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Formal and Informal Credit Markets and Rural Credit Demand in China

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Abstract

Credit markets are an essential economic institution. In developing countries, particularly in countries undergoing rapid social and economic transition, it is important to identify emerging credit demand and institute credit supply in a timely manner to facilitate economic transformation. This research focuses on the evolving rural credit market in China, where borrowing from the social network has been common but the recent economic transition has made this informal credit market inadequate in addressing rural credit needs. This research is aimed at identifying the social and economic factors that explain the farmers' credit constraint and influence farmers' decisions to switch from informal to formal credit markets. Using data from a household survey, we estimated both binary choice probit models and a multinomial probit model to explore the determinants of credit market choice and credit constraints. We found that the credit demand is significantly affected by household's production capacity as supported by the fact that household size, land size, head's education all significantly increase household's probability to borrow, but the impact of these factors varies considerably by credit market. Transaction costs have a significant, negative effect on formal credit demand. The credit constraints analysis suggest that off-farm employment, land size and the cost of the credit are the three most important factors that increase the probability of being constrained.

Key words: Formal Credit, Informal Credit, Credit Markets, Rural Credit, China

Introduction

Owing to the high degree of uncertainty and riskiness of rural economy in general, and agricultural production in particular, formal insurance markets are either completely missing or incomplete (Rozenzweig and Binswanger 1986). While rural households do help each other in the event of adverse shocks, past studies consistently rejected the hypothesis that poor rural households are able to be fully co-insured among themselves (Townsend 1994; Jalan and Ravallion, 1999). The lack of insurance mechanisms in combination with the limited saving ability makes rural poor farmers in developing countries vulnerable to various covariate shocks (e.g., extreme weather, disease epidemics, etc.) and/or idiosyncratic shocks (e.g., sicknesses, funerals, etc.). Therefore, access to rural credit is essential in poor rural households' production, investment and consumption decisions (Eswaran and Kotwal 1989; Urdu 1990).

Rural credit helps rural poor economy in a variety of ways. Credit access can significantly increase the ability of households with no or few savings to meet their financial needs for agricultural inputs and productive investments. Access to credit could also increase rural poor households' willingness to adopt new technologies that raise both mean levels and riskiness of income (Rosenzweig and Binswanger 1993; Carter 1984). Finally, access to credit allows rural households to smooth their consumption in the case of adverse event. The importance of rural credit in rural economy is also well supported by empirical evidence. Feder et al. (1990) argued that one additional *yuan* of credit would yield 0.235 *yuan* of additional gross value of output in China. Diagne (2000) also found positive relationship between credit access and households' welfare. Using data from Peru, Guirkinger and Boucher (2007) showed that 27% loss of agricultural output is associated with credit constraints in rural Peru.

A common feature of rural credit markets in the developing countries is the coexistence of formal and informal credit markets (Hoff and Stiglitz 1990; Besley 1995; Kochar 1997; Bell et al., 1997; Mohieldin and Wright 2000; Anderson and Malchow-Moller 2006; Boucher and Guirkinger 2007; Barlund & Tapp 2008). There are two leading arguments around this phenomenon. The first argument is that the informal credit sector may be artificially created by governments' regulations on the formal credit sector (Bell 1990; Bell et al. 1997; Kochar 1997; Anderson and Malchor-Moller 2006). Governments in many low-income countries have imposed regulations on the formal credit institutions (e.g., by imposing interest rate ceiling) in order to promote formal borrowing and discourage informal borrowing as they perceive informal lending as usurious. Imposing ceilings on interest rates that can be charged, however, limit the extent of lending from formal credit markets to the poor because the poor are typically riskier and lending to them is not profitable at rates below the ceiling. A number of studies (Bell 1990; Hoff and Stigliz 1990) have shown that government regulations largely failed to achieve the desired outcomes. The informal credit sector continuously play dominant role in rural credit transactions and in many cases, the interest rate of informal sector has increased (rather than reduced) due to the interest ceiling and other regulations. This has led some to question the effectiveness of the government regulations (Hoff and Stigliz 1993) in the formal credit sector.

The alternative argument is related to credit rationing due to asymmetric information between lenders and borrowers. Because the adverse selection and moral hazard problems are prevalent in credit transactions, the formal lenders are only willing to lend money to those borrowers with collaterals. The informal lenders on the other hand are willing to lend money to borrowers who do not possess valuable assets as collaterals. They are able to do so mainly because they have better

information about borrowers from being insiders and they can use other mechanisms (e.g., through other contractual interlinkage, see Bell 1988; and Bardhan and Udry 1999) to ensure that borrowers do not default.

While the two arguments almost exclusively focus on factors affecting the supply of rural credit, factors affecting credit demand were largely neglected in the literature. Lack of attention to factors on the demand-side in the past analysis of credit rationing caused a number of researchers to argue that the magnitude of credit rationing in the formal credit market is likely to be overestimated (Kochar 1997). A number of factors have been identified by previous studies as the key factors determining rural households' overall demand for credit and demand for different credit sectors. Total savings or total value of liquidable assets relative to production/consumption scale was identified as an important factor determining household's overall need for credit. Covariate and/or idiosyncratic shocks would also affect the overall demand for credit. High interest rates and other transaction costs including tedious paper work, bureaucratic loan process associated with formal loans (Foltz, 2004), collateral risk (Boucher and Guirkinger, 2007), asymmetric information and also the political reasons (Zander 1994), and the availability of formal credit institutions (He 2007, An and Ren 2005) have been identified as the main obstacles to the demand for formal credit markets.

In this paper, we attempt to shed some light on the related issues by providing empirical evidence in three areas using a household survey data from rural China. First, by describing the extent by which rural farmers in our sample have accessed formal and informal credit, we aim to increase our understanding about the relative importance of rural formal and informal credit markets in rural economy. And by investigating rural households' characteristics by the status of credit access, and the differentiated characteristics of formal and informal credits, we are interested in assessing the

potential underlying factors behind household's decision in credit access and credit sector choice. Second, we conduct rigorous econometrics analysis to further substantiate the descriptive findings with regard to the underlying determinants of credit access, credit rationing and sector choice, both probit models and a multinomial probit model are estimated. And finally, by comparing households' desired level of credit use to the actual level of credit use, we are able to identify the extent to which credit markets have or have not achieved their potential, and what are the main constraints that may have prevented them from doing so, and the potential impact of removing some of the constraints on improved functioning of credit markets.

Rural Credit in China

Most previous research was based on the basic hypothesis: formal credit supply would crowd out the informal credit market. And the informal sector is only the recipient of "spillover" demand from the formal sector (Diagne, Zeller and Sharma, 2000, Bell, Srinivasan, and Udry, 1997). Boucher and Guirkinger, (2007) think the reason why rural households prefer the informal credit is because of the lower transaction costs and collateral risk. The reality in China nowadays is, formal credit has not enough power to crowd out the informal sector. On the contrary, the informal sector has been dampening the demand of formal credit and thus crowding out the formal sector. Informal credit has the advantages of low or zero interest rates, flexible borrowing terms, and little restriction on how the loans be used. This is one of the unique aspects of China rural finance. However, 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 (e.g. high valued crops and non-farm business activities).

China has a population of 1.3 billion, of which 57.01% are living in rural area. Most of the rural population relies on agriculture. In 1979 the “household responsibility system” ushered in a new era for China’s agriculture and entire economy, symbolizing the start of economic reforms, allowing the individual households to “own” the land for fifteen years which has now been extended to another 30 years and longer. The households can make their own decision to produce and deal with the surplus. The “household responsibility system” that plays a very important role in enhancing incentives and promoting efficient production increased agricultural output by 45% during the period of 1979 through 1984 when the first stage of reform was implemented (Lin 2003). The fast growing economy has generated increased credit demand arising from both production and consumption needs of rural households. This has resulted in increased interactions between the households and financial institutions.

China is now implementing the “New countryside” policy. It is widely believed that more than 20 trillion yuan (Tang 2008) of funds will be needed by the year of 2020 in China in this process. According to recent statistics, only 10.9% of loan is used in the rural area in China, which means the majority of farmers do not have access or do not borrow in formal credit market and could only borrow in their social networks such as friends and relatives. Most rural households in China rely on informal credit market to meet their credit needs. According to the literature, non-institutional sources contribute roughly half of the credit volume in rural areas (Jiang 1984). Feder et al. (1989) reported that non-institutional credit shares were between one-third and two-thirds in several study areas. Chen (2004) estimated that among all 240 million rural families, only 15% get loans from formal credit markets.

To address these problems, the Chinese governments have set up credit programs aimed at improving rural households' access to credit, similar to what other countries did over the past 40 years. But most of the programs were not successful. The Agricultural Development Banks (ADB) that provide credit at subsidized interest rates have failed both to achieve its objectives to serve the rural poor and to stay sustainable as a credit institution; The Rural Credit Cooperatives (RCC), the main access to credit for households in rural China, provided 87.5% of loans among all the rural financial institutions by June 2005 (He 2004). The deposits in RCCs were 30,694 million yuan by 2005 while the loan granted by RCCs was only 21,968 million yuan, with a difference of 8,726 million yuan. From this we can see, even the largest rural financial institutions are not providing adequate financial service (loans) to rural households. The Postal Savings Bank of China (PSBC), the so-called "water pumps", provided no loans to rural households before March 2006 when the reform started. The ABC, the biggest commercial agricultural bank, has always been focusing on the city market before 2007. We will show the extent of credit demand and constraints of rural households in China and provide explanations based on the survey we conducted with rural households.

Data

The present research uses data collected by on-site interviews conducted in November 2007 through March 2008 in Heilongjiang Province in northeast of China. Agriculture in this province is important not only to the province itself but to the whole country. The total arable lands in Heilongjiang province is 11,733,333 hectare rankings the first in the country. The overall grain production capacity has been above 35 billion kilograms every year in this province. As the largest production base of the country, it provides half of the commercially traded grain in China (Wang, 2008). The

main agricultural products are rice, corn, soybean and cotton. Heilongjiang is located on one of the three black soil belts in the world, ensuring the quality and quantity of agricultural production. Given the importance of Heilongjiang in China agriculture, this study provides important analysis and has significant policy implications.

In this section, we briefly describe the basic information of the data and the economic context of China rural credit. 471 households were randomly drawn from 28 villages. In the survey we collected information on, among others, whether or not any credit was received during the year, the quantity of credit received, interest, terms of loan, purpose and source of the credit, and whether the household needed more credit. In addition, a set of household demographic and economic variables (e.g. household size, head's education, head's age, head's major occupation, household assets, land endowment) were also included in the survey.

In total 19 variables are analyzed. The average age of observed households is 43.98 years. Male household heads account for 83.44% of the household interviewed. In rural area males usually have higher status. The average household size is 3.8. Table 1 shows that the average number of schooling children is 0.82. As families had to pay for their children's education, the number of schooling children is one of the most important variables affecting the choice of credit sources and the amount of borrowing. The correlation between the number of children and formal, informal credit and not borrowing are -0.0765, 0.1882, and -0.1344, suggesting the more schooling children, the less access to formal credit. However, the families with more children do need the credit to support their children to complete the school education, so they have to address this need through informal channels, mainly from extended families, relatives, and friends. Of all the samples, the households

who engaged in farming account for 49.26%, the percentage of non-agriculture households was 17.20%, and the households who engaged in both agriculture and no-agriculture account for 33.54% of the sample. The occupation the households engaged in is a main concern for formal financial institutions when they decide whether or not and how much credit to provide. The person with a non-farming job would have or restricted access to formal credit in China. Among all the observed samples, 29 households are the leaders of the village. They can usually get credit from formal sector at lower interests and/or with longer terms.

Above is about the basic background of households. The remainder variables are related to the credit. Land is the most important variable that to a large extent determines the ability to get credit especially credit from formal markets. It is easier for those who have bigger land size to get loans from formal credit institutions such as RCCs or ABC. According to the policy requirements of government and the Central Bank, the loans provided by these two institutions should only go to agriculture.

As mentioned previously, the reasons for the existence of informal credit posited in the literature include government interest rate ceilings, collateral requirements and higher transaction costs. (Boucher and Guirkinger 2007; Mohieldin and Wright 2000; Udry 1997; Conning 1996; Hoff and Stiglitz 1990) These factors are the main reasons why informal sector can develop smoothly and can charge higher interests. Sometimes the interest can be very high and uncontrolled. Rural finance in China, however, is entirely different. Our data show that 43.31% households borrow from informal sector, of which 111 households are charged zero interest. This makes not only economic but also cultural sense. In China, links between relatives and friends are much tighter so that the households

have easier access to informal credit, especially when they face restricted access to formal sectors which usually have strict restrictions such as on the use and terms of loans.

The formal credit market in China is also different from credit markets in other countries. The interest rates for agricultural loans are usually fixed. Formal institutions such as ABC charge the “base interest rate” which is 5.21% plus an increase of 30% at a minimum. Another difference between formal and informal credit markets is the credit term. The mean of formal credit term is 10.98 months, while the mean of informal credit is 21.25 months which is actual term of repayment. The term of informal borrowing is often a matter of a verbal agreement without contract. Compare to the formal markets, the term of informal markets is obviously more flexible. If the household cannot repay loans on time, the lenders (usually are the relatives and friends) would usually allow the borrowers to delay the payment. Usually, when liquidity is need, the first choice of households is looking to the relatives and friends, not the formal institutions.

With the development of economy and the increasing credit need, the credit institution has been evolving, changing significantly in recent years. Since the informal credit cannot meet the needs of households’ credit demand anymore, credit reform aiming at instituting a well-functioning formal credit system has become an urgent issue. The correlation between the variable “distance to bank” and “formal credit” is -0.2226 shows that the farther to the bank, the less the households borrow from formal sector. On the contrary, the farther the villages to the bank, the more the households borrow from relatives and friends. Among 471 samples, only 166 households answered “yes” when they were asked the question “whether or not the money you have borrowed is enough to meet your demand?” From this result we can see that the households in rural China are widely constrained or

limited access to credit. According to the research by Li and Zhu (2005), 70.92% of rural households are constrained in China.

We can argue from the data analysis that the availability of formal credit institutions is a major issue that needs to be addressed in order to develop formal credit markets and meet the credit demand in rural China. It is worth mentioning that only two households in our sample borrow both from formal and informal institutions which suggests that the constraints in China rural area is not only because of the availability of credit institutions but also the households' awareness and knowledge of using financial resources to meet their credit demand.

We propose three models in the next section to analyze the social and economic factors that explain the farmers' choice of credit sources and influence farmers' decisions to switch from informal to formal credit markets and provide suggestion to policy maker.

Model

In this study we conduct econometric analyses to identify factors affecting farmers' access to credit as well as borrowers' choice between alternative sources of credit. We further analyze whether credit market access and quantity borrowed are sufficient to meet farmers' credit demand. Probit model is used for both types of analysis.

We first treat farmers' choice of whether to borrow any credit or not as well as their decision on which credit markets to borrow credit from as three independent binary decision. In particular, we use three separate probit models to estimate the probability of a farmer borrowing from formal credit markets, borrowing from informal credit markets, and not borrowing, respectively. To determine what factors influence farmers with regard to each of the three decisions, we first define three latent

variables, i.e. borrowing indices, y_s^* , such that

$$(1) \quad y_s^* = \mathbf{X}_i \boldsymbol{\beta}_s + e_s$$

where the subscript s takes on value of 1, 2, and 3, representing the choice of borrowing from the formal credit markets, borrowing from the informal credit markets, and not borrowing, respectively. For example, y_1^* represents the latent, formal credit borrowing index. \mathbf{X} is a vector of factors that would potentially influence the choice of credit sources. The subscript i indexes individual farmers. $\boldsymbol{\beta}$ are slope parameters, and e are errors, assumed to follow normal distribution.

We do not observe y_1^* but rather y_1 which takes on the value of 1 if the farmer chooses to borrow from formal credit markets, and it takes on the value of 0 if not. The probit model of the formal credit market choice is specified as follows:

$$(2) \quad y_1 = \begin{cases} 1 & \text{if } y_1^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

The probit models for the other two decisions (i.e., borrowing from informal credit markets and not borrowing) can be defined in the similar fashion. Given the fact that farmers are facing three exclusive choices, we further estimate a multinomial probit model which models the three choices simultaneously. We use the choice of informal credit as the base and compare the choices of formal credit and no borrowing with the base.

The potential factors that may influence farmers' borrowing decisions include the demographics (age, gender, and education) of the household head, household characteristics (household size, number of dependent schooling children, farm size, and dummies of sectors, namely, agriculture, non-agriculture, and agriculture and non-agriculture combined). The cost of borrowed funds measured by village level interest rate is also included. In addition, distance to the nearest bank is

included to capture the transaction costs of borrowing from formal credit markets. Distance to banks may also reflect the availability of formal credit supply. Finally, a dummy variable for whether the household members are the village leader is included to capture the social capital, borrowing capacity of the households.

To further investigate whether the credit supply from the formal and informal credit markets is sufficient to satisfy farmers credit demand, we estimate another probit model using the credit constraint indicator y_c as dependent variable, which takes on the value of 1, when the credit supply is perceived to be sufficient, and 0 otherwise. In addition to the same regressors as included in the credit choice models, the amount of funds borrowed is also included as a regressor because the more a household borrows, the less credit constraint it faces.

Results

The descriptive and econometrics analyses yielded a number of highly consistent results across different estimation methods. First, as expected, the credit demand is significantly affected by household's production capacity as supported by the fact that household size, agricultural land, head's education all significantly increases household's probability to borrow (See Table 2). For example, every additional family member would increase the probability by 4%. Additional year of education by head would increase the probability by another 2.5%. And doubling land endowment would increase the probability by 5.6%. However, the impact of these factors varies considerably by credit market. For example, while household size, education and land endowment increase households' probability to borrow from formal credit markets, they decrease or do not affect the informal credit demand. The estimation results suggest that female headed households are more likely to borrow, and the probability to borrow increases by 11%, and they are more likely to borrow from the

informal credit market. Households with more children are more likely to borrow and borrow from informal markets. Interestingly, older farmers are found to be more likely to borrow, contrary to the general hypothesis from the farm life cycle theory, which says that young farmers are generally in the entry and expansion stage and therefore are more aggressive in investment. This may suggest that older farmers have more social network or social capital and therefore have more access to credit market, either informal or formal credit. Another result that we did not expect is that being village leader does not have any impact on borrowing. As village leaders generally have more social capital and more access to formal and informal credit market, they are widely considered to be able to borrow more. However, this is not observed which may be due to the fact leaders are generally better off financially. Another interpretation is that the leadership status does not give the leaders any privilege, suggesting an efficient and more developed institution. However, this is less likely to hold given the power and influence of the village leaders in the political system and culture. Higher interest rate is found to decrease the probability of borrowing from the formal credit markets and this negative effect is statistically significant. The results also show that households in non-agricultural sectors are significantly less likely to borrow, especially from the formal credit markets. This is actually due to government credit policy that restricts non-agricultural households' access to formal credit market.

Household's credit demand and credit choice are significantly affected by the transaction costs. For example, an extra kilometer of distance between the village and the nearest bank would reduce the probability borrowing from the formal bank by almost 1%. As expected, the distance to formal bank is associated with higher probability of informal borrowing. Comparison of the coefficients between the formal and informal borrowing regressions (-0.01 versus 0.006) suggests the informal borrowing

can only partially offset the decline in formal borrowing. The statistically insignificant coefficients on value of assets may suggest that the collateral does not play an important role in borrowing as well as in the credit market choice. This could be partially related to the fact that the amount of borrowing is typically small. The results from the more robust multinomial probit estimation are mostly consistent with results discussed above and are presented in Table 3.

Finally, the probit results (See Table 4) on credit constraints regression suggest that off-farm employment (non-agricultural sector), land size and the cost of the credit are the three most important factors that affect the probability of being constrained. For example, households with main occupation in off-farm are 32% more likely to be constrained. Doubling amount of land endowment increases the probability by 32%. And one percent increase in interest rate would reduce the probability of being able to borrow sufficient loan by 4%. Naturally, households which borrow more loans are less constrained. And finally, the off-farm sector is significantly rationed. While we cannot argue the causal relationship between these factors and the probability of being constrained given the data at hand, our results clearly suggest the evidence of ill functioning of rural credit markets in China.

Conclusion

Recognizing the limited knowledge about the functioning of rural credit markets in China, especially on the demand side of the markets, this paper aims to fill this gap based on a recent household survey. A few interesting findings emerged from our study. First, formal and informal credits coexist in rural China without clear evidence of one superseding the other. Second, households' decisions on whether to borrow credit and from which market to borrow are mainly determined by households' production

capacity and the transaction costs. Increasing the accessibility of formal credits by reducing the transaction costs is an essential step to improve formal credit sector. Finally, there is evidence that the credit markets are functioning below their potential as the credit demand of a significant number of households are not being satisfied. And those who are likely to need the credit the most (with more land and off-farm opportunities) are most likely to be constrained. Findings in this study have significant policy implications for addressing the credit demand and supply in rural China.

References

- Adams, D. W., and R. C. Vogel., 1986 "Rural financial markets in low-income countries: Recent controversies and lessons *World Development*, Vol. 14, No. 4, 477-487.
- Anderson T.B and Malchow-Moller N, 2006. "Strategic Interaction in Credit Markets." *Journal of Development Economics*. Volume 80, Issue 2, August 2006, Pages 275-298
- Anthony, B.1964. "The Determination of Pure Rates of Interest in Underdeveloped Rural Areas." *The Review of Economics and Statistics*, Vol. 46, No. 3. pp. 301-304
- Diagne, A., Zeller, M., and Sharma, 2000. "Empirical Measurements of Households Access to Credit and Credit Constraints in Developing Countries: Methodological Issues and Evidence." *Working Paper*, No.90
- Barham, B., Boucher, S., Carter, M., 1996. "Credit constraints, Credit unions, and Small-Scale Producers in Guatemala." *World Development*. 24: 793–806.
- Binswanger, H., S. Khandker, and M. Rosenzweig, 1989. "How Infrastructure and Financial Institutions Affect Agricultural Output and Investment in India." *Washington DC: World Bank Working Paper* No. 163. World Bank
- Binswanger, H., S. Khandker, and M. Rosenzweig, 1993. "Wealth, Weather Risk and the Composition and Profitability of Agricultural Investments," *Economic Journal*, January 1993, 103, 56-78.
- Bell, C., Srinivasin, T.N., Udry, C., 1997. "Rationing, Spillover, and Interlinking in Credit Markets: the Case of Rural Punjab. " *Oxford Economic Papers*. *Oxford University Press*. 4 (49): 557–585.
- Binswanger, H., S. Khandker, and M. Rosenzweig. 1989."How Infrastructure and Financial

Institutions Affect Agricultural Output and Investment in India." *Washington DC: World Bank Working Paper No. 163. World Bank.*

Boucher, S.R., B.L. Barham, and M.R. Carter. 2005. "The Impact of 'Market-Friendly' Reforms on Credit and Land Markets in Honduras and Nicaragua." *World Development* 33:107–28.

Boucher, S.R. and Guirkinger, C.,2005. "Risk, Wealth, and Sectoral Choice In Rural Credit Markets." *American Journal of Agricultural Economics*. Vol. 89(4): 991–1004

Boucher, S.R., Carter, M., and Guirkinger, C. (2007). "Credit Constraints and Productivity in Peruvian Agriculture." Working Paper No. 07-005. *Department of Agricultural and Resource Economics, University of California - Davis.*

Carter, M. R.1989. "The Impact of Credit on Peasant Productivity and Differentiation in Nicaragua." *Journal of Development Economics*. 103:13–36.

Nisbet, C., 1967. Interest Rates and Imperfect Competition in the Informal Credit Market of Rural Chile. *Economic Development and Cultural Change*. Vol. 16, No. 1, 73-90

Conning, J. 1996. "Financial Contracting and Intermediary Structures in a Rural Credit Market in Chile: A Theoretical and Empirical Analysis." *PhD dissertation, Yale University.*

Duong,P.B., and Izumida.Y. 2002 ." Rural Development Finance in Vietnam: A Micro econometric Analysis of Household Surveys." *World Development* Vol. 30, No. 2, pp. 319 – 335, 2002

Eswaran, M., and A. Kotwal. 1989. Implications of credit constraints for risk Behavior in less developed economies. *Oxford Economic Papers* N.-S. 42 (2): 473–482.

Feder, Gershon, Lawrence J. Lau, Justin Y. Lin, and Xia- openg Luo. 1990." The Relationship between Credit and Productivity in Chinese Agriculture: A Microeconomic Model of Disequilibrium." *American Journal of Agricultural Economics*. Vol. 72(5): 1151-1157.

- Foltz, J. D..2004. "Credit market access and profitability in Tunisian agriculture." *Agricultural Economics*. 30: 229–240.
- Han Jun. 2005. Survey on China's Rural Finance. *Shang Hai Yuan Dong press*.
- He.,G.W., 2001. "The Feature and Path Choice of China Rural Financial Supply and Demand."China Rural Economy . No.10
- He, G. W., 2005. "China Rural Finance Development and System Changes. " China Fiscal Economy Press
- He G.W, 2007, The Diversities and Strategy of China Rural Financial Institutions, The Observation of China Rural Finance, P12-20
- Hoff, K., and J. Stiglitz. 1990. "Imperfect Information and Rural Credit Markets: Puzzles and Policy Perspectives." *World Bank Economic Review*, Vol.4.No.35:235–250.
- Jalan J, and Ravallion M, 1999. "Is transient poverty different? Evidence for rural " *Dynamics in Developing Countries*. Frank Cass Publishers. No.82-99
- Jiang, S.J., 1984. 'How Are the Various Types of Non-Bank Credits in Rural Areas at Present to be Treated?" *Rural Finance Research Institute, Guangxi Zhuang Autonomous Region*, July
- Kochar, A. 1997. "An Empirical Investigation of Rationing Constraints in Rrural Credit Markets in India", *Journal of Development Economics*, Vol, 53 : 339-371.
- Kochar, A., 1997. "Does Lack of Access to Formal Credit Constrain Agricultural Production? Evidence from the Land Tenancy Market in Rural India." *American Journal of Agricultural Economics*, Vol. 79: 754-763
- Li,R, and Zhu X.2007. "Econometric Analysis of Credit Constraints of Rural Households and Welfare Loss" *Economic Research*, No.2:146-155

- Lin, Justin Y., "The Household Responsibility System in China's Agricultural Reform: A Theoretical and Empirical Study." *Economic Development and Culture Change*, 36(1988): 199-224.
- Mahmoud S. M. and Peter W. W., 2000. "Formal and Informal Credit Markets in Egypt." *Economic Development and Cultural Change*. 48:657-670
- Lin, Y.F.,2003. "Information, Informal Finance and SME Financing." *China Center for Economic Research, Working Paper*, No. C2003025
- Nisbet.C.,1967. "Interest Rates and Imperfect Competition in the Informal Credit Market of Rural Chile" *Economic Development and Cultural Change*, Vol. 16, No. 1: 73-90
- Schreiner,M .2001. "Informal Finance and the Design of Microfinance." *Development in Practice*, Volume 11, N.5,637-640.
- Shuitu Qian, Hui Lu. 2008. Research on China Rural Informal Finance and the Household Financing Behavior. *Finance Research*. No.10, 174-186
- Tang, L.Z. 2009." The Impacts of Rural Informal finance on Households' Income Growth. Evidence From Quan Zhou City, Fu Jian Province China" *Agricultural Economic Issue*. No.4, 76-79
- Tang, S 2008. "The Relationship between Credit Access and Agricultural Economy." *Journey of Northeast Agricultural University, Edition of Social Sciences*. No.1,
- Tam,O.K., 1988.Rural Finance in China. *The China Quarterly*.No.113:60-76
- Wen, T.J., 2003. How to Implement A New Reform on China Rural Area. *China Reform*,No8:18-19
- Yao, Y.J.,and Chen,D.F., 2005. "The Development of China Rural Informal Finance—Theory and Empirical Study." *China Rural Economy*.No.8:45-51
- Zander,R,. "Barriers to Credit Access in Rural Sri Lanka." *Financial Landscapes Reconstructed. The Fine Art of Mapping Development, Boulder, Colorado, Westview Press*, pp 12.1-12.8

Zeller, M., Sharma, M., Ahmed, A., Rashid, S., 2001. "Group Based Financial Institutions for the Rural Poor in Bangladesh: An Institutional and Household Level Analysis." *IFPRI Research Report*. No. 120.

Table 1 Households Characteristics by Participation in Credit Markets

Variables	Access to Credit			
	Full Sample	Formal Credit	Informal Credit	Not-borrowing
	Mean	Mean	Mean	Mean
age	43.985	46.558	43.951	40.464
hhsz	3.796	4.071	3.819	3.364
Hhedu	8.397	8.734	8.069	8.518
Children	0.822	0.753	0.956	0.691
Land	19.410	28.879	18.465	8.36
hhincome	28873.04	33396.1	27440.69	25484.545
assets	86012.74	102824.7	86500	62918.182

Table 2 Probit Formal, Informal and Not-borrowing

Variable	Probit Formal		Probit Informal		Probit Not-borrowing	
	dF /dx	P-value	dF /dx	P-value	dF /dx	P-value
Age	.0047 (.0043)	0.285	.0012 (.0042)	0.785	-.0067 ** (.0029)	0.032
Female	-.0163 (.0649)	0.799	.1094 (.0625)	0.079	-.1116*** (.0364)	0.012
hhsize	.0486 ** (.0212)	0.022	-.0131 (.0266)	0.621	-.0386* (.0211)	0.074
hhedu	.0567*** (.0115)	0.000	-.0324** (.0140)	0.020	-.0250*** (.0099)	0.013
children	-.0982 ** (.0457)	0.026	.2140*** (.0355)	0.000	-.1528*** (.0356)	0.000
Inland	.0725* (.0439)	0.088	.0430 (.0332)	0.197	-.0559** (.0259)	0.033
lempsec-2	-.3444 *** (.0481)	0.002	-.0966 (.1206)	0.436	.3482*** (.1317)	0.002
lempsec-3	.0018 (.0801)	0.982	-.1117 (.0832)	0.188	.1376*** (.0585)	0.012
land assets	-.0013 (.0008)	0.108	.0007 (.0008)	0.355	-.00004 (.0005)	0.932
distance to bank	-.0099*** (.0025)	0.000	.0060* (.0031)	0.052	.0035** (.0017)	0.026
Leader	.0481 (.0864)	0.565	-.0845 (.1049)	0.433	.0534 (.1033)	0.578
vinterest	-.0280*** (.0109)	0.011	.0136 (.0096)	0.156	.0076 (.0052)	0.135
R²	0.24		0.079		0.23	
Number of obs:	448		448		448	

***Significant at 1% level

** Significant at 5% level

* Significant at 10%

Table 3 Multinomial Formal and Not-borrowing

Variable	Multinomial Formal			Multinomial Not-borrowing		
	Coef.	z	P> z	Coef.	z	P> z
Age	.0108 (.0153)	0.71	0.481	-.0309 (.0153)	-2.03	0.043**
Male	.1180 (.2722)	-0.43	0.665	.8038 (.3054)	-2.63	0.008***
hhsz	.1659 (.0933)	1.78	0.076*	-.1441 (.1129)	-1.28	0.202
hhedu	.2115 (.0468)	4.52	0.000***	-.0619 (.0534)	-1.16	0.247
children	-.6077 (.1727)	-3.52	0.000***	-1.0264 (.1977)	-5.19	0.000***
Inland	-.2644 (.1030)	2.57	0.010***	-.1833 (.1485)	-1.23	0.217
lempsec-2	-1.6674 (.6149)	-2.71	0.007***	1.1304 (.3879)	2.91	0.004***
lempsec-3	.2163 (.2465)	0.88	0.380	.7560 (.2811)	2.69	0.007***
land assets	-.0059 (.0033)	-1.77	0.077*	-.0012 (.0031)	-0.39	0.696
distance to bank	-.0397 (.0092)	-4.33	0.000***	.0049 (.0091)	0.54	0.590
Leader	.2707 (.3853)	0.70	0.482	.3775 (.4918)	0.77	0.443
vinterestf	-.1014 (.0880)	-1.15	0.249	.0095 (.0910)	0.09	0.924
_cons	-1.6918 (1.1430)	-1.47	0.141	2.3494 (1.2596)	1.87	0.062

***Significant at 1% level

** Significant at 5% level

* Significant at 10%

Table 4 Probit Credit Constraint Model

Variable	Probit Enough		Probit Enough or not	
	dF/dx	P-value	dF/dx	P-value
Age	-.0003 (.0056)	0.963	.0002 (.0048)	0.959
Female	-.0165 (.0929)	0.859	-.0266 (.0798)	0.742
hhsz	-.0242 (.0470)	0.604	-.0078 (.0356)	0.825
hhedu	-.0129 (.0183)	0.477	.0056 (.0144)	0.700
children	.1499 (.0594)	0.009	.1033 (.0539)	0.044
Inland	-.3161*** (.0743)	0.000	-.2752 (.0633)	0.000
lempsec-2	-.3247 (.1119)	0.027	-.0582 (.1015)	0.579
lempsec-3	-.0338 (.0896)	0.707	.0454 (.0748)	0.540
land assets	.0044 (.0024)	0.062	-.0014 (.0016)	0.379
distance to bank	-.0023 (.0049)	0.641	-.0054 (.0033)	0.108
Leader	-.0371 (.1098)	0.738	.0846 (.1229)	0.482
vinterest	-.0377 (.0110)	0.001	-.0017 (.0102)	0.866
loan	.0450 (.0088)	0.000	.0396 (.0078)	0.000
Number of obs:	346		448	

***Significant at 1% level

** Significant at 5% level

* Significant at 10%