1-1-2020

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Recommended Citation

Jiang, M., Paudel, K., & Zou, F. (2020). Do Microcredit Loans Do What They Are Intended To Do? A Case Study of the Credit Village Microcredit Programme in China. *Journal of International Development* https://doi.org/10.1002/jid.3477

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Acknowledgements

This paper was supported by the National Social Science Fund of China [No. 19FGLB052], the Major Projects of National Social Science Fund of China [No. 19ZDA115], 13th Five-Year Planning of Philosophy and Social Sciences in Guangdong Province [GD17XYJ10], and Research Institute of Rural Revitalization Strategy of South China Agricultural University [XZY2019]. Paudel's time in this paper was funded by the USDA NIFA project LAB#94358.

Data Availability Statement: Data and programs used in this paper are available from the corresponding author upon reasonable request.

Conflict of Interest: Authors declare no conflict of interest.

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This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1002/jid.3477

DO MICROCREDIT LOANS DO WHAT THEY ARE INTENDED TO DO? A CASE STUDY OF THE CREDIT VILLAGE MICROCREDIT PROGRAM IN CHINA

Abstract

The purpose of this study is to assess if the Credit Village is an effective way to develop a microcredit program in China from the perspective of poverty reduction policy and risk-monitoring. Cross-sectional household survey data from three credit villages in the Yunan County of China are analyzed using 3SLS and IV probit models. The major finding is that the Credit Village loosens credit restrictions to some extent. However, it has no impact on educational expenditures, medical expenditures, long-term assets, short-term assets and women's rights. Our results are similar to the results found in Banerjee et al. (2015a). It is our observation that the microcredit program in China needs more innovation to become effective.

Keyword: Credit Village, Microcredit innovation, Welfare Impact
JEL Classifications: O22, Q14

1. Introduction

Microcredit is a financial intervention that provides loans without collateral to underserved groups that are excluded by traditional financial institutions (Aggarwal et al., 2015; Holvoet, 2005; Yunus, 2004). Microcredit uses special mechanisms, such as group lending, progressive lending, regular repayment installments, making repayment public, targeting women, financial collaterals, and dynamic incentives (Armendáriz and Morduch, 2010). It provides non-financial services to farmers, such as health education, cultural education, marketing eduction, and training in agriculture production practices.

Implementation and operation mechanisms of microcredit have been developed in different countries (Armendáriz and Morduch, 2010; Awunyo-Vitor et al., 2012; Garikipati, 2008; Goetz and Sen Gupta, 1994; Hermes et al., 2005; Holvoet, 2005; Rahman, 1999), so microcredit systems vary in their operational details, but the fundamental objective of providing loans to the poor without collateral stays the same.

The microcredit program in China was started in 1994 by the Rural Development Institute of the Chinese Academy of Social Sciences and the Yi county government of Hebei province for the purpose of poverty alleviation. The microcredit program is currently operated by three different entities: the government, non-government organizations, and financial institutions. The government agencies that operate the microcredit program are departments operating under the poverty alleviation mandate, such as the Poverty Relief Office and the Labor and Social Security Department. The non-governmental organizations, supported by government, international donors and others, include the Chinese Academy of Social Sciences and the Women's Federation, among others. Financial institutions providing microcredit include rural credit cooperatives, village banks, and other microcredit companies. Microcredit from rural credit cooperatives is the primary credit source in rural areas in China. These rural credit cooperatives get capital through deposits, refinancing, and rediscount from

the People's Bank of China; however, information asymmetry restricts the development of microcredit for individual lending.

Credit Village is an innovation of the microcredit mechanism for clearing the obstacles that exist between the rural credit cooperatives and farmers. It enables the direct flow of capital from rural credit cooperatives to farmers. Another objective of the Credit Village is to prevent an excessive flow of capital from rural to urban areas. The Credit Village reduces credit risk through three mechanisms: by rating farmers; by sharing information with other governmental departments such as the Public Security Bureau and the Administration for Industry and Commerce; and by creating a donation foundation pool which can be expanded five times by rural credit cooperatives to lend to the poor for income generating activities. It extends the Grameen Bank model by penalizing those who fail to repay with social and economic exclusions, not only to the credit group, but also to the entire village.

We analyze the Credit Village mechanism based on microcredit theory and evaluate its effectiveness using 3SLS and IV Probit models to data available from Guangdong Province, China. We organize the remaining parts of the paper as follows. First, we provide literature reviews related to the role of microcredit on asset buildup, education expenditures, health expenditures, and women's empowerment. Second, we provide the working structure of the Credit Village program used in the paper. Third, we

describe the models used in the paper. Finally, we provide results and conclude the paper by highlighting the implications of this study to China's rural credit market and the applicability of the study to rural development in other developing countries.

2. Literature review

2.1 The impact of microcredit on the income and household assets of farmers

The growth of income and household assets are the most important financial outcomes of microcredit because these are effective indicators for gauging poverty alleviation. Effects of microcredit on these financial outcomes have been found to be both positive and negative (Nader, 2008; Li et al., 2011; Swain and Varghese, 2009; Montgomery and Weiss, 2011;, Awunyo-Vitor et al., 2012; Van Rooyen et al., 2012; Weber and Ahmad, 2014; Loubere and Shen, 2018; Loubere, 2018). Microcredit correlates with the income and household assets of farmers positively, but the effect is very small (Nader, 2008). One explanation given was that many microcredit programs focus on survival issues rather than income generation (Nader, 2008; Awunyo-Vitor et al., 2012). Positive effects of microcredit on income and wealth build up are observed only when participants go through multiple loan cycles (Montgomery and Weiss, 2011; Weber and Ahmad, 2014).

Swain and Varghese (2009) affirm the positive impacts of microcredit on farmers' long-term assets only if the MFI requires members to save money and

accumulate poultry and livestock before approving the loan. Hossain (2012) and Imai et al. (2010) find significant poverty reducing effects of microcredit in rural areas in India and Bangladesh. In China, participation in microcredit has improved income level when the loan is used in income generating activities, and the program has been effective when borrowers are more involved in the program(Shuai et al., 2011; Li et al., 2011; Hsu, 2017)

Several other studies have indicated that microcredit has negative effects on asset buildup, especially among participants in Zimbabwe, Pakistan, and Sub-Saharan African countries (Van Rooyen et al., 2012; Barnes et al., 2001; Goldberg, 2005). A systematic review has been undertaken by Van Rooyen et al. (2012) in Sub-Saharan Africa. The authors conclude that microcredit increases poverty in some cases, but poverty can be overcome by better addressing farmers' needs. Microcredit by commercial financial institutions had no effect on farmers' income and assets, irrespective of whether they invested the money in agriculture or other microenterprise (Montgomery and Weiss, 2011). Combining the loan along with other nonfinancial services like training, marketing, and education can help farmers to generate more income and build-up short and long term assets.

2.2 The impact of microcredit on education in farm households

The schooling rate of children is one of the proxy variables of education. In analyzing the

impact of microcredit on the schooling rate, researchers assume a positive education demand elasticity of income. Microcredit may improve the schooling rate by increasing income, smoothing shock, lending to women, and changing the awareness of parents (Nader, 2008; Montgomery and Weiss, 2011, Maldonado and González-Vega, 2008).

Based on data from Egypt, Nader (2008) concludes that microcredit increases the schooling rates of recipient's children. Montgomery and Weiss (2011) also confirm this finding using data from Pakistan. They indicate that the families receiving microcredit are able to send children to school, thereby reducing the total educational inequalities within the community. Maldonado and González-Vega (2008) indicate that microcredit can also reduce the school enrollment rate for children as there is also a demand for child labor in agriculture and other microenterprises. This view is consistent with the findings of Shimamura and Lastarria-Cornhiel (2010), who indicate that girls' school attendance rates declined because agricultural credit induced income generating activities in tobacco production increased in rural Malawi. Hazarika and Sarangi (2008) conclude that microcredit-induced enterprise may not reduce the schooling rate, but the children attending the school from the household with a microcredit enterprise are tired because of farm work and put less effort into their studies.

2.3 The impact of microcredit on women's empowerment

The relationship of microcredit and women's empowerment lies in two aspects. First, microcredit gives women an increased chance to take part in income generating activities, even if they may not always succeed in generating a high return from the investment. It gives them self-confidence and bargaining power in the family (Osmani, 2007). Second, microcredit with group lending organizes women from different walks of life together that can uplift their spirits and help them to face challenges along with other group members (Osmani, 2007; Revindo and Gan, 2017). Microcredit from the Women's Federation (WF) is one path to success. The WF gives women borrowers yellow bean seeds and provides new production technology along with needed microcredit. The WF is a national non-government organization (NGO) that has a strong influence among women borrowers in China. From the transaction cost perspective, providing microcredit along with non-financial service increases the cost of microfinance institutions. So the best strategy may be "borrower+organization+MFI," with organizations giving non-financial services to borrowers. This is a financial linkage system for decreasing transaction costs.

The indicators for women's empowerment include financial and social aspects, such as decision-making, resource-controlling, better treatment in the village, a sense of self-confidence, family harmony, equitable status, participating in a social network actively and access to loans (Rahman, 1986; Goetz and Sen Gupta, 1994; Khandker et al., 1995; Nader, 2008;, Weber and Ahmad, 2014; Revindo and Gan, 2017). Since there are

many indicators available, the results in previous studies do not seem to show across the board positive effects.

Nader (2008) claims that if women do not put themselves in a decision making position, participation in microcredit may not be able to empower them. The impact of microcredit on family harmony can be positive since it increases income, but at the same time may have a negative impact because there is less time available for leisure activities (Nader, 2008). Additionally, women generally do not have full control of the loan borrowed from the microfinance institutions. What is unfortunate in many cases is that if a husband has a loan that he is unwilling to pay, his wife has to settle the debt by selling whatever meager assets they may have accumulated. This problem can be overcome by making loans to women and empowering them with market access (Goetz and Sen Gupta, 1994). Several authors (Rahman,1986; Khandker et al., 1995; Montgomery and Weiss, 2011) have expressed the view that irrespective of who has the managing power, microcredit receiving households are much better off than non-recipient households when evaluated using criteria such as income, consumption, and the right to make decisions by females in a household.

Decision-making abilities are more important for women's empowerment than other rights. However, microcredit cannot be translated into household decision-making automatically. Microcredit has a significant impact on decision making when it is given

through women's groups, especially if the women have been members of the group for a long time (Holvoet, 2005). This is because group pressure and group financial support improve a woman's position within the household. Therefore, delivery models and lending technology are assumed to be more important than the credit itself in empowering women through microcredit (Holvoet; 2005, Garikipati, 2008; Jia et al., 2016). Ganle et al. (2015) explain that women's empowerment depends on the capacity to control the loan and having a microenterprise before receiving the loan. At the same time, they emphasize the importance of adequate loan size, appropriate timing, effective monitoring, and better screening methods in lending to ensure women's empowerment.

Weber and Ahmad (2014) explain that microcredit has an impact on financial empowerment (for example: asset buying, household expenses, and income spending) but not on social empowerment (for example: decision-making, schooling, and marriage). They add that social empowerment is not obtained through increasing income and asset accumulation, but through external forces, such as the cooperation of the husband, autonomous productive activities, family members, and peers outside of the household (Weber and Ahmad, 2014; Ngo and Wahhaj, 2012).

2.4 The impact of microcredit on health expenditures

Microcredit and the household's health are connected through four pathways: social, economic, psychological, and political. Better healthcare is possible because microcredit provides social support, increases income, provides a stronger voice in the community and household, and boosts self-confidence (Mohindra and Haddad, 2005; Ahmed et al., 2001; Mohindra and Haddad, 2005; Montgomery and Weiss, 2011; Pronyk et al., 2006). The most important pathway is that microcredit gives fund to vulnerable groups without collateral to respond to health shocks. In addition to that, the other contributions to health include health awareness, prevention and guidance. This also provide opportunities to spread health knowledge to group members. Microcredit has group power and non-financial services that make it different from other types of credit.

Households receiving microcredit loans provide better medical care for their children and have a lower rate of child mortality (Montgomery and Weiss, 2011) than nonparticipating households. Ahmed et al. (2001) compare mental health problems in two groups of rural women with the same social and economic status. Their study shows that microfinance participants had better mental health as measured by emotional well-being and stress levels. Where women's mental health problems are mostly because of economic problems, the intervention of microcredit can provide loans, skills training, and savings, which improves the economic status of poor women in their households. Women's mental

health problems originating from economic problems are therefore resolved gradually as they continue their membership in the group.

Mohindra and Haddad (2005) also find a significant positive relationship between microcredit and women's health as measured by health care expenditures and mental stress. Pronyk et al. (2006) find that South African women participating in the microcredit project for two years experienced 55% less intimate partner violence compared to the nonparticipating women. However, they did not find any difference in the prevention of HIV between two groups. It is clear from these studies that microcredit can improve the health of recipient households through its unique operating mechanisms.

Different proxy variables of farmers' welfare have different results. Different cultures needs different proxy variables to analyze the impact of microcredit. As for the women's power, women in China have more rights and wealth than in other South Asian countries such as Bangladesh and India. Measures like seeing the doctor when ill or having assets under the woman's name are not good proxy variables for measuring the results of obtaining microcredit in China.

2.5 Problems with microcredit

Microcredit is not the panacea, as described in the previous subsections (2.1-2.4). Excluding problems related to data and econometric methods, there are several

shortcomings of the microcredit program as pointed out by previous authors (Yunus, 2011; Duvendack and Palmer-Jones, 2012;, Banerjee, 2013; Duvendack et al., 2014; Banerjee et al., 2015b; Angelucci et al., 2015; Loubere and Shen, 2018; Loubere, 2018).

The field work of Loubere (2018) in China indicates that microcredit has both beneficial and detrimental impacts during the process of capital, knowledge, and technology transfers from the central town to marginal villages. The negative impact comes from the arbitrage of village officers and elites based on the non-standard operation mechanism as compared to the Grameen Bank operation model. Coleman (2006) also provides evidence through his study of a group-lending program of women in Northeast Thailand that microcredit targets wealthier farmers and has a positive impact on affluent and well-connected farmers. The MFI selects the lending group member based on land holding and local information known through the village leader. This selection process leads to a wealthy group member phenomenon that makes poor farmers think only the wealthy can apply to become a group member and hence results in a relationship-based lending (mission drift occurs). It worsens marginalization of the poor in rural areas. In transforming developing countries, microcredit addresses social problem only temporarily for the workers who are getting laid-off (Loubere, 2017). Loubere and Shen (2018) provide evidence based on two microcredit programs: the Employment Microcredit Program and the Farmer Microcredit Program in China. They

indicates that microcredit causes marginalisation and demarginalisation at the same time without a net positive impact. Microcredit benefits local elites based on relationships (Loubere and Zhang, 2015).

Banerjee et al. (2015a) do not find a substantial impact of microcredit on income, consumption, health, education and women's empowerment in India. Angelucci et al. (2015) measured the impact of microcredit in Mexico using 37 different outcomes encompassing micro entrepreneurship, income, labor supply, expenditures, social status, and subjective well-being, and find no impact.

One of the reasons why microcredit fails is because the time-inconsistent borrowers increase consumption too much, and they have no ability to deposit funds for repayment (Banerjee, 2013). If borrowers use microcredit for consumption, do not have business acumen, and do not have an income-generating project, microcredit cannot generate more income effects (Banerjee, 2013). Eventually microcredit decreases farmers' borrowing ability and expenditure (Seng, 2018).

Other reasons are that investment in microenterprise needs a high return exceeding 24% to cover the interest of microcredit, which is a difficult proposition for small size farmers, the poor (Banerjee et al., 2015a), and especially women who face family-related and individual-related challenges, due to funds, the project itself or other difficulties (Brana, 2013). Gender discrimination leads to smaller loan size and higher

interest rates for women than men (Brana, 2013). Women empowerment requires them to be able to control the loan, the income-generating business, and overcome many social and cultural constraints (Ganle, 2015), which they may feel are too challenging and simply give up and decline to participate in the microcredit borrowing process. Microcredit's assumptions that borrowers have business acumen and income-generating projects able to generate higher profits than farming are faulty. Interest rates are inconsistent with the income generating potential of the project in many cases (Bateman, 2014). Yunus, the founder of microcredit himself, has described many problems associated with microcredit in India where mission drift has happened as microcredit institutions got hijacked by profit making entrepreneurs charging high interest rates (Yunus, 2011). With commercialization of microcredit in some developing countries, MFI accelerates to deviate from its social task. Bateman (2017) indicates that the microfinance sector, especially for out of country investors, earns huge returns through "accumulation by dispossession" from the poor, not through reconstruct value, and thus causes a negative social impact.

Social capital is essential for living in a village. Defaulting borrowers lose social capital, which makes it difficult for them to live in the same village after the default. Even worse is the fact that indebtedness of a group member makes the leader of the group suffer both emotionally and financially. This lack of social capital and social ostracizing

after default makes microcredit borrowers worse off (De Quidt et al., 2018) than before participating in the microcredit process. Women borrowers will encounter more violence for non-repayment of microcredit. Given these problems, some developing countries have halted microcredit projects. An easy and crude policy like halting microcredit projects breaks credit equilibrium for the poor and make credit supply even worse (Breza et al., 2018).

In conclusion, giving farmers loans to solve their loan restrictions is not the best way to increase their income. The loan may get misused by someone other than the borrower or the borrower may use the loan in a nonproductive area, which leads to heterogeneity and non-linear development (Loubere, 2018). Standardizing microcredit systems and combining the loan along with other nonfinancial services like training, marketing, and education can help microcredit to overcome its shortcoming (Jia et al., 2016). External microcredit intervention needs heterogeneous implementation at local and individual levels to be effective (Loubere and Shen, 2018).

We introduce a new microcredit operating mechanism based on Yunus' theory that links social capital with lending to decrease default rates and increase default cost. We are not only proposing to give loans to vulnerable groups, but also providing a series of nonfinancial services, including help with starting a project, assistance with technology,

selling products, and helping to pay the interest rate of microcredit. Additionally, we select appropriate variables that are reflective and consistent with the culture of China.

3. Microcredit innovation mechanisms in Yunan county, Guangdong, China

Yunan county, located in the Guangdong province of China, is a typical mountainous and agricultural area with 500,000 inhabitants. Of these people, 81% live in a rural setting (Figure 1). The majority of farmers are involved in the production or processing of orange, seedless wampee, and sericulture. When the Credit Village program started in 2009, the per capita annual net income of farmers was RMB 5,894, which was much lower than the RMB 6,907 per capita income of Guangdong residents. The number of people below the poverty line in the agricultural sector was about 28,000, or 4497 households. Research conducted by the People's Bank of China in 2009 showed that 80% of the farmers in Yunan county think that it is difficult for them to obtain loans from formal financial institutions. The loans owned by formal financial institutions in Yunan county increased by only 22.41% from 2000 to 2008 and the loan-to-deposit ratio was 36.7% in 2008. The slow growth of loan disbursement indicates that farmers are facing a bottleneck in borrowing. In our sample, 44.1% of farmers think they could not borrow what they need, and 10.56% of farmers believe they could borrow only a very small part of what they need before the Credit Village program got started.

For resolving credit restrictions and enhancing food consumption, farm input applications, and health and educational attainments, the government of Yunan county has been cooperating with microfinance institutions (MFIs) to implement Credit Village since 2009. The goal of the program is three tier credit risk management: (1) rating of farmers based on political, economic, and social information, (2) establishing an information center for the farmers and for small and medium enterprises (SMEs) so that MFIs could obtain information to lower transaction cost, and (3) alleviating poverty by way of microfinance so that the path of disbursing loans to farmers and the poor is redesigned.

3.1 Credit Village

Farmers cannot obtain loans from financial institutions without collateral. A Credit Village can give loans without collateral; this is an innovation of the Yunan County Credit Village (YCCV). The functioning of YCCV is based on the microcredit theory that relies on social capital as collateral. The first step consists of rating individuals by a rating body comprised of eighteen individuals representing government officials, cooperatives, village leaders, Chinese Communist Party members, retired cadres, and other respected members of the village (Figure 2). The ratings reflect the basic conditions of the farmers, their credit, and other financial conditions. An application for rating is

initiated by a household. After the application is received by the rating body, the application gets evaluated and the household's credit worthiness is classified into one of the following categories: excellent (80-100), good (70-80), average (60-70), and poor (below 60). A household with an excellent or good rating is a credit worthy household, which qualifies it to obtain a loan at a reasonable interest rate (Figure 3). This type of household is considered a low risk or model household by the county government.

Rural Credit Cooperatives will commit a loan of up to 30,000 RMB to a household with an excellent credit rating and 10,000 RMB to a household with good credit rating. If three or more households with a good credit rating form a group, each one of them can get a loan up to 20,000 RMB. A household with an average credit rating cannot borrow independently but may qualify to borrow if it forms a group of at least three members. In such cases, each household receives up to 10,000 RMB. This is done to reduce the risk associated with lending to households with an average credit rating.

Of the 623 households in the Wutan village of Yunan county, 420 households qualified after participating in the rating process. Among them, 41 households received an excellent credit rating, 318 households received a good credit rating, 29 households received an average credit rating, and 32 households received a poor credit rating. A total of 85.5% households received an excellent or good credit rating. Wutan village was given recognition as a Credit Village after a year of assessment.

Credit Village recognition is important for the economic well-being of a village. The conditions for becoming a credit village are: (1) non-delinquent loans should account for at least 80% of the total loans disbursed to households, (2) the village must have 60% of households with excellent or good credit ratings, and (3) the Village Party Branch and People's committee must actively support the work of financial institutions and assist financial institutions to organize funds and recover defaulted loans. A credit village could receive a greater loan size and 10% additional discount in the interest rate from financial institutions. Unlike the microcredit setting in Grameen Bank, a household who defaults on their credit can jeopardize the whole village's credit village recognition.

The ratings grade can also be used to discover a model individual to be recognized by the county government every year (while a defaulter will be punished not only in the credit market, but also in social and political settings). The rating result is dynamic, and it is applicable for only two years (the objective is to make loan repayment a habit). Within two years of approval, households can use the authorized credit amount. The interest rate is charged according to the actual amount of the loan and there are no additional fees associated with it.

Through the Credit Village, the relationship between farmers and cooperatives changes into a relationship among farmers, cooperatives, and government. Government plays a coordinating role between the cooperatives and farmers by making the credit

rating uniform. If an individual defaults, he gets penalized socially, politically, and economically. On the other hand, if an individual repays, the Credit Village continues to gain an advantage in loan size and loan rate (multiplier effects).

3.2 County credit information center

Although the Rural Credit Cooperatives in China have a goal to increase the volume of loans disbursed, credit risks and high transaction costs are major obstacles to the microcredit system. The county credit information center is a mechanism innovation that provides credit worthiness information about farmers and SMEs to MFIs. Yunan county is a pioneer in the sense that it created the first county-level credit center that collects information regarding farmers and SMEs originally stored in the Public Security Bureau, Administration for Industry and Commerce, Electric Power Company, Ministry of Human Resources and Social Security, the bank and other departments. This information includes wage arrears information from the Bureau of Human Resources and Social Security, payment to the Telecom and Water Supply Corporation and Electric Power Company, litigation in court, the failure to pay tax from the Local Taxation Bureau, illegal environmental activities reported to the Bureau of Environmental Protection, administrative penalties and awards, and certificates of qualification in relevant

departments. We provide the functioning structure of the Yunan County Information Center in Figure 4.

If MFIs previously needed information about clients, they had to expend lots of resources and it was difficult to obtain information as they had to contact different departments of government. Yunan County Credit Information Center is unique because it provides both financial and nonfinancial information related to farmers and nonfarmers that is not readily available to most financial institutions. This integration of information reduces adverse selection and moral hazards while also leading to lower transaction costs and interest rates.

The importance of the information center can be understood even better by observing what happened in India. There, farmers borrowed money from one MFI to pay to another MFI, creating a consumptive loan rather than the productive loan it was intended to be. This has been highlighted by Armendáriz and Morduch (2010) and Dogra (2016).[2] This type of incident can be avoided through the information center innovation started by Yunan county.

3.3 Poverty alleviation in a financial way

[2] http://thewire.in/18937/why-microfinance-is-becoming-a-bad-word-all-over-again/

Innovation of the poverty alleviation mode is the third aspect of YCCV. The general *modus operandi* of poverty alleviation in China has been to provide food, clothing, or perhaps some monetary support to the rural poor. This approach is a temporary solution to poverty. YCCV implements a financial way to reduce poverty that puts relief money in a foundation as collateral (Figure 5). The Rural Credit Cooperatives disburses loans totaling up to five times the deposited relief money in the foundation. The loan amount provided by the Rural Credit Cooperatives to a borrower cannot exceed 20,000 RMB, the interest amount has to be paid quarterly, and the principal has to be paid by maturity (generally within three years). Another condition for the loan is that 90% of the interest amount has to be paid by the government officials who are responsible for helping the poor, and the remaining 10% interest amount is paid by the borrower. Each of the borrower's projects gets appraised by the relevant government departments for feasibility, and the government departments offer technical support, provide agricultural inputs in credit, and help borrowers sell output. By following these steps, relief money is changed into a microcredit loan with non-financial services and a low interest rate.

There are at least three advantages of this innovation developed by YCCV:

1. From the perspective of non-financial services, Nader (2008) recommends additional development activities (non-financial services) while providing loans to enhance the ability of borrowers. Although Bhatt and Tang (2002) warn that

non-financial services should not be a necessary condition for borrowing, the non-financial services at Yunan involve feasibility analysis, technical support, and health awareness services. Therefore, it should be more effective at improving the livelihood of poor farmers.

2. From the point of view of the interest rate charged, the international microcredit interest rate is between 20% and 50%, compared to only a 6% interest rate on the microcredit provided to poor farmers in Yunan county (Even more interesting is the fact that only 0.6% is paid by the poor borrowers). Based on Dehejia et al. (2012), poor borrowers have more loan demand interest rate elasticity than the rich; therefore, a lower interest rate will provide incentives to poor borrowers to get microcredit loans.

3. The involvement of NGOs or other organizations between the borrowers and the financial institutions has been found to be effective in previous studies. Swain and Varghese (2009) indicate a long term positive impact such as more asset creation if NGOs act as intermediaries between banks and borrowers to provide non-financial services. When the loan is transferred through women's organizations, the impact of microcredit on empowerment of women is obvious, especially when women are in the organization for a long time and they participate in more training and group meetings (Holvoet, 2005).

4. Method

We can use a simultaneous equation method to test if the Credit Village loosens credit restrictions and improves farmers' living conditions through a change in asset buildup, health, and education expenditures. The impact on women's rights can be assessed using a probit model with the dependent variable related to women's decision making power (yes/no) in the household.

Long term assets, short term assets, medical expenditures, and education expenditures are interrelated to each other. Long term assets and short term assets have an impact on medical and education expenditures because selling these assets provides the cash needed for medical and educational expenditures. In the rural financial market, credit restrictions make owned capital more important than other factors of production. Short term assets are more liquid than long term assets. Medical expenditures can reduce the funds available for educational expenditures. If there were a choice between educational attainment and medical treatments, villagers were likely to select the medical treatment first. Long term assets can also be impacted by short term assets because short term assets are an important capital resource for purchasing long term assets. These variables are endogenous to the system; therefore, corresponding simultaneous equations can be expressed as follows:

$$M_i = \gamma_M + \alpha_M D_i + \beta_M S_i + \theta_M F_i + \delta_M LA_i + \varphi_M SA_i + \epsilon_i^M$$

$$E_i = \gamma_E + \alpha_E D_i + \beta_E S_i + \theta_E F_i + \delta_E LA_i + \varphi_E SA_i + \rho_E M_i + \epsilon_i^E$$

$$LA_i = \gamma_{LA} + \alpha_{LA}D_i + \beta_{LA}S_i + \theta_{LA}F_i + \mu_{LA}G_i + \varphi_{LA}SA_i + \rho_{LA}M_i + \sigma_{LA}E_i + \epsilon_i^{LA}$$

$$SA_i = \gamma_{SA} + \alpha_{SA}D_i + \beta_{SA}S_i + \theta_{SA}F_i + \tau_{SA}H_i + \rho_{SA}M_i + \sigma_{SA}E_i + \epsilon_i^{SA}$$

Here, M is medical expenditures, E is education expenditures, LA is a long term asset and SA is a short term asset. The coefficient of F_i measures the impact of a participant's credit rating, loan from MFI and informal ways on household welfare. D_i is a matrix representing the farmers' demographics, including gender, job, education, household head, land and labor ratio. S_i is the proxy variable of the farmers' social situation. $G_i$is the proxy variable of factors that impact long term assets, but do not impact short term assets (Household income in 2010). $H_i$is the proxy variable of factors that impact short term assets, but do not impact long term assets (household members who are involved in farming); ϵ_i^j is error with $E(\epsilon_i^j|X) = 0$ and $corr(\epsilon_i^j, \epsilon_i^k|X) \neq 0$, where X is all exogenous independent variables.

Given that we have some dependent variables enter into another equation as explanatory variables and error terms are correlated across equations, we estimate the above model using a three stage least square (3SLS) method. The 3SLS can use the variance-covariance matrix of cross-equation error terms to correctly estimate the standard error of all equation parameters (Zellner and Theil, 1962; Faggian and McCann, 2009). The Hausman specification test results show that a better specified order of models

is: iterative 3SLS, 3SLS, 2SLS, OLS, so we choose to interpret parameter estimates from the iterative 3SLS in the results section.

The identification issue needs to be resolved when estimating a 3SLS model. Test statistics presented in Tables 1a and 1b indicate that there are no issues related to under identification in the model.

Self-selection issues are often encountered in loan disbursement, as Rural Credit Cooperatives sometimes give loans only to well-to-do clients. Those who receive loans may differ from the very beginning from those who do not receive loans and they continue to differ in resource endowment over time. MFIs choose poor areas where it is easier to implement microcredit. Therefore, unmeasured area factors and household attributes could be obstacles to calculating the real impact of microcredit.

Under the Credit Village system, MFIs give loans to farmers without collateral except in cases of households with poor ratings. Households with poor ratings only account for 7.7% in our sample. Some of these farmers can obtain loans under the system of financial poverty alleviation. We select three villages in the sample with similar political, economic, and social conditions. Furthermore by setting the credit rating level and village as independent variables, we can avoid the selection bias issue.

To determine the variables affecting women's rights, we use the following specification:

$$W_i = \gamma_W + \alpha_W D_i + \beta_W S_i + \theta_W F_i + \sigma_W R_i + \epsilon_i^W$$

Except R_i, all the variables used in this equation are defined previously. $R_i$is a matrix that includes farmers' social relationship variables, such as the number of siblings and the surviving parents of both spouses. This equation is estimated using an IV probit model. Variable *Household income in 2011* is endogenous and we use the village as an instrument variable. Different villages have different geographic orientations and soil fertility levels that can be important factors affecting income generation, but that is only a cause, not a result, and therefore has no relationship to the error term or the women's rights variable. These geographical and soil related variables impact women's rights only through income.

5. Data and Variables

We interviewed randomly selected households from three villages (Dadi, Gumian, Wutan) in Yunan county, Guangdong province in 2012. These three villages have similar political, economic, and social conditions. The Credit Village has been implemented in Yunan county since 2009. We interviewed a total of 214 households: 48 households from Dadi village, 31 households from Gumian village, and 135 households from Wutan village. Most of the farmers are from Wutan village because the Credit Village program was first implemented there.

We use demographic, social, economic, and financial variables in regression models. Dependent variables include education expenditures, medical expenditures, long term assets, short term assets, and women's rights (Table 2). Education and medical expenditures reflect the amount of household spending on education and health in 2011. Compulsory education and some form of minimal medical insurance have been implemented in the study area for many years prior to the Credit Village program. However, education and medical expenditures are still a significant component of spending by farmers. Family members in households go to university or pursue other educational training. There is also the likelihood that some family members will incur health problems that will increase loan demand because rural income is seasonal, but medical and educational expenditures occur throughout the year. Our hypothesis is that the Credit Village provides liquidity and loosens cash restrictions, thereby allowing farmers an opportunity to spend on education and medical expenses when needed.

We sum the value of family house and farm machinery, electrical appliances, and furniture in 2011 to derive the total long term assets. The value of household livestock in 2011 represents the short term assets. Short term asset investment and parts of long term asset investment (except for farm machinery) are termed productive investment in accordance with the loan rules of MFI. Therefore, our hypothesis is that Credit Village has a positive impact on short term and long term asset buildup.

The value of the women's rights variable is equal to one when women can decide how to spend money in households. Compared with other variables like decision-making, resource-controlling, better treatment in district, a sense of self-confidence, family harmony, and access to loans, this variable can express women's rights more accurately. In China, rural women have less rights than urban women because urban women can earn income from outside work. If the Credit Village can give loans to rural women, they can earn more and gain more rights. So we hypothesize that the Credit Village has a positive impact on women's rights.

Independent variables include demographics, social relationships, and the economic and financial characteristics of a household. Demographic variables include gender, age, education, job, labor ratio, village, the number of family members involved in farming, student number in the household, and land size. A farmer's financial situation is indicated by participating in the credit rating program, borrowing from a microfinance institution (MFI), and borrowing from friends and relatives. The number of parents, siblings, and the spouse represent the social relationships of households. Independent economic variables are income in 2011 and in 2010, along with the health situation of household members.

Definitions of variables used and their descriptive statistics are shown in Table 2. As shown in the table, 83.18% of household heads are male and 16.82% are female,

45.79% of household heads are above 50 years of age, the education level of household heads is concentrated at the junior high school level (with 39.91% of the sample belonging to this category) and there are 27.71% household heads with only a primary school education, and 4.72% household heads with a university level education. The main occupation of household heads is farming, accounting for 82.24% of all surveyed households, and small business and migrant work are stated as occupations by 4.12% of the household heads. The three villages selected in the study are primarily dominated by farming operations, so the lion share of income for the households in these villages comes from farming. The education level and the jobs chosen by households are related, as low education precludes many household heads from getting high-paying jobs, so they are engaged in a low income generating job like farming. Similarly, old age may restrict one to migrant work or owning a small business.

In our sample, 74.15% of women can decide how to use money, whereas 63.90% of women can decide on all family related issues. The social status and freedom experienced by Chinese women is better than that of women in other developing countries.

Only 29.65% of households in the sample participated in the credit rating program. Because of a lower participation in the program, there are still 39.72% households who cannot borrow from MFIs. Of those who borrowed money, 24.39% of

households borrowed only from microcredit institutions, whereas 75.61% borrowed from friends and relatives to meet their family's financial needs in 2009-2011. There are 41.71% households who incurred medical expenditures.

On average each household has about six family members, of which three are laborers and two are engaged in farming. The average landholding size is 8.72 Mu,[3] including woodlands and arable lands. The average number of family members at school equals around one person. The number of siblings of household heads and spouse is averaged to four. The number of parents belonging to the head of the household or the spouse is one. Siblings and parents represent social relationships that provide informal financial resources, but elderly parents may become a financial burden to households.

6. Results

6.1 Impact on education

Results from the iterative 3SLS model (Table 3) show that household expenditures in education go down if medical expenditures increase. Results indicate that these two expenditure categories are substitutes. For every one percent increase in medical expenditures, there is a 2.60 percent reduction in education expenditures. Land holding has quadratic effects on education expenditures. As land holding increases, education

[3] 15 mu = 1 hectare

expenditures also increase, but education expenditures decrease after the land holding size reaches to 23.3 mu (approximately 1.56 hectares). This is because land has dual characteristics. Land as capital provides returns annually that can support expenses needed for education. In a rural setting, more land also requires more laborers for the production process. This labor requirement for production forces household members to work in the field instead of going to school, thereby reducing education expenditures. Others have found similar results in the labor allocation tradeoff between education and farm work in developing countries (Maldonado and Gonzalez-Vega, 2008).

Households in the Dadi village spend about 3.24% less on education than the households from the other two villages. Dadi village did not receive the title of Credit Village by the time of this data collection. Marginal effects of some of these significant variables at 1st quartile, median, and 3rd quartile values are shown in Figure 6 (land) and Figure 7 (medical expenditures). Credit rating and loan from MFIs have no impact on educational expenditure.

6.2 Impact on medical expenditures

Results show that land has quadratic effects on household medical expenditures (Table 3). As land holding increases, medical expenditures also increase, but medical

expenditures decrease after the land holding size reaches to 16.25 mu. We do not find long term and short term assets impacting the amount spent on medical treatment.

In China, medical insurance was implemented when the Credit Village program started, but the coverage is for basic checkups and low priced medicine. Oftentimes the coverage amount is low and households have to pay in full after the maximum allowable funds from the insurance are exhausted. In such cases farmers borrow from friends and relatives, as financial institutions cannot give loans to farmers for medical treatment unless something is used as collateral or there is a guarantor. A farmer with more land can buy commercial insurance, which means he or she does not need to spend out of pocket money for medical expenditures once the premium is paid (the premium for basic coverage for one person per year is about RMB150, whereas it is approximately RMB 500 per person per year for the commercial coverage[4]). In our sample, 82.2% households are farmers; therefore, more land holdings mean they can buy commercial insurance, thereby avoiding their responsibilities for medical expenses in case of a catastrophic health event. We also find that a household with no major health problems spends less on medical expenditures.

[4] The Chinese government implements the basic health insurance program for farmers, the premium of which is set at about RMB 150 per year. Commercial insurance should be purchased from commercial companies so the premium amount is different. The value shown here is averaged across several providers based on the authors' knowledge of the area and information available from insurance agents in the region.

Marginal effects show that a one mu increase in land holding increases 347.52 RMB in medical expenditures. Marginal effects of land holding at 1st quartile, median, and 3rd quartile values are shown in Figure 8. Credit rating and loan from MFIs have no impact on medical expenditure.

6.3 Impact on long term assets and short term assets

We use the sum of economic value of the family house, farm machinery, electrical appliances, and furniture to define long term assets. Among these, the value of the house and farm machinery contributes the most towards long term assets. The long term assets increase if farmers acquire these items. Yunan county farmers have mainly fruit orchards and livestock, where manual labor is the norm during the production and harvesting process. Machinery use is minimum.

Results in Table 3 show that household heads of 31-40 years of age invest less in long term assets compared to other households. We can see from Figures 9, 10, 11, and 12 that household heads of 31-40 years of age had the lowest income. Figures also show that a farming head of household invests less on long term assets than others in both 2010 and 2011. This group of farmers does not invest in long term assets compared to the household heads of other ages and professions. They are in the stage of life between being students and older parents. Daily expenses and a low salary make them unable to accumulate long

term assets. The mountainous landscape of Yunan county is also a reason for not investing in long term assets as a farmer.

Results in Table 3 show that more farming members in the household lead to more short term asset investment. We use the value of household livestock in 2011. This result give us information about the importance of livestock in the rural households in the sample districts.

6.4 Impact on women's rights

We use a female in the household having the ability to make decisions as a proxy to measure women's rights. The results (Table 4) show that if the household head's parents are both alive it has a negative impact on women's rights. If a household head is older than 50 years, the woman's rights are less compared to other age groups.

Land, as a proxy variable of assets, has a negative effects on women's rights. Women in households with more land holding have less rights, which is because of the unique land system in China. In China, the government implements land laws to protect the rights of women. Land owned by married women gets expropriated by the village collective of their former domiciles, requiring the village collective of their husbands to give them land. However, if both parents of the woman in question are still alive, the village collective does not expropriate the land, and the new residence village collective

does not redistribute lands to these married women. This creates a situation in which married women can be landless. If a household owns more land this only give husbands more rights, not wives. In our study, 82% of household heads are farmers, and farming is the way of life. Land means economic rights in the family, and those who own more land also have more economic rights.

If a household head is above 50 years of age, he is likely to be more conservative and more likely to make decisions regarding all family issues. A younger household head is likely to be more educated and consider his wife an equal partner. Women's rights are therefore related to the household head's age, and this is confirmed by our results. It is traditional in China and many other Asian countries that the parents of the household head live with their son. The wife of the household head must obey what her husband's parents say. Otherwise, she is considered unfit to be a daughter-in-law by other villagers and cannot continue to live in the village. Therefore, living parents of the household head have a negative impact on women's rights.

Financial situations such as the participation in credit rating, borrowing from financial institutions, and borrowing from relatives and friends have no effect on women's rights. Credit Village has no mechanism to focus on women's rights.

7. Conclusions

Results indicated that Credit Village has no impact on long term assets, short term assets, education expenditures, medical expenditures, and women's rights. However, the Credit Village loosens credit restrictions to some extent as can be seen from Figures 6 and 7. We found that although only 30% of farmers took part in the credit rating, credit disbursement has changed substantially in Yunan county. Before the implementation of the YCCV credit rating program, 45.83% were able to obtain loans, but this jumped to 65.79% after the credit rating (Figures 13 and 14).

On the basis of these observations, one may wonder why the Credit Village program did not improve some of the indicators we have measured in this study. We think time and involvement are the two main reasons. Our survey was conducted only two years after the implementation of YCCV. YCCV may not have impacted economic activities within that short time period. To make the Credit Village program more effective, all agents and entities, including the farmer, MFI, and government, need to work in unison.

Credit village is dominated by the county government and its feasibility is determined by the system set-up and follow-up with different organizations and the successful implementation of the credit rating system. Only county government can make the different departments share information and provide confidence to loan applicants about the system. Dependence on the government to implement and induce market

behavior can result in a lack of long term sustainability, full of hysteresis and variability. Potential replications of the Credit Village program by other countries may be feasible by overcoming some of the drawbacks identified in this paper.

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Table 1a. Instrumental variable identification

VARIABLES	Weak identification test Kleibergen-Paap Wald F-stat	Over identification Hansen J stat	Under identification test Kleibergen-Paap LM stat
Medical expenditure	2.721	8.818 (0.18)	12.091 (0.09)
Education expenditure	2.424	5.549 (0.47)	13.412 (0.06)

Note: P-value of Chi-square in parentheses *** p<0.01, ** p<0.05, * p<0.1. Weak identification test depend that 2.721 is less than 20% maximal IV size value 10.41 and 20% maximal IV relative bias value 6.20.

Table 1b. F-statistic of the first stage

	(1) Medical expenditure	(2) Education expenditure	(3) Long-term asset	(4) Short-term asset
F value	4.12 (0.000)	2.94 (0.000)	1.93 (0.022)	1.66 (0.060)

Note: Prob > F in parentheses

Table 2. Variable Definitions

Variable	Definition	Average	Std. Dev.
Dependent variables			
Education expenditure	Amount of household education expenditure in 2011	5240.67	10501.54
Medical expenditure	Amount of household medical expenditure in 2011	5890.19	12158.63
Long-term asset	The sum value of family house and farm machinery, electrical appliances and furniture in 2011	122645.10	201591.20
Short-term asset	The value of household livestock in 2011	3898.99	17285.76
Women right	Women can decide how to spend money of household	0.74	0.44
Explanatory variables			
Gender	Gender = 1 if the household head is male, else is 0	0.832	0.375
Sickness	Family members had major disease in 2011	0.583	0.494
Students	Number of students in the household	1	1.180
Credit rating	Family participates in credit rating	0.300	0.460
Land	Mus of household woodland and farmland	8.721	12.020
Loan from MFI	Household obtained loan from MFI only in 2009-2011	0.218	0.415

Loan from relatives and friends	Household obtained loan from relatives and friends only in 2009-2011	0.647	0.480
Labor ratio	Number of working members/family members	0.612	0.238
Wutan village	The household lives in Wutan village	0.630	0.484
Dadi village	The household lives in Dadi village	0.224	0.418
Age31-40	The age of household head is 31-40	0.145	0.353
Above 50	The age of household head is above 50	0.458	0.500
High school	The education level of household head is university	0.1830	0.388
University	The education level of household head is university	0.047	0.212
Farmer	The job of household head is farmer	0.822	0.383
Village cadre	The job of household head is village cadre	0.047	0.212
Farming	The amount of farming member in your family	2	1.513
Income2011	Household income in 2011	38075.74	58992.54
Income2010	Household income in 2010	40370.34	64729.17
Alive siblings of head	Living siblings of household head	3.588	2.129
Alive siblings of spouse	Living siblings of spouse	3.875	1.975

Alive parents of head	Living parents of household head	0.842	0.840
Alive parents of spouse	Living parents of spouse	0.962	0.850

Table 3. The impact of Credit Village on education expenditure, medical expenditure, long-term asset, and short-term asset in Yunan county, Guangdong province, China obtained using an iterative 3SLS model.

Variable	Education expenditure	Medical expenditure	Long-term asset	Short-term asset
Short-term asset	-0.379	-0.031	0.141	
	(0.322)	(0.083)	(0.125)	
Education expenditure			-0.00434	-0.286
				(0.379)
			(0.163)	-1.019
				(2.331)
Medical expenditure	-2.601***		0.746	1.376
	(0.646)		(0.964)	(1.583)
Gender	1.348	0.314	-0.725	1.706
	(1.857)	(0.484)	(0.675)	(1.357)
Age31-40			-1.495**	0.279
			(0.603)	(1.042)
Above 50			0.0797	2.988
			(0.475)	(3.753)
High school			0.383	2.254
			(1.550)	(3.249)
University			-2.104	0.788
			(1.475)	(3.153)
Farmer			-1.944	3.395
			(1.373)	(4.158)
Village cadre			-2.596	3.395
			(1.887)	(4.158)
Income2010			0.116	
			(0.0776)	
Credit rating	-0.289	-0.404	-0.707	1.970
	(1.737)	(0.452)	(0.707)	(1.634)
Land square	-0.00485***	-0.002***	0.00121	-0.00290
	(0.00162)	(0.000)	(0.00174)	(0.00411)

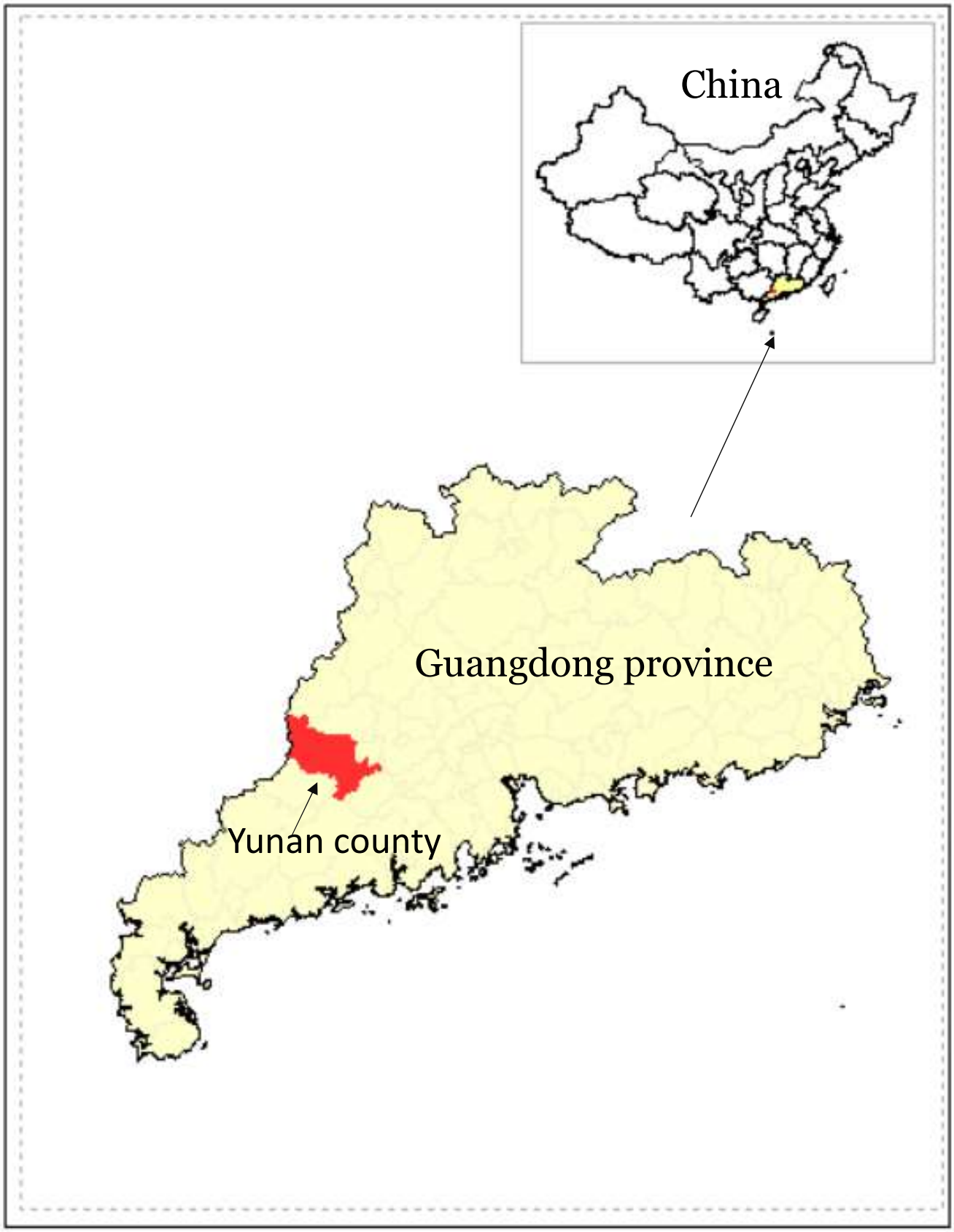
Land	0.226*	0.065**	-0.0177	0.158
	(0.119)	(0.030)	(0.0799)	(0.187)
Loan from MFI	2.674	-0.151	0.153	1.521
	(2.370)	(0.621)	(0.936)	(2.348)
Loan from relatives and friends	2.989	0.380	-1.460	2.445
	(2.381)	(0.619)	(0.958)	(2.249)
Labor ratio	-3.474	-0.346	1.233	0.235
				(3.147)
farming				0.822**
	(3.271)	(0.872)	(1.291)	(0.352)
Wutan village	-0.919	-0.437		
	(1.476)	(0.428)		
Dadi village	-3.238*	-0.658		
	(1.938)	(0.547)		
Sickness		-0.707***		
		(0.216)		
Students	0.793	-0.041		
	(0.614)	(0.167)		
Long-term asset	-0.0640	0.057		
	(0.701)	(0.192)		
Constant	27.60***	8.156***	5.898	4.065
	(9.522)	(2.402)	(9.606)	(23.32)
N	107	107	107	107

Table 4. Impact of the Credit Village on women's right in Yunan county, Guangdong province, China as obtained from estimating a probit model.

Variable	Coefficient (Robust standard error)
Sex	-0.047 (0.448)
Age31-40	-0.072 (0.398)
Above 50	-1.262*** (0.481)
Farmer	-0.182 (0.727)
Land	-0.112** (0.053)
Land square	0.002 (0.002)
Credit village	0.151 (0.403)
Loan from MFI	0.408 (0.514)
Loan from relatives and friends	0.628 (0.441)
Labor ratio	-0.231 (1.045)
Students	0.037 (0.196)
Living siblings of head	0.123 (0.080)
Living parents of head	-0.611** (0.300)
Living siblings of spouse	0.158 (0.132)
Living parents of spouse	-0.040 (0.266)

Income2011	0.329
	(0.354)
Constant	-2.072
	(4.180)
N	105

Note: Values in the parentheses are standard errors.



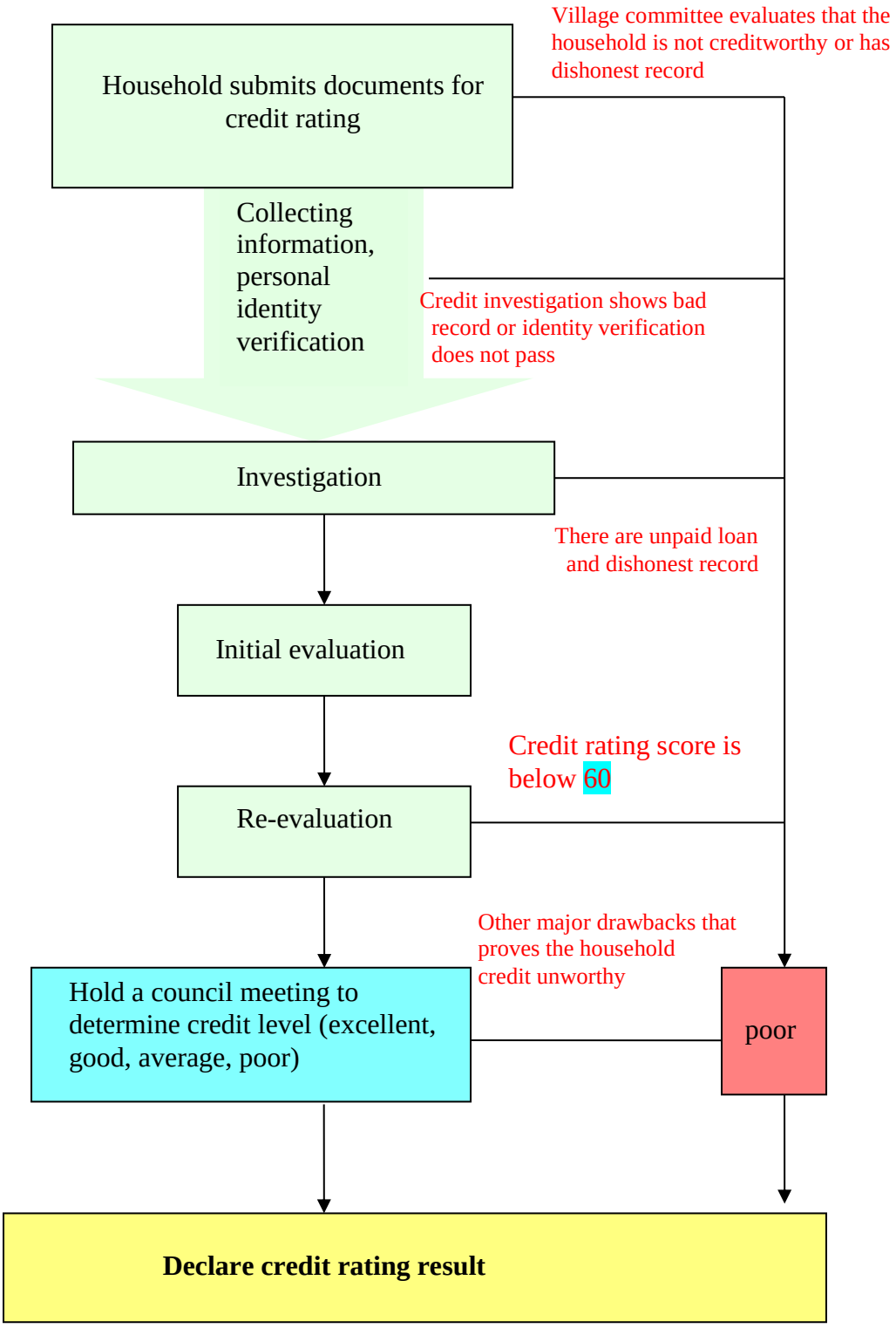


Figure 2. Procedure for rating household's credit worthiness in Yunan County, China (Source: Modified and translated from the Yunan county government document)