indices[3] of the main lending sources; (2). Explore the determinants of households' participation decision in the village development fund and the factors influencing the amount households borrowed from the village development fund; (3) Uncover the determinants influence the probabilities of borrowing from the formal, informal[4] or both lending sources for the villagers; (4). Propose possible suggestions for the rural financial policies and the implementation of the financial projects in the rural areas according to the empirical results in the research areas.

1.3 Research hypotheses

According to the currently available studies and the specificity of the project TCC5, many factors may affect households' participation decision and borrowing behaviors: the general households characteristics such as householder' age, proportion of male family members in the household, householder' education level, household size, household wealth level, whether has craftsman in the household, whether has migrant worker in the household; the social attribute of the household such as whether has cadre in the household, the availability of support from the private lenders[5]; times the family member participated in earlier stage promotion and motivation activities; the cognitive level of the formal financial market[6]. Based on these variables, the following hypotheses are put forward and to be tested in the thesis.

(1).Householder' Age follows an inverted U-shape pattern in its relationship with credit demand[7] and participation decision of village development fund. If householders are younger, then they will have higher expectation for their future income. Because their income is relatively lower than the middle aged group. Based on the theory "Permanent Income Hypothesis" (Friedman, 1957), the younger group will maximize their utility over the life circle by borrowing when having transitory low income and by saving when having transitory

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[3] The indices refer to borrowing amount, interest rate, transaction cost, whether need collateral and whether need guarantee.
[4] In the thesis, the formal lending sources are RCCs and village development fund, which are all supported by the government and has certain legal regulations; the informal lending sources are private lenders, which requires no interest.
[5] Private lenders here refer to extended families, relatives, friends and neighbors, etc; borrowers don't need to pay for the interest.
[6] The cognitive level of the formal financial market can be captured through the understanding degree of rural credit and loan policies from the RCCs, which can be investigated from the questions in the questionnaire. Detailed illustration will be provided in Part four--preliminary data analysis.
[7] Credit demand means actual borrowing behavior that occurred in the households among all the lending sources within the year 2007 and 2008.

high income. And the middle aged householders normally have more assets and social network, so they will have more access to credit markets. Thus the credit demand will increase by age till a certain flex point, after the flex point the credit demand will decrease because older householders will live on their previous savings and have lower repayment ability.

(2). Relationship between the education level and participating in village development fund also shows inverse U-shape. Householder with higher education level will be more prone to accept new thoughts, adapt new technology and undertake income generating activities. Also householder with lower education level might lack the skills or entrepreneur abilities to carry out income generating activities. So credit demand will increase with education level first and decrease later on. Because householder with highest education level normally have enough liquidity, as well as the amount can be borrowed from the village development fund can't fulfill their needs. Also, there will be negative relationship between education level and credit demand from private lenders. Households with lower education level will be more prone to borrow from private lenders in order to smooth their consumption demand.

(3). Good cognitive level of the formal financial market has positive relationship with the credit demand from the RCCs and village development fund, also increase the probability of participating in the village development fund. I suppose the households who understand the credit and loan policy of the RCCs well have stronger recognition of financing and financial market, therefore they will be more willing to participate in the village development fund and try their opportunities to borrow from the RCCs. If things go in another direction that the households don't understand the policy well, they will prefer to borrow from the private lenders when confronting consumption constraint or even becomes non-borrowers.

(4). Social attributes-"whether has cadre[8] in the households" has positive relationship with participation in village development fund. Normally the cadre knows well about the development fund than other villagers so they are more willing to participate in the financial

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[8] "Having cadre in the households" here means at least one family member is the cadre at the town level or above/village level/village group level.

project. Also, in rural areas the cadre always should act as a leader to take income generating projects, such that the other villagers can follow their way.

(5). Availability of getting credit from other sources has negative relationship with the participation decision in the village development fund. Since the popularity of formal credit rationing, "private lenders" is the dominating lending sources before introducing village development fund in the research areas. "Private lenders" is the most powerful competitor of the village development fund. So the larger the amount a household can borrow from the private lender, the lower the probability of participating in the village development fund. Exclude those who really don't need the village development fund, the phenomenon of non-acceptance of the village development fund still exists in the village. Considering the advantage of zero transportation fees and lower interest rate than RCCs of the village development fund, we can also treat borrowing from private lenders as the inertia preference of households' borrowing behavior and part of the households haven't got used to the formal credit market. Also we can see from other perspective, the non-rational decision of human often happens under uncertain conditions. The people choose not to participate in the village development fund might be those households who don't trust in the fund and want to wait and see how the fund functioning.

(6). Sources of non-agriculture income have ambiguous relationship with credit demand and participation decision of village development fund. And the variables "whether family member has craft[9]" and "whether have migrant workers[10] in the households" are the proxies for the income sources. Since the vulnerability and risk of agriculture production, diversification of income will spread income risk and increase the overall household income. For the craftsman, from one perspective, the household can get non-agricultural income, which will be higher than the agriculture income, so they will be less credit constraint; from the other perspective, the craftsman might need to facilitate the working devices, thus they will be in demand for money. For the migrant workers, from one side, migrant workers will

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[9] Craftsman here refers to family member who has special skills for living, such as the veterinary, carpenter, bricklayer, driver, barber, technician, et cetera.
[10] Migrant worker here means that the villagers in the research areas find a job and work in the towns and cities. Migrant workers are very popular in the transitory stage of China. These workers have their families and houses in the rural area, but work in towns and cities away from their hometown in order to support the whole family.

have job salaries and it will be used to support the whole family, then the households will be less likely liquidity constraint, so they will borrow less; from the other side, the job salaries can be functioned as insurance and increase household repayment ability, then household is more willing to borrow. When it comes specifically to the participation of village development fund, I can interpret the role of migrant workers in another way, on the one hand, because the migrant workers are away from their hometown and may not participate in the earlier stage promotion and motivation activities, so they don't know well about the village development fund; from the other hand, the migrant workers normally are more prone to accept and understand new things than the other villagers because they work outside. As a whole, the relationships are vague, which needs to be further investigated.

(7). "The times earlier stage promotion and motivation activities the family member participated in" has positive relationship with the probability of participating in the village development fund. Since this represents how people know about the village development fund and can be used as a proxy for information flows. The more the households know about the village development fund, the higher the probability of participating in the village development fund. Also, households choose not to attend the motivation activities are those who don't have any interest in participating in the fund for all kinds of reasons or don't have time at that time to attend the promotion activities[11].

1.4 Limitations of the study

The main limitation of the study is that the data comes from the evaluation team for "rolling mode and operation research for village development fund" and not specially designed for analyzing the determinants of credit demand, so some of meaningful variables are not included in the data set directly. Here, the other variables are taken in the questionnaire as the proxies, such as the variable of "time stay at home in the year 2008" plays the role for the variable "migrate worker".

Because of the incompleteness of the dataset based on the questionnaire, some interesting variables such as the revenue sources, the endowment of resources for production, annual

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[11] Migrant workers may be not at home during the motivation period.

income before implementing the village development fund and value of household assets before implementing the village development fund are not included. So the decision of the households' credit market participation can't be analyzed among different revenue sources. And I am not able to check exactly the effect of income and the households' assets value on the participation decision of village development fund. Also, normally the endowment of productive resources is closely related to the credit demand for income generating activities, while the variable can't be controlled in the thesis. The above deficiencies can be improved by modifying the questionnaires in further research.

The omitted variables such as the entrepreneur ability and the risk aversion ratio may influence the households' decision of participating in the village development fund and household credit demand. The risk aversion ratio can be measured by conducting a field experiment through a risk aversion measure (Binswanger, 1981), which means in further studies the variable of the risk aversion ratio can be controlled. Also, these omitted variables are related to the pre-survey income and assets. Further studies can use the fixed effect model through panel data to confirm the findings in this thesis.

Chapter 2 Theory and methodology

2.1 Literature review on theory

In previous research, in order to explore the determinants of borrowing behavior or credit demand, researches primary base on the theory of permanent income hypothesis and life circle hypothesis (Doan et al, 2010; Chen & Chivakul, 2008). While the liquidity constraints and the imperfection of financial markets for the households lead to the violation of the theories (Doan et al, 2010; Chen & Chivakul, 2008). Doan et al (2010) also found the violation of permanent income hypothesis results not only from credit constraints but also from households' precautionary behavior.

The difference between this research and the previous research is that in the previous studies, households borrow in order to fulfill their investment demand as well as consumption demand, such as education, medical care, house construction, marriage, family living expenditures and so on (Doan et al, 2010; Liu & Li, 2010; Akram et al, 2008; Turvey et al, 2010; Li & Zhu, 2010; Yuan et al, 2011; Tang et al, 2010; Chen & Chivakul, 2008; Nguyen, 2007). Those studies treat consumption need and investment demand from the households equally and didn't separate the two category of credit demand in their analysis. However, in this thesis, the village development fund can only be used for income generating activities, which has no direct relationship with consumption. So the permanent income hypothesis and life circle hypothesis don't fit here. According to the function of the village development fund and the determinants that are going to be focused on, the permanent production hypothesis (Williamson, 2010) and risk rationing theories (Boucher & Carter, 2001) are applied here.

2.1.1 Permanent production hypothesis

Permanent production hypothesis is a corollary to the permanent income hypothesis and represents the relationships between the households production patterns and capital cost, which stipulates that the choice made by producers regarding their production patterns are determined not by their present term capital cost, but by their long-term capital cost expectation (Williamson, 2010). The key conclusion of this theory is that transitory short term changes in capital costs have little effect on production behavior (Williamson, 2010).

Compared with borrowing from the formal channel—RCCs, the households will pay relatively lower interest rate and experience much less waiting time and application procedures if borrowing from the village development fund. In short, the capital cost of borrowing from the village development fund is relatively lower than borrowing from the RCCs. Also the probability of credit access is much higher for village development fund than RCCs. Actually anyone participate in the village development fund can get loans in the end, they just need to wait for their turns. Also for the village development fund, the "lenders" have enough access of information. Thus collateral is not required for the fund. When comparing with the private lenders, the village development fund is more convenient and the transaction cost is relatively lower[12], households don't need to apply social relationships in order to borrow; also large proportion of the debt from the private lenders are used for consumption while the function of the village development fund is totally different. Nevertheless, with the low cost and convenience of the fund, smaller part of the households who are in credit demand still chose not to participate in the village development fund.

Violation of permanent production hypothesis has something to do with the expectation of the households. Some households seem not to trust in the village development fund, and have a relatively high capital cost expectation of the village development fund. With the introduction and publicity of the village development fund in the end of 2007 and early of 2008, the knowledge of the village development fund is spread in the "earlier stage promotion and motivation activities" by the experts. Villagers in the research areas are mobilized to participate in the village development fund under the condition of rural formal credit rationing. The reasons for the low acceptance of new things for part of the households might be the low education level, low cognitive ability, few borrowing experiences from the formal institutions, low entrepreneur ability, no investment projects at hand, haven't attended the promotion activities and so on.

From another perspective and follows the permanent production hypothesis, the participation decision of the village development fund relates to the borrowing habits of households.

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[12] Household don't need to take time to visit the private lenders and pay for the transportation fee. Also some gifts for the private lenders can also be avoided.

Although the problem of formal credit rationing is very severe and popular in rural China, households are able to borrow from the informal Channels. In the thesis, the informal Channels refer to borrowing from extended families, relatives, friends, neighbors, colleagues and so on. Through informal channels, households do not need to pay for the interest rate and the debt maturity is flexible. Boucher & Guirkinger (2007) raise that the informal sector isn't the sector of last resort but instead maybe the preferred sector considering the lower transaction cost. And their analysis shows that the informal sector not only absorbs the spillover demand of the poorest agents who are excluded from the formal sector, but also maybe preferred by a class of agents who could obtain a formal loan (Boucher & Guirkinger, 2007). So households who are available of adequate informal sources might choose not to participate in the village development fund even the fund is open to all the villagers.

Also for the villagers, the financial project was just implemented in the year 2008 and our investigation is carried out in the early of 2009, it is reasonable for part of the villagers choose not to participate in the fund even under the condition of credit demand. The villagers will understand more about the fund with the passage of time, then the self-constrained behaviors will decrease and the violation of the permanent production hypothesis will be lessened. The convenient and low cost village development fund will be helpful for production investment in the research areas and will cover more villagers in the project finally.

2.1.2 Risk rationing theories

Risk rationing occurs when lenders constrained by asymmetric information, and it shifts so much contractual risk to the borrowers, who voluntarily withdraw from the credit market even when she or he has the necessary collateral wealth to qualify for a loan contract (Boucher & Carter, 2001).

It seems that this theory does not fit here, but since the occurrence of households' self-constrained credit demand behavior, this theory can be further exerted. The households are afraid of the penalty for shirking repayment such as losing the entrance fee of participating in the village development fund, losing the option of borrowing from the fund again, the peer pressure from the joint group members and the damage of his or her reputation in the village.

All the penalties can be treated as contractual risk for the villagers. As for the "lenders", they got enough information of their customers; but for the borrowers, the newly arrive fund has not been used by the villagers before, as well as the rural areas are comparatively seal up and villagers have few experiences and low ability of formal financial market participation. So the borrowers are not sure about the village development fund, this is "asymmetric information" in the other way around. In the research areas, part of the credit demand households are worried about the contractual risk and voluntarily withdraw from participating in the fund even they are supplied with the village development fund. Boucher et al (2006) propose that credit constraints may take three forms: quantity rationing, transaction cost rationing and risk rationing; quantity rationing refers to the farmers who can't post the minimum required collateral and involuntarily excluded from the credit market and transaction cost rationing is closely related to the transaction cost. Follow the division above, if the households are divided into the supply side constrained and demand side constrained, the self-constrained households in the thesis belong to the demand side constrained households. And among the three forms of credit constraints, the risk rationing should be the best explanation for households in the research areas who haven't participated in the village development fund but with credit demand, and the "risk rationing" here can have other meanings instead of "collateral risk", which are all kinds of consequences household feel afraid for shirking repayment.

Pointing out the demand side credit constraint behavior and finding possible determinants of self-constrained behavior make sense for assessing the pilot financial program and further precisely targeting the poorest households. Boucher et al (2008) point out that fail to account for risk rationed agents, who have bankable projects but are discouraged from implementing them because of the riskiness of available loan contract, may lead to misrepresentation of the health of the rural financial systems. Also in another empirical research in China, the authors use cross tabulation results to support the proposition of Boucher et al, the results indicate that the financial wealthy and relatively land-poor are contractual risk rationed (Khantachavna et al, 2011). Self-constrained household here means the one who are in credit demand but choose not to participate in the village development fund.

2.2 Literature review on methodology

The existing studies have developed the methodology of exploring the determinants of credit participation from the single equation model to simultaneous equation models which are based on different assumptions. Initially, researches assume that the households in rural regions are all in credit demand, so the credit participation is determined by the supply side and the non-borrowers are suffered from credit rationing from the credit institutions (Iqbal, 1986). Then the probability of credit participation is estimated through the single equation Probit model or Logit model (Dufhues & Buchenrieder, 2005).

Later on, researchers relax the ideal assumption and explore the determinants both from supply side and demand side. We can only observe the loan behavior and amount of debt if the households has a positive credit demand and is not totally credit constrained. So the partial observability theory is applied and the simultaneous equation model is taken into use (Nguyen, 2007; Li & Zhu, 2010; Yuan et al, 2011). Poirier (1980) concludes that the consequences of partial observability are in two folds: first, the maximum likelihood estimators will be inefficient compared to those obtained in the case of fully observed choices and quantifying the efficiency lost is not possible without reference to a particular data set; second, identification problems arise which require careful examination. In order to improve the efficiency of the model, researchers further investigate the demand willingness of the households (Chen & Chivakul, 2008), so the demand function is identified, which increases the information for the simultaneous equation. For the same purpose, some researchers investigated from the supply side to check whether the households are confronted with credit constrained (Tagle & Vella, 2010).

Under the condition of simultaneous equations, the observed binary outcomes do not reflect binary choice of a single decision maker, but the binary choices of two decision makers (Poirier, 1980). So the bivariate Probit model is estimated to calculate the probability of credit participation of households (Li & Zhu, 2010; Nguyen, 2007), the bivariate Logit model come into play as well (Yuan et al, 2011). Under the condition of partial observability, the problem of sample selection bias arises due to the non-random of households' credit participation decision. Thus the two step Heckman selection model (Heckman, 1979) is applied to correct

for the bias in the decision (Nguyen, 2007; Akram et al, 2008; Chen & Chivakul, 2008; Tagle & Vella, 2010). So Tobit model which is modified by the Heckman model is used to estimate the determinants of credit borrowing amount.

The above is the development and mainstream of the research approaches for exploring the determinants of credit participation and credit demand. Other models and methods are also applied for estimating the factors affecting credit demand in different lending sectors. Turvey et al (2008) use the binary logistic regression against four binary dependent variables to estimate the results of the factors influencing borrowing from informal and formal credit sectors and take general linear method regression to measure the factors affecting credit amount borrowed. Doan et al (2010) employ the multinomial Logit estimates to examine the factors influencing the probability of specified credit market participation, the purpose of the model is to compare each outcome probability with the base outcome of non-borrower group. Tang et al (2010) explore the rural credit demand simultaneously through a multinomial Probit model given the fact that the farmers are facing three exclusive choices, the choice of informal credit is set as the base to compare with the choices of formal credit and non-borrowing.

In short, the existing researches are mainly focused on the credit demand of the households in all the segmented credit sectors, and normally the real credit market participation is determined by the credit demand and credit access. The thesis here primarily focuses on the participation decision of the village development fund, and there are no access constraints of the village development fund for the villagers; and the thesis will also explore the determinants of the credit demand from all the segmented credit sectors.

2.3 Method selection

Poirier (1980) points out it is desirable to provide a utility maximizing rationalization for binary choice problems where the observed binary outcome does not reflect the binary choice of a single decision maker, but rather the binary joint choices of two decision makers. In such a case under the usual normality assumptions the correct choice of distribution will not be a univariate Probit model (Poirier, 1980). Contrary to the binary joint choice of the two decision

makers for the credit participation, the decision of participation in the village development fund is a single decision from the households. Consequently, the univariate Probit model fits for the analysis in the thesis.

Amemiya (1984) points out that shortcomings of standard Tobit model regression are that the model may produce biased and inconsistent estimates if heteroscedasticity exists. Nguyen (2007) also points out that the characteristics of borrowing households are systematically different from the non-borrowing households and also the households have to face accessible constraints from the credit suppliers, thus the standard Tobit model is likely to suffer from sample selection bias due to non-random decision of households to participate in credit market. The thesis will explore the factors affect the borrowing amount from the village development fund among the group of households who participate in the village development fund. The characteristics of the households participating in the fund are treated equal and supply of the fund is open for all the households, so the problem of sample selection bias will not occur in this case, the standard Tobit model will be applied for further analysis.

2.3.1 Probit models

In the thesis, I will take advantage of the econometric analysis to identify factors influencing the decision of participating in the village development fund. Also I will further investigate the affecting factors of borrowing behavior in the three main lending sources. Probit model can be used for the analysis.

First, the households are divided into two types, the participant group and the non-participant group. The univariate Probit model is used to estimate the probability of participating in the village development fund. The latent variable y_i is defined, which is the utility index and stands for the utility of participating in the village development fund: $y_i = X\beta + \varepsilon$

The subscript "$_i$" stands for the individual households, β is the coefficient and ε is the random disturbance and it is assumed to follow normal distribution. It is assumed that the decision of participating in the village development fund depends on the unobservable utility index y_i. The utility index depends on series of independent variables X, which is a vector of influencing factors that potentially affect the participation decision of households. Thus the

larger the utility index, the higher the probability of participating in the village development fund.

There is threshold utility level y_i^*: if y_i exceed y_i^*, then the households would participate in the fund; if not, then the household would be non-participant. Since the utility is unobservable, y_i is assumed to be normally distributed. So the probability that y_i exceeds y_i^* could be derived from the standard normal cumulative distribution function as follows: $P(Y=1|X)=P(y_i^*<y_i)=F(y_i)=\frac{1}{2\pi}\int_{-\infty}^{T}e^{\frac{-t^2}{2}}dt=\frac{1}{2\pi}\int_{-\infty}^{X\beta}e^{\frac{-t^2}{2}}dt$

The variable "t" follows standard normal distribution. Y represents the households participate in the village development fund or not and definitely it is observable. Y takes the value 1 if households choose to participate in the village development fund and 0 if not. The Probit model of participating in the fund is as follows: $Y=\begin{cases} 1 & \text{if } y_i^*<y_i \\ 0 & \text{otherwise} \end{cases}$.

Accordingly, the specified model for credit participation is as follows: $\text{Participate}(Y_{ir})= \beta_0+ \beta_1 X_{1ir}+ \beta_2 X_{2ir}+...+ \varepsilon_{ir}$ The $\text{Participate}(Y_{ir})$ is a binary variable representing households i in county r participate in the village development fund or not, X_{ir} is a vector of explainatory variables [13] that may affect the probability of households participating in the village development fund or not and ε_{ir} is the normal distributed random error term.

In the thesis, the probability of borrowing from the three main lending sources according to the borrowing records of households within the year 2007 and 2008 will also be explored. The multinomial Probit model will be used and non-borrowing behaviors will be used as the base to compare with borrowing from different lending sources. Thus the multinomial Probit model will help to explore the roles of different factors on segmented credit markets. So the specified model can be as follows: $\text{Borrowing behavior}(W_{ir})= \beta_0+\beta_1 X_{1ir}+\beta_2 X_{2ir}+...+\varepsilon_{ir}$

X_{ir} are the explanatory variables. To simplify the analysis, here borrowing from the RCCs and village development fund are treated as borrowing from formal credit, and borrowing from the private lenders is taken as borrowing from the informal credit. So

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[13] The core explanatory variables will be described in Chapter 3, these variables will not be listed here.

the Borrowing behavior(W_{ir}) is a multinomial variable representing households i in county r borrow from the formal credit, borrowing from the informal credit, borrowing from both credit sources or not borrow within the year 2007 or 2008.

2.3.2 Standard Tobit model

Standard Tobit model[14] is taken for estimating the amount households borrowed from the village development fund among the participants.

Tobin (1958) develops the model for the continuous dependent variables that vary between zero and a certain positive value. For the participating households chose not to borrow from the fund, some of them might have excess liquidity and lend to the other households, so for those households the credit demand and borrowing amount from the fund is "negative", however it is unobservable and we can only observe the zero borrowing amount from the village development fund. Thus the distribution of the dependent variables can't follow the normal distribution, and the OSL is not fit here. Just as Amemiya (1984) proposed, the value of the observation destroys the linearity assumptions then the least squares method is inappropriate, the Tobit model is employed to describe the discontinuous distribution and to explain the conditional distribution of the dependent variable.

Let $z_{ir}*$ denotes the amount households i in county r borrowed from the village development fund, and K_{ir} stands for the vector of explanatory variables, then the standard Tobit model should be: $z_{ir}* = \alpha K_{ir} + \mu_{ir}$; $\mu_{ir} \sim NID(0,\sigma^2)$

Even though some of the households choose to participate in the village development fund, they haven't borrowed from the fund till the investigation time. So a certain number of households have zero borrowing amount from the fund. Tobin (1958) defines the model as follows: $z_{ir} = \begin{cases} z_{ir}* & \text{if } z_{ir}*>0, \text{ positive credit amount from the fund} \\ 0 & \text{otherwise, not borrow from the fund} \end{cases}$

Those who borrow more from the fund are the group gained more benefit from the fund. Uncovering the characteristics of those households may help better serve for the policy suggestions and product design of the further rural financial project.

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[14] Type one Tobit model

Chapter 3 Data description

3.1 Data sources and collecting

3.1.1 Data sources

To clarify here, the data comes from the final evaluation team for "rolling mode and operation research for village development fund", which was raised by the State Council Leading Group Office of Poverty Alleviation and Development together with the World Bank. Our investigation carried out in Feb 2009 in two provinces of China -- Henan Province and Sichuan Province. The project was first carried out in the year 2006. For each province, there is one county that carried out the village development fund. In Henan Province it is the Ye County, in Sichuan Province it is the Wangcang County. And initially there were only two villages in each province that implemented the project TCC5. So for each county we only have two villages as the first batch of testing villages in the year 2006.

Till 2008 the project has popularized to more villages after the trial in the first batch villages. During the appraisal, we took 5 villages[15] (the first batch villages included) in each province. In each village we investigate 40 households, among which 30 participate in the project, and 10 are non-participants[16]. So in total we plan to investigate 400 households in two provinces.

3.1.2. Data collecting and sampling.

In the list of participating villages, we took the first batch 2 villages from each county and randomly selected 3 villages from the 2008 popularized group. And for each village, we got the name list[17] of the participants and non-participants. We adopt random interval sampling method to choose 30 participants and 10 non-participants in each village. If the person chosen in the name list can't be contacted, we randomly choose another person around him or her in the name list to substitute. Also due to the constraints of time, we contacted more substitutes

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[15] A map portraying the location of the survey site will be provided in appendix B.

[16] To specify here, since I have participated in the project and interest in the topic, I use the data directly and will not design specific questionnaire and carry out the field survey again. Also because the data is not specially for my thesis, so the samples are not random selected among all the villagers in the research areas. The ratio between the participating villagers and the non-participating villagers is almost 3:1. The samples are only random selected among the participated group and non-participated group respectively. This is another deficiency that can be further developed in the further research.

[17] The name list is in alphabetical order.

just in case that the substitute households were also not available at that time. We interviewed all the households been contacted and available. However, the unavailable situation still occurred, which made the number of non-participants lower than expected amount. Finally there turns out to be 205 samples for the Wangcang County and 200 samples for the Ye County. And among all the samples, 310 are participants and 95 are non-participants.

3.2 Data preparation and preliminary analysis

3.2.1 Data preparation

(1) General description of the participating condition of the village development fund

First I picked out the observations from the overall 405 observations. Since I will focus on the reasons of the self-constrained household, I exclude the observations that both "not participate in the village development fund" and "don't need to borrow money from village development fund", thus 8 observations are taken out from the sample. Also mistakes still exist in the database, 3 observations are recorded "not participate in the village development fund" while the reason for not participating is not recorded, thus whether the household is self-constrained or not can't be identified. So the 3 observations are also taken out of the sample. Finally 394 observations from 2 counties are included in the analysis, the detailed distribution are displayed in table 3.1. For Wangcang County there are 156 participants and 48 non-participants, for Ye County there are 154 participants and 36 non-participants. Generally there are 310 participants and 84 non-participants in the sample as a whole.

Table 3.1 Fund participation situation for the two counties

County	Participants	Non-participants	Observations
Wangcang	156	48	204
Ye	154	36	190
Observations	310	84	394

In order to further provide the general participation condition of households, the reasons for participating and for non-participating in the village development fund are summarized in table 3.2 and 3.3. From table 3.2 we can see that "urgent need for money" and "need to get the option" play major roles. And almost all the effects of reasons are similar according to the

relative proportion except the reason "mobilized by the cadre" for the two counties. It seems more functioning in the Ye County, which reveals the importance of the mobilization activities and the efforts put by the cadre for introducing new project to the villagers. Also the "peer effect"—"Because other people participate in the joint group" seldom works for the villagers, which means that the households make a decision according to their own situation.

To specify first before interpreting table 3.3: the reason—"1. Don't need to borrow money" is excluded according to the observations needed for the thesis. For households choose "8.other reason", which take the largest part among the non-participates, the reason might be they are migrate workers so they don't know well about the village development fund because they were not at home at the mobilizing time; or maybe some of them want to wait and see how the development fund functions; or maybe some of them don't have the proper income generating activity at hand, et cetera. The reasons "2. Don't trust the village development fund" and "3. Can't afford the entrance fee" also play important roles. The reasons for non-participating in the development fund are mainly used to identify whether the households are self-constrained or not, the underlying reasons for non-participating need to be further investigated.

Table 3.2 Reasons for participating in the fund

Reasons for participating	Wangcang	Ye	Observations
1. Urgent need for money	48	44	92
2. Don't need to borrow money now, but need to get the option	62	66	128
3.Because other people participate in the fund	2	4	6
4.Mobilized by the cadre	13	20	33
5. Can help each other in the joint group	13	12	25
6. Other reasons	18	8	26
Observations	156	154	310

Table 3.3 Reasons for non-participating in the fund

Reasons for non-participating	Wangcang	Ye	Observations
2.Don't trust the village development fund	5	1	6
3.Can't afford the entrance fee	6	10	16
4.Can't be enrolled in any joint group	0	0	0
5.Do not want to attend	1	1	2
6.Small borrowing quota	1	5	6
7.Frequent repayment	0	0	0
8.Other reason	35	19	54
Observations	48	36	84

(2) General illustration of the detailed borrowing behaviors for households within the year 2007 and 2008

In order to explore the reasons for self-constraint behavior in participating in the village development fund, a detailed analysis of the borrowing behavior of households is necessary in order to find possible reasons for the decision of participating or non-participating in the fund. Since only 4 villages can borrow from the village development fund in 2007, 6 other villages are unable to borrow in 2007 and can only borrow in 2008, I take the borrowing behaviors within these two years as a whole[18] into analysis.

Among 394 observations, there are 830 records of borrowing behaviors occur within the two years. From table 3.4, we can see that among the 830 records, 6.87% are borrowed from the RCCs, 59.76% are borrowed from the private lenders[19], 31.45% are borrowed from the village development fund and the left 2% are borrowed from the Agricultural Bank of China/Agricultural Development Bank, commercial bank and private lending with interest. The empirical results are similar to the existing studies. Yuan et al (2011) find that although Chinese government has made efforts in developing the formal financial markets in rural markets, borrowing from informal channel reaches up to 60% among farmers. Tang et al (2010) conclude from the statistics and find only 10.9% of loans is used in the rural area of China, which means that the farmers does not have access or don't borrow in formal credit market and could only borrow in their social networks such as friends and relatives. Tang et al (2010) also point out that with the rapid economic growth, informal credit supply may not be sufficient to meet the increased demand for relatively larger amount of credit as farmers start to engage in more diversified or more capital intensive economic activities.

Under the condition that there are only 4 villages in the sample implemented the financial project within the year 2007 and 2008, households in the remaining 6 villages can only borrow from the village development fund in 2008, there is obvious substitution effect

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[18] It's a pity that the village code in the database can't be identified. Otherwise I can compare the changes of borrowing behavior before and after the village development fund, thus the function of the village development fund can be further displayed. Because I can just distinguish those who are participant and nonparticipant till the investigation time, and the village code in the database can't be used, so I can't differentiate the household that can or can't borrow from the fund in 2007. So in order to compare the borrowing behaviors under the same condition (all the households are provided with the option to borrow from the fund), I take the two years' borrowing behaviors as a whole.

[19] The "private lenders" refers to "private lending without interest".

between the village development fund and private lending without interest. In 2007, 69.08% records of debt are borrowed from the private lending without interest, but in 2008 the proportion decreased to 55.63%; while the ratio of village development fund has increased from the 19.85% to 36.80%, with the ratio of borrowing from other sources haven't changed that much. Also we should take into account the condition of the earthquake that happened in the Sichuan Province, so many houses in Wangcang County are destroyed, households need to borrow in order to build or repair their house. The village development fund can't be used for house construction, the main lending sources that villagers can resort to is the RCCs or private lenders. So the spillover effect of the village development fund is to some extent underestimated by the unexpected earthquake.

In the thesis, I will focus on the three main lending sources: RCCs, village development fund and private lenders. Because 814 records of debt are borrowed from the three lending sources. The other lending sources can be neglected in the research areas.

Table 3.4 Lending sources for borrowing records within the year 2007 and 2008

Lending source	Within the two years		2007		2008	
	Records	Ratio (%)	Records	Ratio (%)	Records	Ratio (%)
1.RCCs	57	6.87	23	8,78	34	5.99
2.ABC/ADB	2	0.24	1	0.38	1	0.18
3.Commercial Bank	6	0.72	2	0.76	4	0.70
4.Other NGO	0	0	0	0	0	0
5.Private lending with interest	8	0.96	3	1.15	4	0.70
6.Private lending without interest	496	59.76	181	69.08	316	55.63
7.Village development fund	261	31.45	52	19.85	209	36.80
8. Other sources	0	0	0	0	0	0
Total	830	100	262	100	568	100

For each record of the debt, track the lending sources, amount, interest rate, the way of using the debt, whether need collateral or guarantee and transaction cost among different lending sources as well as comparing these indicators among the participating and non-participating group in order to find possible reasons for non-participating. In the existing studies, these indicators are considered relating to the probability of credit demand and sector choice (Abiad et al, 1988; Akram et al, 2008; Tang et al, 2010). Tang et al (2010) consider that the informal

credit has the advantage of zero interest rate, flexible borrowing terms and little restriction on how the loans been used and they are the unique aspects of Chinese rural finance; also through the analysis of the informal and formal credit market in China, authors conclude that the high interest rate significantly decrease the probability of borrowing from the formal credit markets and households' credit demand, which means credit sector choice are significantly affected by the transaction cost. Pagura et al (2001) illustrate from another perspective, they conclude that client dropout from microfinance can be attributed to the inappropriateness of the frequency and the amount of repayment as well as the interest rate and late fees associated with these loans, the inability to keep up with the predetermined repayment schedules propelled some clients into delinquency and further into debt due to late fees assessed to them.

(2.1) Generation of the transaction cost

Abiad et al (1988) define the transaction cost as the non-interest expenses incurred by borrowers as well as lenders, which is made up of the actual cash outlay and the opportunity cost of time spent in applying for, securing and repaying a loan. They hold the view that the longer the time taken to evaluate and process a loan, the greater the transaction costs for the borrowers—as seen in the longer hours spent in the bank premises, more frequent trips to the bank, great expenses for transportation and food and possibly, higher fees (Abiad et al, 1988).

Similar to Abiad et al (1988), I divide the transaction cost into three parts: the opportunity cost spend in order to borrow money which is calculated through the time wasted in order to borrow the money, the transportation fees for borrowing and other cost such as gifts for the lenders. And the transaction cost takes the three parts as a whole. In order to calculate the opportunity cost, I treat it as the compensation for the absent working time, thus the income level of each household is needed. However, we haven't collected the variable in the survey, so here I take the per capita GDP for each county in 2007 and 2008 to substitute. Assume that the working days for every household per year are 250 days[20], so daily cost for borrowing

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[20] Because in China we have 11 days for official holidays and 104 days for weekends, so the amount of working days is 250 per year.

money can be calculated and it shows in table 3.5. Finally the transaction cost for each borrowing behavior will be as follows:

TC = time used to borrow money * cost for losing working time+ transportation fee+ other cost

Table 3.5 GDP and daily cost for borrowing for the two counties in the year 2007 and 2008

GDP(CNY)	2007	2008	Cost for loss of working time (per day)	2007	2008
Wangcang	7306	8771	Wangcang	29.2	35.1
Ye	9818	11389	Ye	39.3	45.6

Sources: GDP for the year 2007 and 2008 come from Sichuan Statistical Yearbook 2008/2009 & Henan Statistical Yearbook 2008/2009. The right hand side of the table is calculated through GDP per working day in the year 2007 and 2008.

(2.2) General comparison of the borrowing indicators among different lending sources for villagers participate and non-participate in the village development fund

Table 3.6 Borrowing indicators among main lending sources for participants and non-participants

county			RCCs	Private Lenders	Village Dev. Fund
Wangcang	Participant	Amount (CNY)	11396	5349	1918
		Interest rate (‰/month)	8.48	0	7.84
		Transaction cost (CNY)	134	36	1.17
		Prob .of needing collateral (%)	29.17	0	1.27
		Prob. of needing guarantee (%)	45.83	0.77	68.99
	Non-participant	Amount (CNY)	11667	4862	
		Interest rate (‰/month)	8.46	0	
		Transaction cost (CNY)	167	47	
		Prob .of needing collateral (%)	33.33	1.67	
		Prob. of needing guarantee (%)	33.33	0	
Ye	Participant	Amount (CNY)	11739	4249	1796
		Interest rate (‰/month)	8.3	0	7.89
		Transaction cost (CNY)	38	2.02	0.06
		Prob .of needing collateral (%)	8.7	0	0.97
		Prob. of needing guarantee (%)	65.62	0	66.99
	Non-participant	Amount (CNY)	20000	3455.56	
		Interest rate (‰/month)	9	0	
		Transaction cost (CNY)	0	0	
		Prob .of needing collateral (%)	0	0	
		Prob. of needing guarantee (%)	1	0	

From the table above: for borrowing amount, RCCs> private lenders> village development fund; for interest rate, RCCs> village development fund> private lenders; for transaction cost, RCCs> private lenders>village development fund. RCCs have highest probability of requiring collateral, Village development fund has highest probability of requiring guarantee, while the private lenders normally doesn't need collateral or guarantee. The small borrowing amount is one of the disadvantages of the village development fund, because the maximum borrowing amount is 5000 CNY. As we can see the average borrowing amount for the village development fund are 1918 CNY in Wangcang County and 1796 CNY in Ye County, which are much smaller than the borrowing amount from the RCCs and private lenders. The core advantage of the private lenders is the zero interest rate and flexible use of money. For the RCCs, it has the highest interest rate, transaction cost and probability of requiring collateral. But since the RCCs is the formal credit sources, household can get largest amount of loan from the RCCs if been accessed.

When comparing the borrowing details among participants and non-participants to check the difference, I found the borrowing amount from the "private lenders" is relatively smaller for the non-participate group, the other indicators are similar. While the statistical indicators for the RCCs can't perfectly stand for the average condition of borrowing due to few borrowing records from the RCCs especially for the Ye county.

The statistical difference is contrary to our common sense, the household choose not to participate in the village development fund normally could resort to the private lenders, but the non-participate group borrow relatively smaller amount from the private lenders compared with the participate group. As a matter of fact, the actual borrowing amount can't equal to the amount that can borrow from the private lenders. So in order to explore the true relationship between the availability of getting help from private lenders and the decision of participating in the fund, the availability of getting debt from the private lenders can be used as one of the core factors that might influence the participating decision of household.

One of the disadvantages of the village development fund is that it can only carry out income generating activities, which is shown in table 3.7. The table 3.7 below shows the ways of using debt among the three lending sources. Generally I divide the uses of debt in two parts:

income generating activities and consumption. Because of the credit regulations, the village development fund seldom serves for the consumption purpose even though it has indirect effect of supporting households' consumption. In the research areas, the debt borrowed from the RCCs can be either used for income generating activities or consumption. Two thirds of the debt from the private lenders is taken for consumption, and the "private lenders" is the main lending source households resort to when confronting consumption constraints. Among all the income generating activities for the three lending sources, "breeding and husbandry" takes 78.1% of the activities that household implement for income generating when debiting, "crop plantation" and "small business" take the second and third place. For consumption, "build house", "see a doctor", "consumer goods", "marriage" and "children's education" are the principal reasons for loan demand. Also I checked the uses of the village development fund in the respectively two counties, which are similar. 94.97% records of the loans are borrowed for the purpose of breeding and husbandry for Wangcang County and 82.5% records of loans are used for the same purpose in Ye County. It reflects that the "breeding and husbandry" industry is the first choice for the majority households when they try to increase household income in the research areas.

Table 3.7 Ways of using debt among different lending sources

| Ways of using debt | Records of Using debt | | | |
	RCCs	Private Lenders	Village Development Fund	Total
Income generating activities	*25*	*177*	*255*	*457*
1. Crop plantation	3	45	14	62
2. Breeding and husbandry	19	103	235	357
3. Rug production	0	1	0	1
4. Small business	3	21	4	28
5.Manufacture industry/repair industry	0	1	1	2
6. Transportation service	0	2	1	3
7. Veterinarian	0	1	0	1
8. Search for job outside	0	3	0	3
Consumption	*32*	*319*	*6*	*357*
1. Build houses	21	105	2	128
2. Funeral	0	2	0	2
3. See a doctor	4	87	0	91
4. Consumer goods	0	20	0	20

5. Marriage	3	24	1	28
6. Children's education	3	66	2	71
7. Borrow for other people	0	0	1	1
8. Repay other debt	0	1	0	1
9. other uses	1	14	0	15
Total	*57*	*496*	*261*	*814*

3.2.2 Preliminary data analysis

Here, statistical analysis of the variables that are chosen for further analysis is provided. Generally the factors can be classified into four parts: household characteristics, social attributes, cognitive level of the formal financial market and times participated in the earlier stage promotion and motivation activities. Also, the county dummy will be included. The table 3.8 displays the detailed description of each dependent and core independent variables.

Table 3.8 Dependent variables and independent variables

Dependent variables
1. Participate condition of the development fund: 0—not participate, 1—participate;
2. Borrowing amount from the village development fund (take the logarithm)[21];
3. Borrowing behavior[22]: 0—haven't borrowed within the year 2007 and 2008, 1—borrow from the RCCs or Village development fund only[23], 2—borrow from the private lenders only, 3—borrow from both formal and informal lending sources;

Independent variables
1.Household characteristics

- ✓ Householder's age[24];
- ✓ Proportion of the male family members in the household;
- ✓ Householder's education level :1—illiteracy and half illiteracy, 2—primary school, 3—junior high school, 4—senior high school, 5—technical school/college/university;

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[21] Among the 394 observations, 310 are participants of the village development fund, of whom 114 households haven't borrowed from the fund but just participate in it. Those 310 observations are the subjects for studying the determinations of borrowing amount from the village development fund. And the amount of village development fund borrowed is the sum of the amount borrowed within the year 2007 and 2008.

[22] Among the 394 observations, 2 observations only borrowed from the private lending with high interest rate. So these two observations don't belong to any of the type defined in the final analysis, and need to be crossed out. Finally the effective observations become 392 for analysis in this step.

[23] Here borrowing from the RCCs and Village development fund are treated equally as borrowing from the formal credit sources. For the one side, that the two lending sources are supported by the government and have certain regulations; for the other side, it helps to differentiate the households borrow from the private lenders and from the official channels.

[24] In the database, among the 394 observations, only 347 households had their own householders recorded. So in order to capture the age of the decision making person in the household, I take the age of mate, brothers and sisters in the household and parents as the substitute, and preference identical with the sequences list above. And the missing information of the householder is mainly because that he/she has passed away. Also the education level of householder is captured follow the same way.

- ✓ Household size: the number of people who has registered permanent residence in this settlement or stayed at home for more than 6 months in the year 2008. Exclude children who departed from the settlement, already have married and live outside, join in the army and go to university/college/ secondary technical school[25];
- ✓ Household wealth (take the logarithm): sum of the value of durable consumer goods ,the Capital assets and the house at the end of 2008[26];
- ✓ Whether has craftsman: 0—no craftsman, 1—at least one craftsman;
- ✓ Whether has migrant workers in the household: the migrant workers are defined as the person live at home for less than 9 months[27] in the year 2008, 0—no migrant worker,1—at least one migrant worker;

2.Social attributes

- ✓ Whether has cadre in the household: 0—no, 1—yes;
- ✓ Availability of borrowing from private lenders: the amount of money can be borrowed from private lenders (take the logarithm).

3. The cognitive level[28] of the formal financial market: 0 — low cognitive level, 1—otherwise;

4. Times participated in the earlier stage promotion and motivation activities;

5. County dummy: 0 — Ye County , 1—Wangcang County;

According to the participation condition of the household, I summarize the core variable in two groups: non-participate household and participate household. From the table 3.8, I find that the education level of the householder, household size, household wealth, the probability of having craftsman, the probability of having cadre, the amount of money that can borrow from the private lenders, times participated in the earlier stage promotion and motivation activities and the cognitive level of the formal financial markets are relatively lower for the non-participate group at the mean value. However the probability of having migrant workers

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[25] The children who join the army or go to university/college/secondary technical school are excluded from the household when accounting the household size, just because they are seldom at home, which is considered as a defect here. Actually the education fees and the allowance from the army will influence the living standard and the consumption level of the household. But this is also due to the limitation of the data and those people are not recorded in the questionnaire.

[26] Value of the durable consumer goods, capital assets and house are investigated after the implementation of the village development fund, so the problem of endogeneity and reverse causality might happen. But the problem will not that severe. For one perspective, the village development fund that can be borrowed is a small amount and can't change the value of assets in the household fundamentally; for the other perspective, the village development fund can only be used to carry out income generating activities, then it will have indirect effect on the house value and durable consumer goods, so the sum of the values at the end of the year 2008 can be used as a proxy for the household wealth.

[27] When defining the migrant workers, not only taking into account the time stay at home, but also taking family members' age and education level into account. For example, the person younger than 16 years and older than 60 years are not considered as migrant workers even though they live at home less than 9 months. Also, I take the education level to help identify the person, if the person at his/her age generally haven't finished the education level, he/she is considered studying outside, so he/she isn't regarded as the migrant worker.

[28] Combine the three questions together: "if you want to borrow from the credit union, the requirement for collateral and guarantee"; "if you have guarantee and collateral, can you borrow from the credit union"; "according to your condition, if you are in urgent need of money, can you borrow from the credit union" If any of the three corresponding answers are "don't know", then the dummy variable for the cognitive level is 0, otherwise the variable takes the value 1.

in the household is higher for the non-participate group. The age of householder and the proportion of male family member in the households are similar for both groups.

In combination with the research hypothesis, further illustration of the summarization table is provided as follows. Householder with lowest education level will choose not to borrow because they are not willing to burden the risk of inability of repaying, so the education level is lower for non-participate group. Good cognitive level of the formal financial market will push forward households to participate in the formal credit market, this explains why the cognitive level of the non-participate group is lower. Being a cadre also prompt the probability of participating in the fund, because they understand well about the funds and will set an example for the other villagers, thus the indicator for the non-participate groups are lower. Relating to the income generating activities: first, the probability of having craftsman in the household is lower for the non-participate group which means that craftsman might need more money to facilitate their working devices so they will be more prone to participate in the fund; second, the probability of having migrant worker in the household is on average higher for the non-participate group, which means that the job salaries outside provide more liquidity for the household and lower the probabilities of borrowing from the fund or the migrant worker don't know well about the development fund due to absenting from the promotion activities. Also, the times participated in the earlier stage promotion activities for the participant group are more than the non-participant group. The reverse intuitive variable is the amount of money that can be borrowed from the private lenders, which is on average smaller for the non-participate group; however, it is the average value, situation will turn out to be different if dividing the available borrowing amount in 4 quantiles groups, which shows in table 3.10 that as long as the available borrowing amount is smaller than a certain amount[29], the non-participate group can borrow more from the private lenders. The results still support the hypothesis that the availability of money from the private lenders has negative relationship with participating decision in the village development fund. Also, in order to check whether non-linearity relationship exists between the credit demand and the householder' age, squared age will be used in the final estimation. The last variable that needs to be mentioned here is

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[29] Because the maximum amount can be borrowed from village development fund is 5000 CNY, so the substitution effect of the village development fund will be reflected more in the lower borrowing amount.

the household wealth, the participant group is on average richer, and the conclusion still holds when dividing the household wealth into different levels.

Table 3.9 Means, SD, Min and Max of the core independent variables for participants and non-participants.

Variable	Non-participate household (Observations:84)				Participate household (Observations:310)			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Age	49.33	12.88	11	84	49.17	10.74	27	78
Pmale (%)	50	23.47	0	1	48.85	17.35	0	1
Edu	2.63	0.99	1	5	2.8	0.87	1	5
Hhsize	3.14	1.36	1	6	3.39	1.29	1	7
Wea	4.29	0.53	3.06	5.22	4.47	0.46	3.32	5.62
Cra (%)	7.14	25.9	0	1	13.55	34.28	0	1
Mig (%)	33.33	47.42	0	1	16.45	37.13	0	1
Cad (%)	3.57	18.67	0	1	14.19	34.95	0	1
Avail	2.34	1.67	0	4.3	2.47	1.6	0	4.7
Cogn (%)	53.57	50.17	0	1	66.77	47.18	0	1
Activi	0.32	0.95	0	5	3.89	2.13	0	9

Table 3.10 Four quantiles of possible borrowing amount from the private lenders

county		4 quantiles of possible amount can borrow from private lenders (take the logarithm)				total
		1	2	3	4	
Wangcang	Participant	0	2.81	3.47	4.09	2.3
	Non-participant	0	2.9	3.54	4.05	1.85
Ye	Participant	0	2.89	3.52	4.19	2.64
	Non-participant	0	2.9	3.49	4.06	3

Considering there might be differences between two counties, summarization of the dependent variables and core independent variables are provided by counties. From Table 3.11, private lending in Ye county is more popular than in Wangcang County; and households in Wangcang County are more used to borrow from the formal sources, which is either from RCCs or from the village development fund. Specifying here again that classifying credit demand/borrowing behaviors into 4 categories[30] makes sense for further policy implications and project targeting, because we will know the reasons why certain group of household hasn't got used to the formal lending. Knowing from table 3.12, households from Wangcang

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[30] 0—haven't borrowed within the year 2007 and 2008, 1—borrow from the RCCs or Village development fund only, 2—borrow from the private lenders only, 3—borrow from both 1 & 2.

County borrow more from the development fund. Base on table 3.13, the householder's education level, household wealth, probability of having craftsman and the amount of money that can be borrowed from the private lenders are relatively higher for the Ye county; while the cognitive level of the formal financial market, probability of having migrant worker and times participated in the earlier stage promotion activities are lower for the Ye county; while the other core independent variables are similar for the two counties. The summarization among counties reveals differences exist, so the regressions of the subset data for each county are necessary to explore the different roles of the independent variables on respected counties.

Table 3.11 Borrowing behaviors of the households in the two counties

Category of borrowing behaviors	Ye County		Wangcang County	
	Frequency	Percent	Frequency	Percent
1. Non borrower	30	15.79	25	12.38
2. Borrow from RCCs/village development fund	33	17.37	52	25.74
3. Borrow from private lenders	68	35.79	51	25.25
4. Borrow from formal and informal sources	59	31.05	74	36.63
Total	190	100	202	100

Table 3.12 Average borrowing amounts from the fund for the two counties

Dependent Variable	Ye county					Wangcang County				
	Obs.	Mean	Std.Dev.	Min	Max	Obs.	Mean	Std.Dev.	Min	Max
Boramo	154	1.77	1.65	0	3.7	156	2.42	1.52	0	3.95

Table 3.13 Means, SD, Min and Max of the core independent variables for the two counties

Independent Variable	Ye county					Wangcang County				
	Obs.	Mean	Std.Dev.	Min	Max	Obs.	Mean	Std.Dev.	Min	Max
Age	190	49.97	11.28	11	78	204	48.49	11.13	21	84
Pmale (%)	190	48.1	18.7	0	1	204	50	18.88	0	1
Edu	190	2.91	0.89	1	5	204	2.63	0.88	1	5
Hhsize	190	3.36	1.41	1	7	204	3.32	1.21	1	6
Wealth	190	4.55	0.38	3.06	5.18	204	4.32	0.53	3.08	5.62
Cra (%)	190	14.74	35.54	0	1	204	9.8	29.8	0	1
Mig (%)	190	16.84	37.52	0	1	204	23.04	42.21	0	1
Cad (%)	190	12.1	32.7	0	1	204	11.76	32.3	0	1
Avail	190	2.71	1.57	0	4.7	204	2.2	1.62	0	4.6
Cogn (%)	190	58.95	49.32	0	1	204	68.63	46.51	0	1
Activi	190	2.74	1.79	0	9	204	3.5	2.86	0	9

Chapter 4 Results and discussion

4.1 Results

4.1.1 Participating in the village development fund

Probit model is taken to explore the determinant factors influencing the participation decision in the village development fund. Dependent variable: "*Participation decision in the village development fund*", 0—not participate, 1—participate; independent variable: "*householder' age*", "*proportion of the male family members in the household*", "*householder' education level*", "*household size*", "*household wealth*", "*whether has craftsman*", "*whether has migrant worker in the household*", "*whether has cadre*", "*amount of money that can be borrowed from the private lenders*", "*times participated in the earlier stage promotion and motivation activities*", "*cognitive level of formal financial market*" and "*county dummy*".

Table A.1 shows the results of the factors influence the probability of fund participation. There are two models applied here. The only difference is that Model two drops the variable" *Times participated in the earlier stage promotion and motivation activities*". In Model one, the core variables "*whether has migrant worker in the household*" and "*whether has cadre in the household*" haven't revealed significant relationship with the dependent variable, and the direction for the variable "*cognitive level of formal financial market*" reflect reverse relationships which is unanticipated, also the variable "*householder' education level*" has different relationship with the dependent variable compared with the expected results. So with the insignificant relationship of certain core variable and the unanticipated relationship for certain variables, multicollinearity problem is suspected to exist in model one. The correlation between "*whether participate in the village development fund*" and "*Times participated in the earlier stage promotion and motivation activities*" is 0.6030, which indicates that the two variables are highly correlated. So in order to support and confirm the speculation, one additional regression of the "*Times participated in the earlier stage promotion and motivation activities*" is carried out in table A.2, with all the socioeconomic characteristics of households as the independent variable. The results show "*education level at primary school*", "*whether has craftsman in the household*", "*whether has migrant worker in the household*", "*whether*

has cadre in the household", "*cognitive level for the formal financial market*" and "*county dummy*" are the determinant variables that significant affect "*times households participate in the promotion and mobilization activities*". The results illustrate that part of the core independent variables are the determinant variables influencing another independent variable in model one. So dropping the variable "*times participated in the earlier stage promotion and motivation activities*" makes sense for estimating and exploring the relationships between dependent variable and the other core independent variables[31], thus model two is estimated and results in model two are in accordance with the initial hypothesis.

The estimation in model two presents several determinant variables for development fund participation in the research. "*Householder' age*", "*household wealth*", "*whether has migrant worker*", "*whether has cadre*" and "*cognitive level of the formal financial market*" all significantly affect the probability of participating in the village development fund. The other variables such as "*householder' education level*" and "*amount of money can be borrowed from private lenders*" are all insignificant but have the same direction of effect as anticipated. Also in order to increase the explanatory degree for the variance, the variables "*proportion of male*" and "*household size*" are also added into the estimation.

As expected, "*householder' age*" has inverse U-shape relationship with village development fund participation, which accords with the "Permanent income hypothesis" (Friedman, 1957). For participants in the fund, younger householders are more prone to invest and raise their income; the middle age group normally has more assets and social network, then the probability of participating in the development fund will higher for them than any other groups; while the older households normally will live on the savings from their earlier life stage, thus have less motivation and ability to invest, so finally "*householder' age*" reflects the inverse U-shape relationships.

Similar with the expectation, even though "*householder' education level*" does not significantly affect the probability of fund participation, it also reveals the inverse U-shape

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[31] The VIF test is also applied for Model one. The VIF value for the variable "times participated in the earlier stage promotion and mobilization activities" is 3.13, which is lower than 5. So we can't conclude that the variable "times participated in the earlier stage promotion and motivation activities" causes the multicollinearity problem, but dropping the variable help to ease the problem of multicollinearity.

relationships with the dependent variable. Compared with the education level illiteracy and half illiteracy, education level at the primary school/ junior high school/ senior high school all have higher probability of participating in the fund; while for the education level at technical school/college/university, the probability of participation declined compared with the lowest education level. Thus the whole relationship for education is roughly inverse U-shape with the probability of fund participation. The lowest education level and highest education level have lower probability of participating in the fund, especially for householders have the highest education level. The highest education level householders normally have enough liquidity and social networks, so there is no need for them to borrow from the village development fund. For the lowest education level households, they might have lower investment ability and conduct more precautionary behavior in participating in the village development fund.

As for "*household wealth*", the wealthier households are more prone to participate in the fund. One unit increase in the household wealth will lead to 9.96% increment in the probability of fund participation when taking the average value of all the other variables. The reason might be that the wealthier households have higher repayment ability and more likely to have the proper investment projects at hand.

"*Having migrant worker in the household*" significantly decreases the probability of participating in the village development fund at 1% level. The probability of participating in the village development fund for the household hasn't migrant worker is 23.62% higher than those household with at least one migrant worker. The results of the econometric analysis supported the ideal in the hypothesis that migrant worker will bring the salaries back home so the household is less likely to be liquidity constraint; or the migrant workers might not have participated in the promotion and mobilization activities since they are far away from home, so they will not know well about the village development fund and then choose not to participate[32].

Also identical with the expectation, "*having cadre in the household*" will increase the probability of participating in the village development fund. The probability of participating

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[32] Just as stated before, households will conduct self-constrained behavior in the credit market. So if the migrant worker don't know well about the village development fund, they are more likely to choose not to participate in the fund.

for the household with cadre is 13.22% higher than the household without cadre. Cadres are those who are more likely to support the projects promoted by the government and know well about the financial projects. So the higher probability of participation is expected.

"*Cognitive level of the formal financial market*" has significant positive relationship with the participation decision of the village development fund at 10% level. The household has higher cognitive level is 8.05% more likely to participate in the fund compared with the household has a lower cognitive level. The notion of financing and the acceptance level of the new arrival financial project will be higher for the households with higher cognitive level of formal financial market. Since two thirds of the money borrowed from the private lenders are used for smoothing consumption, the low cognitive level household haven't get used to formal financial market and has lower notion of carrying out income generating activities, thus they will have lower probability to participate in the village development fund.

"*The amount of money that can be borrowed* from the private *lenders*" presents the expected negative relationship with the probability of fund participation but insignificant. The results further support the real credit situation in the research areas that the "*private lenders*" are the major lending sources households can resort to before introducing the village development fund. Even though the development fund has much lower transaction cost, convenient application procedure and lower interest rate than the RCCs, when comparing with "*private lenders*", the "*private lenders*" still has its advantages. Thus "*the amount of money that can be borrowed* from the private *lenders*" decreases the probability of fund participation. From one side, "*private lenders*" has zero interest rate; from the other side, villagers experience long-term formal credit rationing and "*private lenders*" has been the dominating lending sources for a long time in the research areas. It will take time for the villagers to adapt to the new arrival financial project and adjust their borrowing preferences and behaviors. But the insignificant relationship also reveals the success of the village development fund to a certain extent.

While the other variables such as "*proportion of male in the household*", "*household size*", "*whether has craftsman in the household*" don't affect the probability of fund participation significantly. According to the results of model two, the direction of these variable are

identical with the preliminary statistical analysis. Having craftsman in the household and a larger household size will increase the probability of participating in the fund, and higher proportion of male family member will decrease the probability of fund participation.

"*Times participating in the earlier stage promotion and motivation activities*" significantly promote the villagers to participate in the fund according to the estimation results of Model one, which supports the hypothesis in Chapter 1. Also pseudo R-squared value for model two is 0.1170, while the value for model one is 0.6406, which indicates that the variable "*times participating in the earlier stage promotion and motivation activities*" closely related to the participation decision of the households.

Also, there is no significant county difference for fund participation. But it is mainly due to the methods of sampling. Because we haven't employed the random sample method among all the villagers in each county, we just apply the random sample methods within participate and non-participate group in the respective counties. So among the two counties, the ratio of participants and non-participants are similar, the problem could be improved in furture research. However, the previous statistical analysis indicates county difference exists, so it is meaningful to estimate the regressors in a subset based on each county. Table A.3 provides the Probit estimation on the probability of fund participation by counties, which represents different roles of the core independent variables in each county. For the two counties respectively, "*householder' age*" and "*whether has migrant worker*" play the same role as in the overall database. Also, "*householder' education level*" still has the inverse U-shape with the dependent variable, while the significant relationship only appears for the Wangcang County at the highest education level. The inflex point for the Wangcang County is lower than the case in the overall data base, the householder with education level at and higher than the senior high school level has lower probability of participation in the development fund. "*Household wealth*" and "*amount of money that can be borrowed from the private lenders*" only significant for the Ye county, which means wealthier households and households can borrow smaller amount of money from "*private lenders*" have higher probability of fund participation in the Ye county. "*Cognitive level of the formal financial market*" is only significant for the Wangcang County, households with higher cognitive level are more likely

to participate in the development fund. The variable "whether has cadre" isn't significant for any of the two counties but significant for the entire dataset. In short, part of the core variables play different roles when splitting the dataset and perform separate model on the subset of observations for the respective counties.

In summary, "*household age*", "*household wealth*", "*whether has migrant worker*", "*whether has cadre*", "*times participated in the earlier stage promotion and motivation activities*" and "*cognitive level for the formal financial market*" significantly affect the probability of village development fund participation. The "*highest education level*" and "*whether has craftsman*" are also important for fund participation. The other variables such as "*proportion of male in the household*" and "*household size*" have no influential effect on the probability of village development fund participation. Also, part of the core variables play different roles on the probability of fund participation in respective counties.

4.1.2 Amount borrowed from the village development fund

Tobit model is used to explore the influencing factors affect the amount borrowed from the village development fund among the participating villagers. Dependent variable: Borrowing amount from the village development fund within the year 2007 and 2008 (take the logarithm); independent variable: same as in the previous Probit model; sample of the estimation: the households participate in the village development fund.

Table A.4 displays the results for the two models. The difference for the two models is the same as in the previous Probit analysis. However, the results of the two models turns out to be similar, which indicates the variable "*times participated in the earlier stage promotion and motivation activities*" does not have significant relationship with the loan size from the village development fund. The results in the table A.4 reveal some meaningful findings regarding loan size from the development fund.

First, households with craftsman significantly borrow more than households without craftsman among the participating group, which supports the function of the financial projects in the research areas. Households with craftsman choose to borrow in order to invest in their working devices and expand their income generating activities.

Second, households with cadre significantly borrow more than households without cadre. The result is not so intuitive at the first brush, because even though the cadres will set an example to participate in the fund for the other villagers, regulations of the development fund encourage the poorer households to have the priority to borrow. Normally households have cadre would have better living standard, higher income level and less capital constraints. The reason for the result might be that cadres normally have higher investment ability and larger investment scale than the other villagers, so the loan size of the cadres are significantly larger than the other villagers. Also, it is possible that households in the poverty stricken areas are generally poor and households in the sample are all in credit demand. So the cadres who have better investment skills and knowledge about the fund borrow more from the fund.

Third, "*cognitive level of the formal financial market*" has significant positive relationship with the loan size at 1% level. Among the 310 participants, there are still 114 participants haven't borrowed from the fund. Some of them might really don't need to borrow right now, but we can't exclude the possibility of precautionary behaviors of the households. That's why the households with higher cognitive level of the formal financial market borrow more. The households with high cognitive level normally have better notion of financing and higher acceptance of formal credit market.

Fourth, there are county differences for the loan size from the development fund. From the table we can see Wangcang County borrows more than Ye County. The result confirms with the reality that economic condition of the Ye County is better than Wangcang County[33]: On one side, households in Wangcang county are more likely to confront capital constraints; on the other side, the capital mobility among the villagers inside the Ye county will be more active than in Wangcang county, so the community mutual help effect will be more effective in Ye county and households will less dependent on the village development fund. The significant negative relationship between the "amount of money can be borrowed from the private lenders" and the probability of fund participation for the Ye county in previous Probit estimation supports the argument. Also we can see from another perspective, since the

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[33] The average wealth of the household in the respective counties in table 3.13 also supports that households in Ye County are wealthier than households in Wangcang County.

research areas are all very poor, every household would seize the opportunity and implement the income generating activities, it is possible that households in the Ye county have not got enough proper income generating activities at hand.

Fifth, the education level as a whole shows the inverse U-shape, but the inflex point is lower than that of in the previous Probit model. Only the householder with the highest education level is significant compared with the base group. A householder who has the education level of the primary school will borrow more than the householder in the illiteracy/half literacy group, while the householder has the education level at the junior high school and above borrows less than the illiteracy/half literacy householder. The reason for householders with the highest education level borrow significantly less should be similar as in the previous Probit analysis: the highest educated group is less likely capital constraint; or the amount that can be borrowed from the village development fund is relatively too small for them.

"*Householder' age*" also shows inverse U-shape relationship with the loan amount but insignificant. "*Household has migrant workers*" generally borrows less but not significant. Also bigger "*household size*" decreases the borrowing amount with insignificant relationships.

Finally, "*proportion of male in the household*", "*household wealth*", "*amount of money can borrow from the private lenders*" and "*times participated in the earlier promotion and motivation activities*" have no significant influence on the loan size from the village development fund.

In summary, "*whether has craftsman*", "*whether has cadre*", "*highest education level*", "*cognitive level of the formal financial market*" and "*county dummy*" are significantly affecting the loan size from the village development fund; "*householder' age*", "*household size*" and "*whether has migrant worker*" also play important roles. "*Proportion of male in the household*", "*household wealth*", "*amount of money can be borrowed from the private lenders*" and "*times participated in the earlier promotion and mobilization activities*" don't matter for the loan size borrowed from the fund.

4.1.3 Borrowing behaviors from the main lending sources

Multinomial Probit model is used to find the determinant factors affect the borrowing behaviors from the main lending sources within the year 2007 and 2008. Dependent variable: categorical variable for different household is generated according to the real borrowing behaviors happened within the year 2007 and 2008.

Independent variables: same as in the previous two models except that the variable "*times participated in the earlier stage promotion and motivation activities*" is dropped, because the variable will not influence the borrowing behavior from the private lenders or RCCs. Also according to the Probit model for village development fund participation, adding this variable will sharpen the problem of multicollinearity, so the variable "*times participated in the earlier stage promotion and motivation activities*" is dropped here.

Among all the 392 observations, 14.03% haven't borrowed within the year 2007 and 2008, 21.68% have loans only from the RCCs or the village development fund, 30.36% borrow from the private lenders only, and the left 33.93% borrow both from the formal sources and informal sources. Here borrowing from "*RCCs*" and "*village development fund*" are all treated as borrowing from formal lending sources, and the "*private lenders*" is considered as the informal lending sources. In order to reveal the different effect of the factors on borrowing from segmented lending sources, the multinomial Probit model is employed. The table A.5 presents the results and the non-borrowers within the two years are taken as the base group.

"*Householder' age*" has significantly affected households borrowing from "*formal sources only*" and "*both lending sources*", and has no effect on borrowing from "*informal lending sources*". The significant relationship shows the inverse U-shape relationships, which indicates that younger and older households are less likely to borrow from the "*formal sources only / both lending sources*" compared with middle aged households. The result is in accordance with the previous Probit model, which indicates that middle aged households have higher ability of paying back and households borrow from "*formal sources only / both lending sources*" base on their own production and repayment capacity. Also, the non-significant relationship with borrowing from "*informal lending sources*" reveals that "*informal lending sources*", which is featured by the flexible term of payback, is seldom constrained by the

repayment ability of households and serves for the urgent and rigid consumption demand in the research areas[34].

"*Householder' education level*" also shows the inverse U-shape relationship with the "*formal lending sources only*" and "*both lending sources*". Household with highest education level significantly decreases the probability of borrowing from the "*formal lending sources only*" compared with the lowest education level group, which is deviate from our common sense. Because the education level is normally treated as the proxy of the expected income level of the households, the higher the education level, the higher the future income thus higher repayment ability. So householders with the highest education level are more accessed to the formal lending sources--RCCs. The reason for the result is that "*borrowing from RCCs*" just takes 17.92% of all the formal lending records in the research areas, and the left are for "*borrowing from the village development fund*". And education level will not provide any advantages for accessing the village development fund. Normally householders with highest education level are less confronted with financial constraints and the borrowing quota from the village development fund is very small to them. So they will choose not to borrow from the fund. If we separate the RCCs and village development fund, the results might turn out to be different[35]. Since the objective of the thesis is to explore the determinant factors affect households choosing between "*private lenders*" and "*formal lending sources*", then households borrowing from RCCs and village development fund are taken as a whole and divided into the same category here.

"*Household size*" has positive significant relationship with borrowing from" *informal lending sources*" and "*both lending sources*" at 1% level, and has no significant relationship with borrowing from "*formal sources only*". The possible reasons should relate to different ways of uses of different lending sources. Because village development fund can only be used for income generating activities, loans from "*private lenders*" and "*RCCs*" can be either used for

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[34] "Private lenders" in the poverty stricken areas always plays the role of financial relief and social salvation.

[35] In order to confirm the argument, the households are divided into five groups: non-borrowers, borrower from RCCs (due to the limited observations, the household borrowed both from RCCs and development fund also belongs to this category), borrow from the village development fund only, borrow from the private lenders only, borrow both from the formal and informal lending sources. Additional multinomial estimation is supposed to be implemented, but due to the limited observations for those borrow from the RCCs (19 households), the multinomial Probit model comes up with the convergency problem, so the idea of additional test can't be realized here.

investment or consumption purpose. Among all the records of the informal lending, one third of them is used for income generating activities, two thirds of them is used for smoothing consumption. Even though larger household size will have more income sources with more labor, the consumption requirement for the larger size household must be relatively larger. Under the situation that households are general poor in the research areas, "consumption requirements" prevails over the "diverse income sources" for the larger size household. The larger size households need to resort to the private lenders for consumption demand.

"*Household wealth*" has negative influence on the probability of borrowing from "*private lenders*" significantly, which illustrates the poor households have higher probability of borrowing from the informal lenders for consumption demand. "*Household wealth*" has no significant relationship with borrowing from "*formal sources only*"/"*both lending sources*".

"*Having craftsman in the household*" positively affects the probability of borrowing from "*formal sources only*" and has no effect on borrowing from "*informal lending sources*" and "*both lending sources*". This reflects that craftsman takes advantage of the "*formal lending sources*" and invests in their working devices. Also, the non-significant relationship with "*informal lending sources*" indicates that the probability of borrowing from "*private lenders*" for the households with and without craftsman are not significant different, and having craftsman inside the household doesn't necessarily ease the financial constraint of the household. So further invest in their working devices, enlarge their working scale and raise their working skills are the possible ways for raising income levels for such households. The village development fund makes sense for households with craftsman in the research areas.

"*Having migrant worker in the household*" negatively affects the probability of borrowing from "*formal lending sources*" and "*both lending sources*" significantly and has no effect on the probability of borrowing from "*private lenders*". According to the direction of the coefficient, conclusion can be made that "*having migrant worker in the household*" can decrease the probability of borrowing behaviors in any lending sources. As in the previous Probit estimation, household with migrant workers are less likely to participate in the village development fund, the reason could be has no time to participate in the earlier stage promotion and mobilization activities or less liquidity constrained because of the job salaries

the migrant worker earned. Combined with the results in the multinomial analysis here, conclusion can be made that the first reason might be the main reason. Because households with migrant worker aren't significant less likely to borrow from the "*private lenders*", and the significant negative relationship with borrowing from "*formal source only*" and "*both lending sources*" could be that the migrant workers don't know well about the village development fund and they choose not to borrow from the village development fund.

"*Having cadre in the household*" positively affected the probability of borrowing from the "*formal lending source only*" and "*both lending sources*" significantly and has no effect on borrowing from "*private lenders*". From one side, "*having cadre in the household*" hasn't helped the household lower the probability of borrowing from "*private lenders*", which means households with cadre are not generally well off than the other households; from the other side, the significant relationships with borrowing from "*formal lending sources only*" and "*both lending sources*" reveal that households with cadre have higher investment ability and larger investment scale. Also the cadres have more social relationships and higher social status, then the probability of accessing "*RCCs*" are higher for them.

"*The amount of money can be borrowed from the private lenders*" plays an interesting role. Because of the substitution effect of the money that can be available from the "*private lenders*", this variable always plays negative effect for the probability of village development fund participation and amount borrowed from the development fund. As shown in table A.5, "*the amount of money can be borrowed from the private lenders*" has negative relationship with all the lending sources especially with the "*private lenders*" and "*both lending sources*". It sounds interesting that households can borrow more from the private lenders actually have lower probability of borrowing from private lenders. Normally household with better social relationships are able to borrow more from "*private lenders*". While the households with better social relationships are generally well off than those with worse social relationships, so they will have lower probability of borrowing from "*private lenders*". Also, the result displays the substitution effect of the "potential private lenders" according to the direction of the coefficient for "*formal lending sources*" and "*both lending sources*", and the coefficient for the "*both lending source*" is significant. "*Private lenders*" is the principal lending sources

before introducing village development fund and it has the absolute advantages of zero interest rate and no contract risk, so the households with competent "potential private lenders" will have lower probability to borrow from "*the formal lending sources*".

"*Cognitive level for the formal financial market*" significantly influences the probability of borrowing from all the lending sources. For the "*formal sources only*" and "*both lending sources*", the coefficient is significant at 1% level, because they know more about the formal financial market, thus will have higher probability of borrowing when suffering from financial constraint. For the "*informal sources only*", the coefficient is significant at 5% level, the explanation could be households with higher cognitive level of the formal financial market normally have higher notion of financing and borrowing, which explains why the "*cognitive level for the formal financial markets*" matters for borrowing from "*private lenders*".

In summary, "*cognitive level of the formal financial market*" have important role on all the lending sources, while "*householder' age*", "*householder' education level*", "*household size*", "*household wealth*", "*whether has craftsman*", "*whether has migrant worker*", "*whether has cadre*" and "*amount of money can be borrowed from private lender*" have different roles on different lending sources. In contrast, "*proportion of male*" has no effect. Also, the county difference exists, households in Ye County borrows more from the "*private lenders*".

4.2. Synthesis of the results

Through the general statistical analysis of the microcredit situation of the households within the year 2007 and 2008 in the research areas and the exploration of the determinant factors affect the village fund participation, fund amount borrowed and borrowing behaviors from different lending sources, the summarization of the results are as follows.

First, households with the following features normally have higher probability of self-constraint and precautionary behaviors regarding participating in the development fund: younger or older householder, low household wealth level, household with migrant worker, household without cadre, less times participated in the earlier stage promotion activities and low cognitive level of the formal financial markets. Some of the features can be summarized into the same reason, for the household with migrant worker and times participated in the

mobilization activities, we can take it as a whole, because the reason for the household with migrant worker choose not to participate in the village development fund is that they are not at home during the mobilization time and they don't know well about the development fund.

Second, among all the households who have participated in the village development fund, householders with highest education level borrow least from the village development fund. In contrast, household has craftsman, household has cadre and household has high cognitive level of the formal financial market borrow more from the village development fund. Also households in Wangcang County generally borrow more than households in Ye County.

Third, when we look at borrowing behaviors within specific credit lending sources, cognitive level of the formal financial market positively affected borrowing behaviors from all the lending sources. In contrast, proportion of male in the household has no effect on households' borrowing behaviors from all the lending sources. The remaining core variables play different roles across different lending sources. The younger and older householders have lower probability of borrowing from the formal lending sources only/both lending sources and there is no significant difference among the age group for borrowing from the private lenders. Householders with highest education level have significantly lower probability of borrowing from the formal lending sources only, which is due to that RCCs takes a smaller proportion in the formal lending sources. Larger household size increases the probability of borrowing from private lenders and the both lending sources. Wealthier household has lower probability of borrowing from the private lenders only. Households with craftsman have higher probability of borrowing from the formal lending sources only in order to carry out income generating activities. Household has migrant worker has lower probability of borrowing from the formal lending sources only and the both lending sources due to the worse knowledge of village development fund because they are far away from hometown and have no time to participate in the earlier stage promotion and mobilization activities. Household has cadre has higher probability of borrowing from the formal lending sources only and the both lending sources. Household can get more amount of money from the private lenders have lower probability of borrowing from private lenders and both lending sources. Also county differences exist. Households in Ye County have higher probability to borrow from the private lenders.

Chapter 5 Conclusion and recommendations

In the research areas of Wangcang County and Ye County, more than 80 percent of households in the development fund supported villages have participated in the fund. A growing number of households continue to choose to participate in the village development fund as time passes. Even though the fund has helped a majority of households in this research area, the precautionary behaviors of certain households have lessened the possible effect of the fund. The goal of the project TCC5 is to relieve the formal credit rationing condition in the research areas and raise the income of the households through helping those households solve the problem of capital constraints and start with proper income generating projects. In the short term, the project helps the households in a most efficient way as it covers the majority of the poverty stricken households and helps them out of the condition of credit rationing. In the long run, through the self-management of the financial project in the village, the cognitive level of financial participation and recognition of financial markets are raised for the rural villagers, thus they will be more willing to pay attention to and participate in the formal financial market. However, not all the households can be covered with the fund based on the self-constrained behaviors of the households. Knowing this, we can conclude with the following: on the one hand, the positive effect of the fund for easing capital constraints in the research areas could be recognized; on the other hand, exploring the possible ways to target more households that are in credit demand are the main concern of the thesis here. According to the results from the previous chapters, the comprehensive results and suggestions can be made as follows.

First, the cognitive level of the formal financial markets has a significant effect on credit demand and borrowing behaviors of the rural households. The formal credit rationing in the rural areas lowers the cognitive level of households because only a relatively small proportion of households can be covered with the services from the formal financial sectors. Possible ways to increase the access of financial market for the rural villagers could include lowering the entry barriers of the formal financial market in the poverty stricken areas, designing suitable financial products for the local households and completing the insurance market from

the "lender side" to reduce covariate risk. Also, the cognitive level could be related to the education level. Householders with a lower education level have less chance and more difficulties in understanding policies and regulations of the formal financial sectors. The correlation of the cognitive level and the education level of the householders is 0.1093, which illustrates a positive relationship. In the research areas, less than 16% of the householders have an education level at the senior high school and above, thus raising the education level of the households makes sense for credit participation and rural financial deepening. The relationship between the education, cognitive level and credit market participation has been explored by many different research perspectives. Abiad et al (1988) considers that education can be functioned as a facilitator to enter into the credit market and reduce transaction cost. Campbell (2006) finds that the part of households that appears poorer and less well educated will make significant mistakes in the financial investment. The nonparticipating households may be aware of their limited investment skills and withdraw from risky markets because they know their own limitations and try to avoid financial strategies that require them to make decisions they are not qualified to (Campbell, 2006). Agarwal & Mazumder (2011) propose that the mathematical component of the test is what matters most for financial decision making and financial wealth, which states that the particular forms of cognitive ability matter for specific types of suboptimal behavior. Based on the results of the study and the support from the existing studies, raising education quality and guaranteeing the implementation of nine-year compulsory education in the rural areas are crucial for the sustainable development of the rural areas.

Second, with the significant effect of initial promotion and mobilization activities for implementing the village development fund, publicizing the knowledge of financial products and policies of the formal financial sectors to the local villagers is important. Thus, financial acknowledgement and participation abilities in the credit market will be cultivated gradually in the rural areas. If we take into account the occupation structure of the households, the areas with a high proportion of migrant workers should be provided with mobilization activities at appropriate times. The times could be when they are generally at home in order to raise the

coverage of mobilization activities and make sure the majority of households are acknowledged with new financial projects.

Third, regarding the relationship between household wealth and credit market participation, wealthier households are more prone to participate in the financial projects and borrow more from the fund for production purposes; however, the wealthier households are less likely to borrow from the private lenders. Also, the inverse U-shape relationships between householders' age and project participation/borrowing behavior from the formal lending sources support the ideal that wealthier household are more likely to participate in the credit markets because the middle aged group have relatively more income sources and household assets. The poorer households normally have lower repayment ability and are more risk averse, so they are more likely to conduct precautionary behavior and be self-constrained even with open credit market access. Also, we can't conclude that the project is a failure under the condition that the poorest households do not benefit from the financial project. This is because the villagers in the research areas as a whole are poor, so the most efficient way to alleviate poverty is to help those around the poverty line. What we can do in future is to design and complete the interrelated insurance market and lower the production and contractual risk for the poorest households to participate in the financial market. Policies that facilitate rural household capacity to manage risk are important as they increase households' willingness to participate in the formal sector (Boucher & Guirkinger, 2007) and improvement in risk management mechanisms at the household level which would have a positive spill-over effect in relation to the performance of credit markets (Guirkinger, 2008). Thus, completing the rural insurance market and increasing the access to insurance will decrease the contractual risk for the households and encourage their credit participation.

Fourth, households with a larger size are more likely to borrow from the private lenders and both lending sources, which is due to the desire for consumption smoothing. The larger the household size, the higher the probability of exposing to the problems of education and medical expenses. The demands for these kinds of expenditures are usually large, urgent and rigid for the households- If they can't afford these expenditures by themselves, they have to borrow from others (Li & Zhu, 2010). Strengthening the rural medical insurance system and

education loan mechanism will help to ease credit constraints of the households and lower the probability of driving them into poverty by medical crises and education fees.

Fifth, households with craftsmen are found more likely to borrow from the formal lending sources only, and they borrow a larger amount from the village development fund. This result shed light on the possible solution for the income generating problems in poverty stricken areas. Technical training in certain areas can be organized and then households will be endowed with special skills to make a living besides agriculture production. Thus, the diversified income will lower the risk of agricultural income and increase total household income.

Finally, the credit demand differences among counties present the complementary relationship between the private lenders and village development fund. Since the two represented counties are all the poverty-stricken counties and households are generally suffering from liquidity constraints, we have a certain reason to suspect that households in the Ye County may not have gotten proper income generating activities and thus borrow less from the village development fund. Building effective and local connections with markets is essential for motivating households to carry out income generating activities. Just as Tang et al (2010) concludes, a good market connection serves as credit outreach in a two-fold manner: first, households have better access to credit-relevant information; second, through better market access, they may find new investment opportunities.

The conclusions above state the discussion regarding the projects and policy implications relating the financial projects. Also, exploring the possible way of developing and moving on with such projects makes sense. Moll (2005) points out a possible way of developing microfinance institutions which is based on the idea of –"pushing the financial frontier." It shows the importance of the permanent financial relationships for rural households. Instead of "credit for target group" and subsidized interest rates from the government, strengthening financial sustainability and realizing financial liberalization, in order to carry out financial stability and expansion for the microfinance institutions, is the long term perspective for microfinance and rural development (Moll, 2005). In accordance with the view of Moll (2005), project TCC5 helps the majority of households, although not the poorest ones, which

is the aim of the project as well as for the purpose of financial sustainability. In order to cover all the villagers, the village development fund also sets up emergency loans and separate funds for household in absolute poverty. The only difference for these loans is that the temporal guarantor is needed and the loan amount can't be more than 1000 CNY. For the village development fund, villagers can only borrow from the fund and can't deposit money into the fund, so expansion of the fund is not possible at this stage. The aim of the project is to build a stable and convenient microfinance institution first, and with the increment of the household income level, the access to the RCCs will be easier for the villagers. Also, the cognitive level of financing activities and financial market is cultivated through participating in the village development fund. In short, the village development fund is just the transition vehicle for the villagers to integrate into the formal financial market--RCCs. The village development fund is just one of the possible ways of easing rural credit rationing. Developing diversified financial institutions in different regions is essential based on the different socioeconomic conditions of different regions in China.

Bibliography

Abiad, V. G., Cuevas, C. E., & Graham, D. H. (1988). *Borrower transaction costs and credit rationing in rural financial markets: the Philippine case.* Philippine Institute for Development Studies.

Agarwal, S., & Mazumder, B. (2011). *Cognitive abilities and household financial decision making.* Chicago: Federal Reserve Bank of Chicago.

Akram, W., Hussain, Z., Sial, M., & Hussain, I. (2008). Agricultural credit constraints and borrowing behavior of farmers in rural Punjab. *European Journal of Scientific Research, 23*(2), 294-304.

Amemiya, T. (1984). Tobit models: a survey. *Journal of Econometrics, 24*(1-2), 3-61.

Binswanger, H. P. (1981). Attitudes toward risk: theoretical implications of an experiment in rural India. *The Economic Journal, 91*(364), 867-890.

Boucher, S. R., Carter, M. R., & Guirkinger, C. (2008). Risk rationing and wealth effects in credit market: theory and implications for agricultural development. *American Journal of Agricultural Economics, 90*(2), 1-15.

Boucher, S., & Carter, M. R. (2001). *Risk rationing and activity choice in moral hazard constrained credit markets.* Madison: Department of Agricultural & Applied Economics, University of Wisconsin-Madison.

Boucher, S., & Guirkinger, C. (2007). Risk, wealth and sectoral choice in rural credit markets. *American Journal of Agricultural Economics, 89*(4), 991-1004.

Boucher, S., Guirkinger, C., & Trivelli, C. (2006). Direct elicitation of credit constraints: conceptual and practical issues with an empirical application to peruvian agriculture. *Economic Development and Culture Change, 57*(4), 609-640.

Campbell, J. Y. (2006). *Houshoeld finance.* Cambridge: National Bureau of Economic Research.

Doan, T., Gibson, J., & Holmes, M. (2010). *What determines credit participation and credit constraints of the poor in peri-urban areas, Vietnam?* University of Waikato, Economics Department. Munich: Munich Personal RePEc Archive.

Dong, X. f., Lu, J., & Featherstone, A. M. (2010). *Effects of credit constraints on productivity and rural household income in China.* Iowa State University. Ames: Center for Agricultural and Rural Development.

Dufhues, T., & Buchenrieder, G. (2005). *Outreach of credit institutes and households' access constraints to formal credit in Northern Vietnam.* Stuttgart: Institute of Agricultural Economics and Social Sciences in the Tropics and Subtropics, University of Hohenheim.

Friedman, M. (1957). *A theory of the consumption function.* Princeton: Princeton University Press.

Guirkinger, C. (2008). Understanding the coexistence of formal and informal credit markets in Piura, Peru. *World Development, 36*(8), 1436-1452.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica, 47*(1), 153-161.

Iqbal, F. (1986). *The demand and supply of funds among agricultural households in India.* (I. Singh, L. Squire, & J. Strauss, Eds.) Baltimore: Johns Hopkins University Press.

Ke, C. C., & Chivakul, M. (2008). *What drives household borrowing and credit constraints? Evidence from Bosnia and Herzegovina.* Washington, D.C: International Monetary Fund.

Khantachavana, S. V., Turvey, C. G., & Kong, R. (2011). *Risk rationing in China rural credit markets.* Pittsburgh: Agricultural & Applied Economics Association.

Li, R., & Zhu, X. (2010). Econometric analysis of credit constraints of chinese rural households and welfare loss. *Applied Economics, 42*(13), 1615-1625.

Liu, H., & Ji, L. (2010). Empirical study on the influencing factors of rural households' credit and loan demand. *Asian Agricultural Research, 2*(12), 70-74.

Moll, H. J. (2005). Microfinance and rural development: a long term perspective. *Journal of Microfinance, 7*(12), 13-31.

Nguyen, C. H. (2007). *Access to credit and borrowing behaviour of rural households in a transition economy.* Heriot-Watt University, Centre for Economic Reform and Transformation. Rome: International Fund for Agricultural Development.

Nguyen, C. H. (2007). *Determinants of credit participation and tts impact on household consumption: evidence from rural Vietnam.* Heriot-Watt University. Edinburgh: Center for Economic Reform and Transformation.

Pagura, M. E., Graham, D. H., & Meyer, R. L. (2001). *Determination of borrower dropout in microfinance: an empirical investigation in Mali.* The Ohio State University, Department of Agricultural, Environmental and Development Economics. Chicago: AAEA & CAES.

Poirier, D. J. (1979). Partial observability in bivariate probit models. *Journal of Econometrics, 12*, 209-217.

Richter, S. M. (2008). *The insurance role of remittances on household credit demand.* University of California, Davis. Orlando: American Agricultural Economics Association.

Tagle, J. R., & Vella, F. (2010). *Borrowing constraints and credit demand.* Santiago: Central Bank of Chile.

Tang, S., Guan, F. Z., & Jin, q. S. (2010). *Formal and informal credit markets and rural credit demand in China.* Denver: Agricultural & Applied Economics Association.

Tsai, K. S. (2004). Imperfect substitutes：the local political economy of informal finance and microfinance in rural China and India. *World Development, 32*(9), 1487-1587.

Turvey, C. G., Kong, R., & Huo, X. X. (2010). Borrowing amongst friends: the economics of informal credit in rural China. *China Agricultural Economic Review, 2*(2), 133 - 147.

Williamson, S. D. (2010). *Macroeconomics* (4th ed.). Canada: Pearson Education.

Yuan, Y., Hu, X. Y., & Gao, P. (2011). *Farmers' choice and informal credit markets in China.* Southwestern University of Finance and Economics, Research Institute of Economics and Management. Pittsburgh: Agricultural & Applied Economics Association.

Zhang, C. X., Xu, Z., Shen, G. M., & Cheng, J. E. (2010). *Rural finance in poverty-stricken areas in the People's Republic of China: balancing government and market.* (Y. Qian, & T. A. Manza, Eds.) Mandaluyong, Manila, Philippines: Asian Development Bank.

Appendix A: Estimation Results

Table A.1 Probit estimation results and marginal effects on the probability of rural development fund participation

Explanatory variables	Model One				Model Two			
	Estimated coefficients	z	P>|z|	Marginal effects	Estimated coefficients	z	P>|z|	Marginal effects
Age	0.23997**	2.44	0.015	0.00450	0.12504***	2.92	0.004	0.03330
Age square	-0.00260***	-2.65	0.008	-0.00004	-0.00124***	-2.87	0.004	-0.00033
Proportion of the male	0.28123	0.59	0.555	0.00528	-0.09757	-0.23	0.819	-0.02598
Education 2:primary school[0]	-0.43090	-1.07	0.285	-0.01068	0.31630	1.08	0.282	0.07858
Education 3:junior high school[0]	-0.30965	-0.79	0.431	-0.00595	0.21644	0.75	0.454	0.05756
Education 4:senior high school[0]	-0.56505	-1.25	0.212	-0.01854	0.25012	0.64	0.521	0.06089
Education 5:technical school/college/university[0]	-1.95929***	-2.83	0.005	-0.27449	-0.61498	-1.33	0.184	-0.20126
Household size	0.07335	0.87	0.386	0.00138	0.07135	1.07	0.287	0.01899
Household wealth (take the logarithm)	0.41819*	1.81	0.071	0.00785	0.37389**	2.15	0.031	0.09956
Whether has craftsman (yes=1)[0]	-0.56173	-1.08	0.281	-0.01837	0.33369	1.30	0.193	0.07871
Whether has migrant worker (yes=1)[0]	-0.31001	-1.23	0.219	-0.00742	-0.75253***	-4.14	0.000	-0.23618
Whether has cadre (yes=1)[0]	0.80024	1.62	0.106	0.00798	0.63149**	2.11	0.035	0.13222
Amount of money can be borrowed from private lenders (take the logarithm)	-0.20077**	-2.54	0.011	-0.00377	-0.01636	-0.32	0.747	-0.00436
Times participated in the earlier stage promotion and motivation activities	1.10069***	6.48	0.000	0.02066	/	/	/	/
Cognitive level for the formal financial market (Relative high level=1)[0]	-0.27144	-1.23	0.217	-0.00471	0.29184*	1.81	0.070	0.08047
Wangcang County[0]	-0.07082	-0.31	0.754	-0.00133	-0.08696	-0.54	0.589	-0.02312
Wald χ^2test	63.96***				52.06***			
Prob. > χ^2	0.0000				0.0000			

Predicted probability at x-bar	0.99329		0.81573
Pseudo R-squared	0.6406		0.1170
Observations	394		394

Notes: results are robust in the table, statistically significant at 10% (*), at 5% (**) and at 1% (***) level. Ye County is set as the base county for county dummies. (^{0}) marginal effect is for discrete change of dummy variable from 0 to 1.

Table A.2 OLS estimation on the factors influencing times participate in the earlier stage promotion and mobilization activities

Explanatory variables	Estimated coefficients	t	P>|t|
Age	0.08224	1.02	0.309
Age square	-0.00075	-0.94	0.348
Proportion of the male	-0.47115	-0.72	0.471
Education 2:primary school	0.97135*	1.86	0.064
Education 3:junior high school	0.70238	1.37	0.171
Education 4:senior high school	0.4842	0.83	0.410
Education 5:technical school/college/university	0.41342	0.52	0.602
Household size	-0.04442	-0.48	0.633
Household wealth(take the logarithm)	0.34593	1.19	0.236
Whether has craftsman(yes=1)	0.85175***	2.60	0.010
Whether has migrant worker (yes=1)	-1.08571***	-3.42	0.001
Whether has cadre(yes=1)	1.28227***	3.12	0.002
Amount of money can be borrowed from private lenders	0.02009	0.26	0.792
Cognitive level for the financial market(Relative high level=1)	0.70217***	2.78	0.006
Wangcang County	0.87944***	3.59	0.000
F test	5.04***		
Prob> F	0.0000		
R-squared	0.1495		

Notes: results are robust in the table, statistically significant at 10% (*), at 5% (**) and at 1% (***) level.

Ye County is set as the base county.

Table A.3 Probit estimation results and marginal effects on the probability of rural development fund participation by counties

Explanatory variables	Wangcang				Ye			
	Estimated coefficients	z	P>|z|	Marginal effects	Estimated coefficients	z	P>|z|	Marginal effects
Age	0.14753**	2.22	0.026	0.04106	0.12303**	2.09	0.037	0.02838
Age square	-0.00148**	-2.23	0.026	-0.00041	-0.00121**	-2.05	0.040	-0.00028
Proportion of the male	-0.06697	-0.11	0.914	-0.01864	0.33058	0.55	0.580	0.07626
Education 2:primary school[0]	0.25584	0.67	0.505	0.06865	0.59420	1.13	0.259	0.11190
Education 3:junior high school[0]	0.48958	1.25	0.213	0.13206	0.02408	0.05	0.960	0.00556
Education 4:senior high school[0]	-0.06620	-0.13	0.900	-0.01882	0.85059	1.24	0.216	0.13706
Education 5:technical school/college/university[0]	-1.37092*	-1.66	0.097	-0.49921	-0.21956	-0.31	0.759	-0.05585
Household size	0.08492	0.8	0.426	0.02364	0.04405	0.47	0.635	0.01016
Household wealth(take the logarithm)	0.20109	0.95	0.344	0.05597	0.70020**	2.33	0.020	0.16152
Whether has craftsman(yes=1)[0]	0.54740	1.39	0.164	0.12359	0.22319	0.67	0.500	0.04729
Whether has migrant worker (yes=1)[0]	-0.91065***	-3.59	0.000	-0.29635	-0.50494*	-1.75	0.081	-0.13652
Whether has cadre(yes=1)[0]	0.52027	1.40	0.160	0.12004	0.69439	1.49	0.138	0.11910
Amount of money can be borrowed from private lenders (take the logarithm)	0.05231	0.79	0.430	0.01456	-0.14720*	-1.77	0.076	-0.03395
Cognitive level for the formal financial market(Relative high level=1)[0]	0.42502*	1.93	0.053	0.12573	0.24156	1.06	0.291	0.056991
Wald χ^2 test	38.61***				25.48**			
Prob.> χ^2	0.0004				0.0301			
Predicted probability at x-bar	0.8019				0.85239			
Pseudo R-squared	0.159				0.1431			
Observations	204				190			

Notes: results are robust in the table, statistically significant at 10% (*), at 5% (**) and at 1% (***) level. Ye County is set as the base county for county dummies. ([0]) marginal effect is for discrete change of dummy variable from 0 to 1.

Table A.4 Tobit estimation results on the amount of rural development fund borrowed

Explanatory variables	Model one			Model two		
	Estimated coefficients	t	P>|t|	Estimated coefficients	t	P>|t|
Age	0.16327	1.35	0.178	0.16374	1.35	0.177
Age square	-0.00162	-1.35	0.179	-0.00162	-1.35	0.178
Proportion of the male	-0.80833	-1.02	0.308	-0.81332	-1.03	0.304
Education 2:primary school	0.08077	0.14	0.892	0.09161	0.16	0.876
Education 3:junior high school	-0.21936	-0.38	0.707	-0.21275	-0.37	0.715
Education 4:senior high school	-0.50797	-0.73	0.466	-0.50296	-0.72	0.470
Education 5:technical school/college/university	-2.33078**	-2.15	0.033	-2.30981**	-2.14	0.033
Household size	-0.16464	-1.42	0.155	-0.16615	-1.44	0.151
Household wealth (take the logarithm)	0.01720	0.05	0.959	0.016840	0.05	0.959
Whether has craftsman (yes=1)	1.02879**	2.57	0.011	1.03516***	2.59	0.010
Whether has migrant worker (yes=1)	-0.59153	-1.54	0.125	-0.59414	-1.55	0.123
Whether has cadre (yes=1)	1.03478**	2.51	0.013	1.04656**	2.57	0.011
Amount of money can be borrowed from private lenders (take the logarithm)	-0.02813	-0.32	0.749	-0.02860	-0.33	0.745
Times participated in the earlier stage promotion and motivation activities	0.01166	0.17	0.866	/	/	/
Cognitive level for the formal financial market (Relative high level=1)	0.78913***	2.58	0.010	0.79528***	2.62	0.009
Wangcang County	0.82618***	2.74	0.007	0.84208***	2.94	0.004
Wald χ^2 test	49.03***			49.01***		
Prob. > χ^2	0.0000			0.0000		
Sigma (test for Tobit model)	2.22423			2.22440		
Observations	310			310		

Notes: statistically significant at 10% (*), at 5% (**) and at 1% (***) level. Ye county is set as the base county for county dummies.

Table A.5 Multinomial Probit estimation results on the credit demand from main lending sources

Explanatory variables	Borrow from the RCCs or Village development fund only (21.68%)			Borrow from the private lenders only (30.36%)			Borrow from both lending sources (33.93%)		
	Coefficients	z	P>|z|	Coefficients	z	P>|z|	Coefficients	z	P>|z|
Age	0.15540**	2.04	0.042	0.03197	0.45	0.656	0.19710**	2.50	0.012
Age square	-0.00171**	-2.24	0.025	-0.00052	-0.73	0.466	-0.00214***	-2.70	0.007
Proportion of the male	0.25432	0.42	0.677	0.25337	0.39	0.698	-0.06994	-0.12	0.908
Education 2:primary school	0.14178	0.30	0.764	0.31371	0.67	0.504	0.22666	0.48	0.634
Education 3:junior high school	-0.39874	-0.84	0.402	-0.24647	-0.53	0.598	-0.20945	-0.44	0.658
Education 4:senior high school	-0.84631	-1.42	0.154	-0.45209	-0.76	0.445	-0.45707	-0.80	0.426
Education 5:technical school/college/university	-1.39293*	-1.69	0.092	0.15609	0.23	0.821	-0.35743	-0.46	0.645
Household size	0.06310	0.56	0.578	0.37033***	3.46	0.001	0.29032***	2.70	0.007
Household wealth (take the logarithm)	-0.40881	-1.47	0.141	-0.66127**	-2.38	0.017	-0.10295	-0.38	0.706
Whether has craftsman (yes=1)	0.93293**	2.28	0.022	-0.11415	-0.27	0.788	0.47153	1.13	0.258
Whether has migrant worker (yes=1)	-0.63443*	-1.94	0.052	-0.01947	-0.07	0.947	-0.58641**	-1.96	0.050
Whether has cadre (yes=1)	0.84489**	1.97	0.049	-0.47087	-0.99	0.322	0.80745**	1.98	0.048
Amount of money can be borrowed from private lenders (take the logarithm)	-0.10020	-1.17	0.242	-0.19569**	-2.33	0.020	-0.16772**	-2.06	0.039
Cognitive level for the formal financial market (Relative high level=1)	0.87857***	3.32	0.001	0.54858**	2.18	0.029	0.91381***	3.63	0.000
Wangcang County	0.24329	0.92	0.358	-0.50817*	-1.94	0.052	0.14910	0.58	0.560
Wald χ^2 test	111.66***								
Prob. > χ^2	0.0000								
Observations	392								

Notes: results are robust in the table, statistically significant at 10% (*), at 5% (**) and at 1% (***). Ye county is set as the base county for county dummies.

Appendix B: Maps for research countries

Figure B. 1 Chinese equivalents--which country match the GDP per capita of chinese provinces, and the location of the city where the survey implement
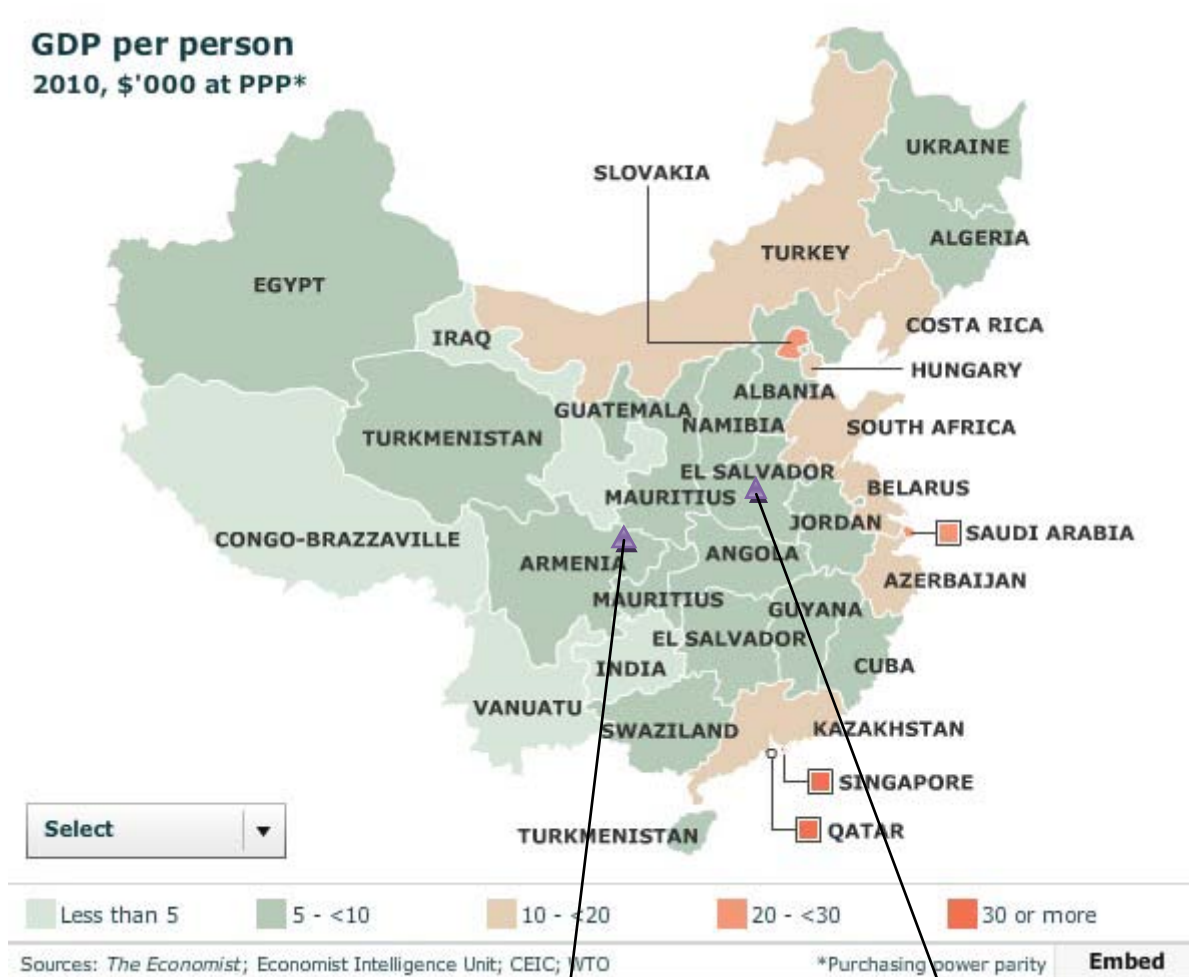

Figure B. 2 Location of Wangcang County and Ye County in the respective cities.

| Wangcang county | Ye county |