

Sustainability of Micro-credit System in Rural China

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Synopsis

As the main micro-credit institutions in rural China, Rural Credit Cooperatives (RCCs) are suffering the unsuccessful repayment induced by rural households' ignoring about RCCs' sustainability. And that will damage the long-term benefit of rural households and RCCs. In this paper we are trying to solve above problem by introducing a two-period model. As one exciting result, we found that the expected utility in the future will give rural households positive incentive to care about RCCs' sustainability. And there is one optimal loan size for RCCs' sustainability and the loan interest rate should be kept at some adequate level.

Keywords: rural China, micro-credit, rural households, Rural Credit Cooperatives, sustainability

1. Introduction

After Prof. Muhammad Yunus & Grameen Bank Awarded the Nobel Peace Prize for 2006, microfinance attracted the global attention again. The birth of microfinance in Europe (maybe in the world, according to our knowledge) dates back to tremendous increases in poverty since the 16th century. In Ireland, loan funds emerged in the 1720s, using peer monitoring to enforce the repayment in weekly instalments of initially interest-free loans from donated resources (Seibel, 2003). Of course, that microfinance only means the narrow sense of modern microfinance that consists of micro-credit, micro-saving and micro-insurance (Zeller and Sharma, 2000). In other words, the microfinance started in 1720s in Ireland should be considered as micro-credit. Compared with the other two kinds of microfinance, micro-credit is much more famous and popular in the whole world. And many people and institutions (the World Bank, the Grameen Bank, ProFI, BKDs, BANCOSOL and so on) are applying themselves to applying, generalizing and improving micro-credit programs. There are many ideas about what the micro-credit exactly is. According to Prof. Muhammad Yunus, for example, there are ten kinds of micro-credit

(Yunus, 2006). Here, we would like to refer to the definition given by OECD: Micro-credit programs offer loans and/or technical assistance in business development to poor people (OECD, 1996). And in general, according to OECD, micro-credit has one or more of the following three goals (OECD, 1996).

- [1] Improvement of self-sufficiency and welfare of poor entrepreneurs.
- [2] Development of stable sources of income and full-time employment.
- [3] Expansion of micro-enterprises to larger firms.

Since its birth, with its new design and operation, micro-credit has been becoming more and more helpful and popular in the world, especially in rural or undeveloped areas. And it does make much meaningful improvement in the outreach and relevance of credit for the poor. Similar with its definition, there are many opinions about how good micro-credit is. According to Jonathan Morduch (Morduch, 1999), micro-credit (although he used the term of microfinance, but according to our opinion, he exactly meant micro-credit) has the following advantages at least.

- [1] Contract innovations like "Group Lending" mitigate the problems created by informational asymmetries. Because the new designed loan contracts focus on

encouraging mutual monitoring by considering local or individual realities fully, micro-credit loan suppliers will face less informational asymmetry.

[2] High repayment rate. Besides mutual monitoring, the relatively more trust from loan suppliers to rural households also improve the latter's incentive to repay the micro-credit loan and related interest. As a good example like a perfect advertisement, the annual repayment rate of Grameen Bank is always beyond 90%.

[3] Make credit really reach poor individuals, particularly women. Because the main purpose of micro-credit is to supply the poor with necessary help such as loan, it is supposed to work better on poverty mitigation than traditional or normal bank. Further, some micro-credit programs pay main attention on disadvantaged people such as women. Again, Grameen Bank gives us a good example.

[4] Reduce government involvement. Many micro-credit programs or institutions are organized and operated un-governmentally. And the most of the loan allocation depends on mutual monitoring and individual information among rural households, so civil opinion plays one more important role in loan distribution.

[5] Pay close attention to the incentives that drive efficient performance. According to its definition from OECD, micro-credit is not subsidy. That means it has to reach self-sustainability. In other words, micro-credit programs have to cover all the cost of operation and loan-getting by their own income in long term.

Micro-credit has been doing similar active things in rural China. But besides the obvious positive effect on the development of rural China, there still are some insufficiencies related with micro-credit programs in the rural areas of China.

The rest parts of this paper will be arranged as follows. Chapter 2 will talk about the characteristics and insufficiencies of micro-credit in rural China by focusing on Rural Credit Cooperatives (RCCs) that are the main institutions supplying rural households with micro-credit loan. As the end of this chapter, we will get our focus problems for this study. Chapter 3 will introduce the model and discuss the results. Chapter 4 will get the conclusions based on the results and discuss the future work.

2. Micro-credit in Rural China

It is seen from Fig. 1 that present rural households

can get loan service from several resources. The quick economic development and more governmental attention on the development of rural China caused the delectable situation.

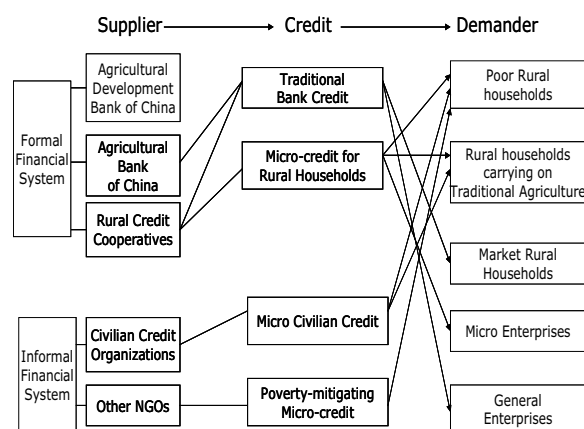


Fig. 1 The structure of the micro-credit in rural China (see Xu and Zhu, 2006)

Under the monitoring of the People's Bank of China (PBC), Rural Credit Cooperatives (RCCs) are the main institutions that supply rural households with loans in the forms of individual micro-credit and group lending micro-credit. The latter form comes from Grameen Bank mode. During 1950s, Chinese Rural Credit Cooperatives (RCCs) were found as the rural primary organizations of the bank. Their main function is to supply rural households with necessary loan for agricultural production. In 1996, rural financial system reformation happened. The Agricultural Bank of China has no longer supervising right on Rural Credit Cooperatives (RCCs). The latter are becoming the cooperatives that make their own management decisions (Kawahara, 2005). Individual and group-lending micro-credit loans from RCCs were put into practice in 1996 and popularized in 2000. The loan interest rate should be decided by RCCs with considering about the basic interest rate set by People's Bank of China. Loan term is always 1 year. In the end of 2002, 93% of RCCs are operating micro-credit loans. And more than 20% rural households got micro-credit loans. When the loan size is relatively bigger, the group-lending is proposed. The loan group consists of 3-5 rural households. They have mutual monitoring among themselves (Kawahara, 2005).

According to current study on RCCs, they at least have the following insufficiencies (Ding et al., 2006; Chen and Xie, 2002).

[1] Loan granting process is not normative. Many details

(such as loan size, loan interest rate and so on) of micro-credit loan allocation are not clear. That induce human resources wasting and management cost increasing.

[2] Credit risk still exists. It is even involved in Group-lending Micro-credit Loan, because it is not very clear that who should be responsible to the final repayment when some group member fails to pay back the loan and interest.

[3] Post-loan monitoring is not adequate. RCCs rely too much on mutual monitoring after the loan was allocated because the capital and resource for post-loan monitoring are limited. And RCCs will get un-complete or incorrect information from lending-group because of rural households' disability on monitoring or incentive to hide truth. All the fact is not good for RCCs to value and manage the credit risk.

[4] The sustainability of Rural Credit Cooperatives is being challenged. Because of relatively high credit risk, RCCs' income can not cover relatively high operation cost.

[5] Micro-credit organizations are lack of incentives and courage to go further. The development of micro-credit is lack of adequate economic and law environment while government behavior always interrupts the management and operation of micro-credit programs.

[6] Borrowers are lack of incentives and pressures to make good use of micro-credit loan. The interest rate of micro-credit loan in rural China is always lower than market loan interest rate. In some sense, that will give the borrower one wrong hint that it is easy to pay back loan and interest. So borrowers will not try their best to use the loan adequately.

In this paper, we would like to focus on the problem related with sustainability of RCCs. Because that is the key question that involves all above insufficiencies. According to OECD, there are two level meanings for the sustainability.

[1] Self-sufficiency, the first level of sustainability, requires sustainable micro-credit programs to cover operating expenses (including loan losses and the cost of capital) entirely with internally-generated sources of income (OECD, 1996).

[2] Long-term service, the second level of sustainability, requires sustainable micro-credit programs to continue to provide service to its customers or clients over the long term (OECD, 1996).

And in general, the sustainability of one micro-credit

program has the following importance (Buss, 1999).

[1] Make micro-credit different from subsidy. Critics retort that failure to hold micro-credit programs to the sustainable or self-sufficiency standard allows many weak organizations to persist when they should be terminated.

[2] Only when sustainability is achieved can outreach be durative. Critics fear that the rapid growth in size and in number of programs has empowered the micro-credit movement to such an extent that it cannot be held accountable.

As for RCCs' case, failure to keep sustainability comes from relatively high operation cost and credit risk. And the root of credit risk is rural households' unsuccessful repayment induced by their ignoring about RCCs' sustainability. In general, rural households only focus on current income and do not care about future welfare. As we know, the unsuccessful repayment will damage the sustainability of RCCs because the cost of capital and even the capital itself will not be gotten back. That is not good for RCCs to supply rural households with long-term micro-credit. And without long-run loan support, rural households can not make crop or animal production continue. As one certain but bad result, rural households' long-run benefit will also be damaged. Equally important, we cannot stop the micro-credit supplying from RCCs, because that will affect rural households' current welfare and even their future benefit. So what we can do? For solving above embarrassment, this paper introduced one game in which rural households know that some long-run income will come in the future if they put adequate attention and effort on their repayment to RCCs and make RCCs can supply durative loan service. In the coming model, we are trying to solve the following related problems.

[1] How to give rural households enough incentive to care about RCCs' sustainability? In other words, is it efficient to increase repayment rate by introducing some kind of future welfare?

[2] Is there any optimal level for the size of loan? In other words, is it true that bigger loan size means more positive outcome for RCCs and rural households?

[3] Is it true that higher loan interest rate is better for RCCs? In other words, should we increase micro-credit loan interest rate as high as possible for improving RCCs' sustainability?

3. Model and Results

3.1 Basic Idea

It is seen from Fig. 2 that in our model there is some kind of future welfare that connects RCCs' sustainability with rural households' expected utility. For simplifying the analysis, we supposed a two-period model in which we have two parties: RCCs and rural households. At first, RCCs decide the size of loan and the loan interest rate. Then in the first period, rural households get loans from RCCs and decide their effort invested in cultivating. Rural households' effort will decide the probability of successful crop and RCCs' surviving from period 1. Here we use RCCs' surviving to stand for their sustainability. Rural households' expected utility in period 1 equals to the income from successful crop minus the cultivating effort. And if RCCs still exists in period 2, rural households will get some certain welfare in the future. Under the contract supplied by RCCs, rural households' effort in period 1 decides his two-period expected utility. So rural households will choose adequate cultivating effort with considering RCCs' sustainability and maximizing his own two-period expected utility.

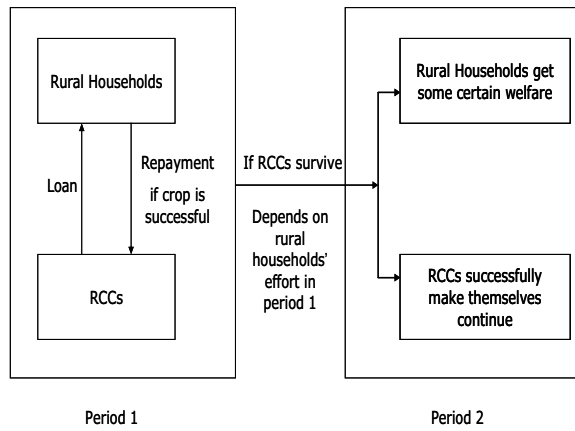


Fig. 2 Basic idea of the mechanism for prompting rural households to care about RCCs' sustainability

3.2 Variables

For the coming calculation and analysis, we define the variables of our model as follows.

- [1] We suppose the rural households are homogeneous and the number of them is standardized to 1.
- [2] m We let m be the loan that rural households get from RCCs. Here m is decided by RCCs.
- [3] $f(m)$ We let $f(m)$ be rural households'

production function in which $f' > 0, f'' < 0$.

- [4] r We let r be the loan interest rate asked by RCCs.

- [5] E^f We let E^f be the effort that rural households invest in cultivating.

- [6] $\gamma(E^f)$ We let $\gamma(E^f)$ be the probability of successful crop in which $\gamma' > 0, \gamma'' < 0$.

- [7] $\Phi(E^f)$ We let $\Phi(E^f)$ ($0 \leq \Phi(E^f) \leq 1$) be the probability of RCCs surviving from period 1. We suppose $\Phi' > 0, \Phi'' < 0$. According to above

assumptions, successful crop means successful repayment. And the rural households are homogeneous and the number of them is standardized to 1, so

$\gamma(E^f)$ is the number and ratio of the rural households who can repay the loan and interest successfully.

Because we suppose RCCs' surviving depends on the successful repayment rate, the probability of RCCs'

surviving should be $\Phi[\gamma(E^f)]$ that re-expressed by

$\Phi(E^f)$ for simplification.

- [8] W We let W be the welfare rural households will get in period 2 if RCCs survive after period 1.

3.3 Results

According to above basic idea and variable definitions, we have the two-period expected utility of rural households as (1) shows.

$$U = \gamma(E^f) \cdot [f(m) - m \cdot (1 + r)] - E^f \quad (1)$$

$$+ \Phi(E^f) \cdot W$$

Where $f(m) - m \cdot (1 + r)$ is the income that the rural household will get from cultivating if the crop is successful in period 1.

So $\gamma(E^f) \cdot [f(m) - m \cdot (1 + r)] - E^f$ is rural households' expected utility in period 1. And

$\Phi(E^f) \cdot W$ is their expected utility in period 2. It is easy to know that the two-period expected utility of rural households only depends on rural households' cultivating effort E^f when the loan size m , the loan interest rate r and the future welfare W are fixed. So we have rural households' optimal problem as (2) shows.

$$\begin{aligned} \text{Max}_{E^f} U = & \\ & \gamma(E^f) \cdot [f(m) - m \cdot (1+r)] - E^f \\ & + \Phi(E^f) \cdot W \end{aligned} \quad (2)$$

In order to maximize U , we need the first order condition about E^f as (3) shows.

$$\begin{aligned} L = & \\ & \gamma'(E^f) \cdot [f(m) - m \cdot (1+r)] - 1 \\ & + \Phi'(E^f) \cdot W = 0 \end{aligned} \quad (3)$$

Where we let L be the implicit function implied by (3).

According to (3), we can get the following partial derivative.

$$\begin{aligned} [1] \quad \partial L / \partial E^f = & \\ & \gamma''(E^f) \cdot [f(m) - m \cdot (1+r)] \\ & + \Phi''(E^f) \cdot W \end{aligned} \quad (4)$$

$$[2] \quad \partial L / \partial m = \gamma'(E^f) \cdot [f'(m) - (1+r)] \quad (5)$$

$$[3] \quad \partial L / \partial W = \Phi'(E^f) \quad (6)$$

[4]

$$\partial L / \partial r = -m \cdot \gamma'(E^f) \quad (7)$$

According to the theorem of implicit function, we can get the following results.

$$\begin{aligned} [1] \quad \frac{dE^f}{dm} = & - \frac{\partial L / \partial m}{\partial L / \partial E^f} = \\ & \frac{-\gamma'(E^f)}{\gamma''(E^f) \cdot [f(m) - m \cdot (1+r)] + \Phi''(E^f) \cdot W} \\ & \times [f'(m) - (1+r)] \end{aligned} \quad (8)$$

According to our previous assumptions, $\gamma'(E^f)$ is positive, $\gamma''(E^f)$ is negative, $\Phi''(E^f)$ is negative, $f(m) - m \cdot (1+r)$ is positive and W is positive.

So the first part of dE^f / dm is positive. That means $[f'(m) - (1+r)]$ decides dE^f / dm is positive or negative. When the loan size m is relatively small, the marginal outcome of cultivating $f'(m)$ will be bigger than $1+r$. That means $[f'(m) - (1+r)]$ is positive. So dE^f / dm is positive. That means E^f will increase when m increases. According to our previous assumption, $f'' < 0$. That means $f'(m)$ will decrease when m increases. So when m reaches some certain level m^* , $f'(m)$ will equal to $1+r$. That means $[f'(m) - (1+r)]$ is 0. So dE^f / dm is 0 too. That means m has no influence on E^f . After m exceeding m^* , $f'(m)$ will less than $1+r$. That means $[f'(m) - (1+r)]$ is negative. So dE^f / dm is negative too. That means

E^f will decrease when m increases. Now we can say that for maximizing E^f , we have the optimal loan size m^* that imply $f'(m) - (1+r) = 0$. In this paper, we assume the probability of RCCs' surviving (that considered as RCCs' sustainability) only depends on rural households' cultivating effort E^f . That means RCCs should maximize rural households' incentive for cultivating if RCCs want to improve their own sustainability as high as possible. And according to above result, there is one optimal loan size m^* that will maximize E^f with implying $f'(m) - (1+r) = 0$. So RCCs should choose adequate (NOT as big as possible) loan size in the loan contract with rural households according to the detailed conditions of local agricultural production. And in general, the agricultural production in rural areas is small-scale. So the optimal loan size m^* will be relatively small. That gives us one reason why the micro-credit is suitable for the rural areas such as rural China.

[2]

$$\frac{dE^f}{dW} = - \frac{\partial L / \partial W}{\partial L / \partial E^f} = \frac{\Phi'(E^f)}{\gamma''(E^f) \cdot [f(m) - m \cdot (1+r)] + \Phi''(E^f) \cdot W} \quad (9)$$

According to previous assumptions, $\Phi'(E^f)$ is positive, $\gamma''(E^f)$ is negative, $\Phi''(E^f)$ is negative, $f(m) - m \cdot (1+r)$ is positive and W is positive. So dE^f / dW is positive. That means E^f will increase when W increases. Then we can say that the expected welfare W in period 2 will give rural households positive incentive to care about RCCs' sustainability. W connected rural households' total expected utility with RCCs' sustainability that will affect their future income, because without RCCs' long-term

support, rural households cannot make their agricultural production continue. And RCCs' long-term support is based on RCCs' sustainability or surviving as we supposed in this paper.

[3]

$$\frac{dE^f}{dr} = - \frac{\partial L / \partial r}{\partial L / \partial E^f} = \frac{m \cdot \gamma'(E^f)}{\gamma'' \cdot [f(m) - m \cdot (1+r)] + \Phi'' \cdot W} \quad (10)$$

According to previous assumptions, m is positive, $\gamma'(E^f)$ is positive, $\gamma''(E^f)$ is negative, $\Phi''(E^f)$ is negative, $f(m) - m \cdot (1+r)$ is positive and W is positive. So dE^f / dr is negative. That means

E^f will decrease when r increases. So RCCs should maintain the loan interest rate at some adequate level. Too high loan interest rate will damage the probability of RCCs' surviving that equals to RCCs' sustainability in this paper. So besides considering RCCs' profit-making that affected by the loan interest rate r , we should take rural households' willing into account for improving RCCs' sustainability. It is not true that higher loan interest rate is better for RCCs.

4. Conclusions

By introducing future welfare that depends on RCCs' durative service, we proved it is possible to make rural households pay more attention on RCCs' sustainability. As for the size of loan from RCCs to rural households, there is one optimal loan size m^* for maximizing rural households' cultivating effort that decides RCCs' sustainability. Considering the negative effect of loan interest rate on rural households' cultivating effort, RCCs should carefully set down loan interest rate that affects RCCs' profit-making ability.

As for the future work, we would like to do the following considering.

[1] Involve credit insurance into the effort of rural households. Here we would like to extend the effort of rural households to be including disaster risk financing.

Based on this considering, we will introduce some kind of insurance such as credit insurance that can repay loan and interest to RCCs for rural households that suffer disaster risk. Of course, rural households have to buy this kind of insurance before getting loans from RCCs. Some practical method is that RCCs supply rural households with loan and credit insurance together. And RCCs will pass the insurance service from some professional insurance company to rural households.

[2] Introduce the loan interest rate as extra factor affects RCCs' sustainability. In this paper, we suppose RCCs' sustainability only depends on rural households' cultivating effort. But in reality, RCCs' sustainability consists of many factors, especially the loan interest rate that will affect RCCs' ability to make profit. As we see in this paper, the loan interest rate will also affect rural households' positivity in cultivating that affects RCCs' sustainability too. So RCCs should decide the loan interest rate carefully during daily operation. In the future research, we will consider the loan interest rate and rural households' cultivating effort synthetically.

[3] Analyze RCCs' Co-objective through Multitask Model or Game Theory. In general, RCCs have social assignments such as supporting agriculture and economic ones such as making profit. As for the latter, the society or the government can value it and pay RCCs for it. But for the former, the society or the government cannot value it and even does not want to pay for it. Then RCCs will not try their best to do the social job in general while the job is the main reason for RCCs to exist. So we should design one adequate system or mechanism to promote the government and RCCs to perform the social job as well as possible.

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中国農村部における小額信用貸付の持続可能性に関する基礎的研究

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要 旨

中国農村部では農村信用社による小額信用貸付が農民の資金調達のを拡大させている。しかしその一方で、農民の債務不履行も発生しており、小額信用貸付システムの持続可能性が問題となっている。本研究では小額信用貸付システムの破綻の可能性を考慮した2期間モデルによって、農民の返済努力のインセンティブについて分析する。分析の結果、農民に最大の努力を引き出すための有限な貸付規模が存在することが明らかになった。

キーワード: 中国農村部, 小額信用貸付, 農家, 農村信用社, 持続可能性