

Study on the Relationship of Folk Finance and Rural Small and Medium-Sized Enterprise

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Abstract

As the integral part of finance markets, the rural folk finance exists extensively and has been playing an important role in small and medium-sized enterprise financing. This paper points out the way to implement the Nash Equilibrium of both the lender and the borrower of rural finance. Based on borrowing behavior of rural finance by the game analysis, we find that establishing folk restriction mechanism, such as reputation mechanism, guarantee mechanism and third-party restriction and supervision mechanism is an optimal way to solve the problem existing in rural finance. With the aid of cob-Douglas production function, which shows that there is a huge financing gap existing in rural small and medium-sized enterprises. So, it's important to seek more financial support from the rural financial market; the development of the folk finance speeds up the progress of rural small and medium-sized enterprises, and vice versa.

Keywords: Folk finance, rural small and medium-sized enterprises, game

1 Introduction

It is a worldwide difficulty for small and medium-sized enterprises (SMEs) to deal with financing. While rural small and medium-sized enterprise is an important economic subject in our country, the difficulty in financing of which has caused a great attention of the central government and social public. As is shown in large amounts of data, in the developing countries and regions, the informal finance plays a vital role in small and medium-sized enterprise's financing, and even in some countries and regions that have already achieved financial liberalization, the informal finance exists in different degrees.

Looking back on the western economics literature, at the earliest, scholars expounded informal finance from the perspective of high risk, high interest rates, after which shifted to relationships between information asymmetry and the informal finance. Foreign scholars Atieno (2001), Isakson (2002), Gilles (2002) argued that the folk financial system is a derivative when economic subject could not get the support from financial system or the mainstream financial supply [1-2]. A theory called "the relationship bank" proposed by Petersen, Mitchell A. and Rajan (1994) [3] and another theory called "small bank hypothesis" put forward by Berger and Udell (1995), pointed out what suitable more for the development of SMEs is the smaller regional Banks and the loan product based on the regional relationship [4]. Mauri (2000) argued that in developing countries, there was a complementary relation between the informal finance and formal finance [5].

Domestic scholars such as Lin yifu (2005) expounded the necessity for informal finance to exist from the point of

theory, and considered that informal finance could improve the allocation efficiency of the whole credit market. One of its advantages was that it owned a strong ability to acquire information, that is, informal financial sector could easily obtain the information of nearby SMEs through all sorts of interpersonal and geopolitical relations [6]. Lin yifu, Li Yongjun (2001) suggested that the fundamental way to solve the financing problem of SMEs in China was to draw lessons from researches and practices of relationship financing theory from developed countries to promote the development of private finance and small and medium-sized financial institutions [7]. Zhou xiaochuan (2008) put forward that it was necessary to establish rural credit guarantee mechanism supported by the government, participated by different parties and operated by the market, which will be conducive to improve credit rating of farmers and rural small and medium-sized enterprises, be helpful for financial institutions to control credit risk and be good to expand the supply of rural credit [8]. Ma Hongyu (2011) argued that the unique service fields of rural folk finance and operating characteristics determined the rural folk finance had a greater vulnerability and risk. Therefore, it was effective supervision to folk finance that became an important guarantee of the rural financial system to operate effectively [9].

So, what is the reason for the widespread existence of non-formal finance? Compared with the formal finance, what advantages does informal finance own when it provides financing services for rural small and medium-sized enterprises under the circumstance of information asymmetric and lacking of collateral? What makes the informal financial markets with these characteristics? Based on the above questions, this article discusses attributions of the rural small and medium-sized

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enterprise's financing difficulties from the aspects of borrowing behavior characteristics in rural credit market and credit environment.

2. GAME ANALYSIS ON THE RURAL FOLK FINANCIAL BORROWING

Combined with the reality of China, the rural folk financial in this paper is defined as follows: it represents all kinds of investment and money lending occurring in various economic entities which is relative to the official financial, i.e., existing out of the normal financial system.

Under such assumption, build a basic framework of game theory for the behavior of the rural folk financial organization: (1) The participants: the lender (here only considering the rural informal finance) and debit (i.e., rural small and medium-sized enterprises). Both sides are rational person, which means that under the given case, they will pursue the maximization of their own expected utility. (2) The rural credit market is laid under perfectly competitive situation, where folk financial organizations are lending and small and medium-sized enterprises can choose to loan according to their own requirements. (3) The game is the complete information game. Based on the basic assumption above, we set the benefit of both sides under different strategy combinations in game [10].

2.1 ANALYSIS ON COMPLETE INFORMATION GAME

First of all, set parameters: assuming that lender is represented with A, debit with B, the amount of loans the folk financial choosing to lend with M, lending rates with r, the rates of capital returns with i, time limit of loan with t, profits acquired by debit with M_e^{rt} , the sum of the capital and interest with $M(1+e^{rt})$.

When money is led by lenders, if the debit could return loan, the lender could get M_e^{rt} as profits, and the borrower's income is $M_i - M(1+e^{rt})$; if debit fail to return, lender could get the value -M. When lender choose not to lend, and debit would not pay back as well, both sides pay zero; But when lender is unwilling to loan, the borrower is willing to pay yet, lender's payment is zero, while the borrower's payment is C_0 , namely, various efforts debit paid in order to obtain loans, including the amount of time and money. Then, the pay-off matrix of both parties in game could be shown in figure 1.

		B	
		Repayment	Non-payment
A	Credit	$M_e^{rt} - C, M_i - M(1+e^{rt})$	$M - C + F, M_i + M - F$
	Non-credit	0, $-C_0$	0, 0

FIGURE 1 The pay-off matrix of both parties in game

Folk financial organizations would be to their own reputation and credit guarantee fund to the participants, based on the reputation of the initiator, the two sides form Nash equilibrium; the rural folk financial are founded. Therefore, in the face of the multi-stage rural folk financial organizations complete information game analysis of loan relationships:

(1) Reputation restriction mechanism

When the game between the rural folk finance and SMEs is infinitely repeated, if small and medium enterprises at this stage to default, because of the effect of reputation restriction mechanism will be in the future by the folk financial organizations "punitive" revenge, such reputation restriction mechanism can restrict the behavior of the borrower, but considering the actual situation, reputation punishment restriction conditions has a certain binding.

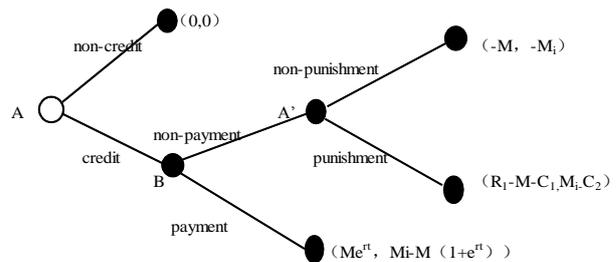


FIGURE 2. Game tree of reputation for penalties paid

Folk finance, credit grantor, makes credit strategy choices according to the initial credit of trusted party. In the first stage of the game, when credit grantor lends money, if debit choose not to repay at the deadline, credit grantor will punish borrower by disclosure its personal credit and pay C_1 as the punishment costs, gaining R_1 as revenue. In general, it is $R_1 \geq C_1$. Accordingly, debit bears the cost of punishment C_2 , and $C_2 \geq M(1+e^{rt})$. If a borrower refuses to repay, the lender has two actions: one is to applying reputation punishment, which may result in its loss of a good social reputation; another is choosing not to punish. The two actions set (reputation punish, not reputation punish). Because debit fears to lose a good social reputation and pay huge social and economic costs, therefore, it is obvious everyone involved in the folk financial deal has sufficient incentives to abide by the contract. It is chasing after "not hard to borrow again" and the revenue of long-term deal that the folk financial participants actively build their own social reputation and limit opportunism behavior consciously in a financial transaction, choosing to be cooperative and honest. Specifically, the game process of two sides could be revealed in the game tree (Figure 2).

Coming to the second stage in the game, if borrowers choose reimbursement and gain $M_i - M(1+e^{rt})$ accordingly; While if not, gain $M_i - C_2$. This process between folk finance and debit is an infinitely repeated game. When the borrower could achieve more revenue in credit cooperation than the earning of current default, debit will choose the repay the loan, which is also a constraint condition for the credit cooperation, i.e., $M_i - M(1+e^{rt}) \geq M_i - C_2$.

In the third stage, if a borrower choose not to repay, the lenders choose reputation punish and earn $R_1 - M - C_1$; if not to punish, earn -M (being regarded as sunk costs). Due to $R_1, C_1 \geq 0$, the optimal strategy is to choose the punishment.

Since both borrowers and lenders are bounded

rationality and the pursuit of utility maximization under given conditions, only when they could form a long-term cooperation would they both harbor maximize interests. Based on such premise, the lenders choose to publish the borrowers as well, leading to a result, that is the lender choose to loan, borrowers choose reimbursement. At this point, the stability of the Nash equilibrium solution could appear.

(2)Credit guarantee mechanism

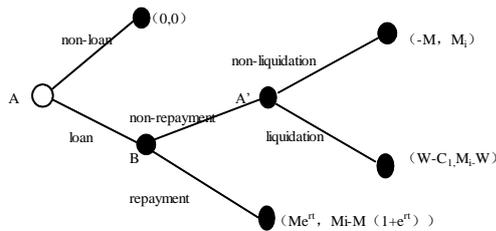


FIGURE 3. Game tree of secured payment constraints

In the rural folk financial transaction, credit guarantee is another important reason of maintaining high execution rate. When borrowers have financing needs, folk financial institutions insist that the other side should supply real estate mortgage including building, forest rights, land and so on, or find security guarantees. In order to simplify the analysis, we collectively call these as collateral assets being remembered with W , and suppose $W-C_1 \geq 0$, and the $W-M \geq Me^t$. When expire, if debit determines not to reimburse, lenders have projects, that is either cash collateral assets, or choose not to cash collateral assets, leading to a action assemblage(guarantee cash, guarantee not cash). Assume that if the lender decides to cash the debit's assets, it could get income W , and it should pay C_1 as cost for such behavior. In this game, the rough process is: the lender chooses whether loan or not at first; If loans, borrower choose whether to repay the loan or not; if it fails to repay, lender now considers whether the cash collateral assets or not. Specific game process and the payment could be revealed in the following game tree (Figure 3).

Using the backward induction to analyze, in the third stage, if the choice of lender is to cash the guarantee of the opposite side, the earnings could reach to $W - C_1$; But if not, earnings is $-M$. Therefore, the optimal strategy is to select cashing the collateral. Recognizing that the lender would choose to cash the guarantee in the third stage game, it is rational for debit to choose to return payments in the second phase, because the benefit of the reimbursement could reach at $M_i - M(1+e^t)$, which is greater than the benefits of not reimbursement $M_i - W$ ($W-M \geq Me^t$). Due to debit would repay gains in the second phase, lenders may choose to loan in the first stage of the game, because if loan, they could acquire Me^t ; if not, it is zero. Thus, the optimal solution in the matrix is (loan, repay) will be perfect Nash equilibrium game for both sides. Therefore, it is visible that under the condition of guaranteed restriction, both sides in the game have a stable solution.

In short, the effective means for rural credit two sides to avoid the prisoner's dilemma at least should satisfy one

of these follows: almost infinitely repeated game, reputation punishment mechanism, or credit guarantee mechanism. Only at this time, could they have a possibility of cooperation and the Nash equilibrium is stable, namely, the lender choose to loan, and the borrower choose to reimburse.

(3) The third party supervision mechanism

In credit transactions, the borrower rarely considers the credit environment due to the pursuit of self-interest maximization. Therefore, it could effectively improve the efficiency of finance by introducing the third party constraint supervision to make debit be constrained finitely when being credit transactions [11]. Private financial institutions pay a certain cost C to supervisory organization and make it watch the debit in the aspect of credit behavior and judge whether there is a default.

		B	
		Repayment	Non-repayment
A	Loan	$Me^t - C, M_i - M(1+e^t)$	$M - C, M_i - F$
	Non-loan	$0, -C$	$0, 0$

FIGURE 4. The game of the third party supervision mechanism

if it finds that the borrower default, the third-party regulators will punish the debit with F according to the will of financial institutions, and match a condition, that is the supervisory cost $C < (Me^t, -M)$ and punishment pay $F > Me^t$. It is a must to satisfy the following condition for the two sides to cooperate under the situation of bringing in a third party punitive supervision mechanism, i.e., as lenders consider that the probability of borrowers' repayment $q \geq (C+M) / (Me^t + M)$, the kind of situation of game could be shown in figure 4.

2.2 ANALYSIS ON THE INCOMPLETE INFORMATION GAME

The participants of incomplete information game model are still lenders A and borrowers B in the rural credit market. Due to the effect of a series of uncertain factors, such as natural conditions, social environment and market fluctuation, the borrower's investment return rate is uncertain. So, we assume that high investment return rate is i_h , but low rate is i_l . In this paper, backward induction is used to analyze hypothesis above. Debit acts first according to their own actual situation, which is followed by the folk financial institutions that choose their own actions and decisions in terms of the former's situation. In order to better describe the game, it is necessary to bring into a virtual "natural" game.

Firstly, the type of projects could be divided into two parts according to "natural" game party, namely, a good agricultural project is (G), while bad one is (W). If it is a good project, debit would be trend to return loan on time because of its high rate of return; if it is a bad project, the borrower may not return the loan on time, thus resulting in the phenomenon of bad debt. Such situation belongs to the "unwanted" default affected by uncertain factors.

For simplicity we assume that the probability of acquiring a good project and a bad one is q and $1-q$

respectively. In view of the assumptions above, there will be two different situations: first, if the loan is poured into a good project, the lender can recover the loan on time, lending to the benefit of both sides; When project is not so promising, rural small and medium-sized enterprises may not pay loan back timely as a result of the a series of uncertain environment. If not, the loss of lender could be shown in Figure 5.

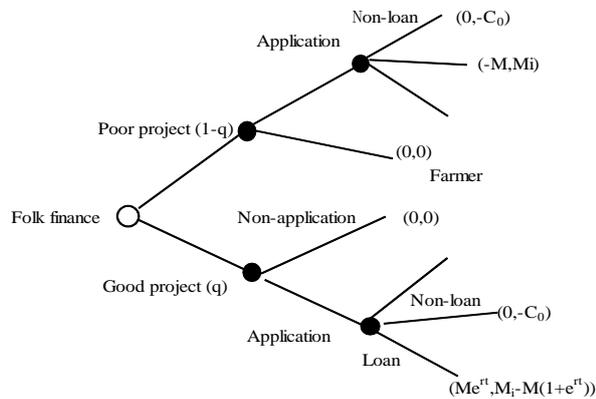


FIGURE 5. Game tree of incomplete information

To sum up, it is effective to reduce the credit loss, the problem of information asymmetry existing in the rural financial market and “prisoner’s dilemma”, which means debit fail to carry out agreements for the sake of chasing after short-term interest, through establishing folk constraint mechanism, like the reputation restrict mechanism, guarantee restriction mechanism and the third party supervision mechanism.

3 The relationship between rural sems and private financial

In order to further analyze the impact that folk finance experts on the rural small and medium-sized enterprises, assume that the goal of folk financial management is to achieve the maximum of profit, which is the same as SMEs. Then the production function could be analyzed with the aid of cob-Douglas production function. However there is a difference that labor force factor is regarded as a constant due to only considering the effect made on the output by capital’s input. A in the function also includes labor force constant factor. Here number of times, that is α represents elasticity capital to output, which is not the same in different industries and is a constant in the same industry. K means loans supported by the folk finance (suppose the loans are all put into production). P is for probability that the loan is applied into production after acquiring. Y presents as the output. A is the constants on behalf of the characteristics of production function. M and N respectively present the lending rates of folk of financial institutions and the cost rates of lending. W_π means expected profit of loan given to the SMEs by the rural financial institutions. When the SMEs get financial support successfully and put it into production, the value of production is AK^α . While it unsuccessfully, the value of production output is zero. The financing function

production of rural small and medium-sized enterprises could be shown as follows:

$$Y = \begin{cases} AK^\alpha & P \\ 0 & 1-P \end{cases} \tag{1}$$

Due to the relatively small size of rural small and medium-sized enterprises, it is flexible for them to adjust the scale of production. Now, assume that all the expected outputs of rural small and medium-sized enterprises are the same. Then the loan decisions of the rural small and medium-sized enterprises are analyzed as follows:

The first step, the optimal loan of the rural small and medium-sized enterprises is expressed as (2) (appoint K^* to present the optimal loan).

$$\max \{ (AK^\alpha - KM)P - KA(1-P) \} \tag{2}$$

Among (2), $(AK^\alpha - KM)P$ represents the financing loan acquired successfully by the rural small and medium-sized enterprises. $KA(1-P)$ is the investment cost without getting financing loan.

Calculate the first derivative function of (2), available:

$$(K^*)' = A(K^*)^{\alpha-1} P\alpha - PM - A(1-P) \tag{3}$$

Make the first derivative of K^* equal to 0, available:

$$(K^*)^{\alpha-1} = \frac{A(1-P) + PM}{\alpha PA} \tag{4}$$

The second step, the expected profit deriving from the loan supported by the rural financial institutions is:

$$W_\pi(K, M) = PKM + (1-P)KA - KN \tag{5}$$

Among (5), the expected profit is a function of M. Because financial institutions are chasing after the maximization of profit, it is inevitable for them to improve M as large as possible, at the same time, to reduce the cost of lending N. Rural small and medium-sized enterprises, meanwhile, are rational as well--they could not afford to pay higher borrowing costs. So, only when the expected profit is greater than zero would they choose to loan, namely:

$$AK^{\alpha-1}P\alpha - PM - A(1-P) \geq 0 \tag{6}$$

Then, it is available by calculating:

$$A\alpha K^{\alpha-1}P - A(1-P) \geq PM \tag{7}$$

$$M \leq A\alpha K^{\alpha-1} + A - \frac{A}{P} \tag{8}$$

When the interest rate is high, the rural small and medium-sized enterprises would not choose to borrow from financial institutions. So only under the condition of a lower interest rate, would they are willing to loan. So only

when M is lower interest rates, they will choose to borrow. Only take:

$$M = A\alpha K^{\alpha-1} + A - \frac{A}{P} \quad (9)$$

Otherwise, the rural small and medium-sized enterprises would have to exit the markets. It is easy to find out from equation above, that when P smaller, namely, the probability of successful production declines, and the risk increase corresponding, the value of M is going to be bigger. While if the rural financial institutions increase lending rate M blindly, the small and medium-sized enterprises would be forced to drop out from lending markets or the financial institutions have to face adverse selection problem. Put (9) into (5), leading to a functional relationship between the value of loan and expected income of loan:

$$W_{\pi}(K_1) = \left(A\alpha K^{\alpha-1} + A - \frac{A}{P} \right) (K_1 P) + (1-P)K_1 A - K_1 N \quad (10)$$

Now, we analyze the function, late the first derivative of K_1 , it is available:

$$W_{\pi}'(K_1) = \alpha^2 A P K^{\alpha-1} + A P - A + (1-P)A - N = \alpha^2 A P K^{\alpha-1} - N \quad (11)$$

Make the first derivative be equal to zero, K_1 could be shown on

$$K_1^{\alpha-1} = \frac{N}{A P \alpha^2} \quad (12)$$

Because $0 < \alpha < 1$, then $0 < 1 - \alpha < 1$,

when $K < \sqrt[\alpha-1]{\frac{N}{A P \alpha^2}}$, $W_{\pi}'(K_1) > 0$;

when $K > \sqrt[\alpha-1]{\frac{N}{A P \alpha^2}}$, $W_{\pi}'(K_1) < 0$, so, $K = K_1$,

$W_{\pi}(K_1)$ obtains maximum value. Therefore, the expected profit $W_{\pi}(K_1)$ is a function that monotone increasing at first, then reaching at a extreme, finally monotone decreasing. So, from the perspective of their profit maximization, financial institutions would not supply loans for rural small and medium-sized enterprises unlimited, but make K_1 (the loans SMEs could acquire) close to K^* as far as possible. As is analyzed above, the conclusion could be drawn that K_1 would always less than the optimal loan K^* , when financial institutions always need to guarantee their maximum profit.

From analysis above, the optimal loan of most could not be satisfied, leading to a funding gap during their process of development. Therefore, it is a trend for SMEs to seek for more financial support from the rural financial markets, which will greatly stimulate the development of the rural folk financial markets.

4 Conclusion

Based on borrowing behavior of rural finance by the game analysis, we find that establishing folk restriction mechanism, such as reputation mechanism, guarantee

mechanism and third-party restriction and supervision mechanism is an optimal way to solve the problem existing in rural finance. With the aid of cob-Douglas production function, which shows that there is a huge financing gap existing in the process of the development of rural small and medium-sized enterprises that must be broken through if enterprises strive for a better future. Seeking more financial support from the rural financial market is a trend for enterprises to solve such problem, which will greatly stimulates the development of rural folk financial markets; In return, the development of the folk finance speeds up the progress of rural small and medium-sized enterprises.

In order to cope with the financing difficulty of SMEs, this paper introduces the folk finance to provide corresponding loan decisions and credit services for economic subject. The existence of informal finance is beneficial from its institutional basis and driven by economic interests. At the same time, huge funding gap provides a development space for the rural folk finance. Therefore, it is a indisputable fact that folk finance exists universally. Obviously, the folk finance dose eases the financing difficulty of smes to some extent. Some countermeasures are put forward as follows:

(1) It is important to fully understand the rationality and necessity of the existence of folk finance. Meanwhile, it is ignorant to ignore that China's rural financial problems could not get rid of its survival soil, namely, China's rural society. On the one hand, the rural small and medium-sized enterprises need injection of business capital; On the other hand, folk finance also has the profit space like business finance. Therefore, the most important policy implications is to realize health and sustainable development of capital in rural areas to make up for lending funds shortage from formal financial institutions through endowing the folk finance rightful place in law, specifying and guiding the folk finance actively, encouraging the folk finance to carry out financial business legally.

(2) It is necessary to establish a sound scientific folk financial supervision system. Most folk finance are free from the current legal and regulatory system, lacking of restriction and supervision, which making the folk finance become a hotbed to nourish social problem. Therefore, strengthening regulation is a necessary prerequisite to ensure the healthy development of the folk finance. The rural financial regulation not only should pay attention to solve the risks later or to examine financial institution assets in a certain point, but also should pay more attention to advanced warning of risk prevention, with the method of dynamic regulation, continuously tracking, controlling and avoiding. Those rural financial institutions that violate the standard of industry should be disclosed to the society timely and dynamically, making their reputation among the social public damaged, and increasing the loss of their income.

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