SENIOR RESEARCH

Topic: The Mechanism of Social Capital in P2P Lending

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Introduction

As stated in mainstream economics, there are few agents who consume all of their endowment in every period of time. Some keep a part of their income for future consumption, an act known as "saving". Some are not fully satisfied with the maximum consumption level possible in each period. These individuals seek more endowment from other to increase the upper bound of current consumption. In return, they accept a reduction in future consumption. In other word, they "borrow" from someone with a surplus.

Given that the interest of "savers" and "borrowers" coincided, market for lending and borrowing activities naturally occurs. Borrowers seek loan, a contract which specify the cashflow between both parties, from lender. Since lenders need to forsake a part of his wealth in the current period, they ask for a reward, the interest, from such action. Of course, the interest rate is determined based on borrowers' credit rating, which evaluate how trustworthy borrowers are. This is what transit in traditional credit market, which centers around commercial banks.

However, there has been an emergence of new credit market system, the Peer-to-Peer lending Platform. Two agents contact each other through an online platform and agree on loan agreement. The owner of the platform would serve as a middleman for a small haircut. P2P Lending Platform has undergone immense expansion in many countries. For Instance, there exist "Zopa" in UK, "Prosper" and "Lending Club" in US, "Pop-funding" in South Korea and "Ppdai" in China.

The mechanism of the innovative marketplace attraction attention from numerous fields of researches, such as, information engineering, psychology and economics. Overall, investing in P2P Lending can be more profitable than holding treasury bond (Klafft, 2008). Limiting to AA, A and B grade loan, it offers higher return on investment in comparison treasury. Lender may need to pay extra caution toward subprime bond as it gives a negative rate of return at the current period. All in all, this does not contradict the established concept of risk-return tradeoff. Because borrowers have no need to put forth an illiquid asset as collateral, those who could not apply for loan from traditional banks utilize P2P Lending Platform to facilitate their need (De Roure, Pelizzon & Tasca, 2016). The lack of need for collateral also serves as an attractive feature which the traditional banking system does not possess. In order for bank to facilitate a loan for any purpose, it sticks to us as natural that collateral is necessary. This serves as a good new which reaffirms P2P Lending Platform as an alternative investment choice.

There are attempts to improve investors' portfolio performance. Emekter, Tu, Jirasakuldech & Lu (2015) asserts that it is best to only lend to those with high credit grade. The interest rate is not enough to cover risk from subprime borrowers. Their work is in agreement with the one by Klafft. Furthermore, Serrano-Cinca & Gutierrez-Nieto (2016) identify variables for constructing a "Profit Score" on loans. Rather than relying solely on credit rating, Profit Score provide lenders an extra tool for judgement on preferred loan. With the same purpose in mind, Luo, Xiong, Zhou, Guo & Deng (2011) create a decision model for P2P Lending using data mining technique.

Psychological element is observable in Peer-to-Peer Lending Platform as well. Lee & Lee (2012) suspect and observe herding effect, an action which is influenced by other's action, rather than one own decision, in P2P Lending Platform. For loan with similar characteristics, new participants are attracted to place bid on the one with high participation rate. Moreover, despite the same level of interest rate, lender love to bid on newly generated loan. Another element which deserve some attention is trust. In mainstream economic where every agent is rational and selfish, the component never exists. However, empirical evidences illustrated that trust in intermediary and borrower play a role in determining the efficiency of the market, thought the latter is more significant (Chen, Lai & Lin, 2014). This stands starkly different from traditional bank as marginal effect of each aspect play a massive role.

Several papers explain the overall picture of Peer-to-Peer Lending Platform. Some descriptively classify the market along two dimensions, motive of lending and the degree of separation between participants, (Wang, Greiner & Anderson, 2009). Though it may seem a bit strange that there exist a platform whose participants' motive of lending is purely philanthropic, Kiva is, without a doubt, a representative of this group. Kiva present itself as a provider of progress support. Lender could lend money to entrepreneurs wishing to start a new business. This stand different from simple donation, since they could track the progression and effect their money has on other people. Another example of a descriptive work is the 6 steps of action in the generation of loan (Wang, Chen & Song, 2015). By categorizing minor steps, the authors analyze the difference between the new system and the old one.

Unfortunately, a simple mathematical model for the whole mechanism has not yet existed. This serves as an objective for this paper to design an economic model for explain the phenomena. Primarily, the paper focus on "Prosper" as a subject of study.

In Proper, an US Lending Platform, borrowers could form a community. Community is a group of people with similar characteristic, for example, Microsoft worker, Oxford graduates, etc. These communities would have their credit rating as well. The past actions, such as, default rate, are reflected in group's credit score. Hence, by becoming a member of a community, borrowers would have two credit scores, personal and general ones.

Since community's credit rating is a product of social network, it is not too farfetched to classify it as a social capital. Although argument over the definition of social capital has persisted for a long time, according to Portes (1998), there is a growing consensus that social capital represents actor's ability to secure benefit from being part of a social network. Despite heavy emphasis that trust is the primary component, Glaeser, Laibson, Scheinkman & Soutter (1999) express similar view that individual could obtains better outcome depending on corporation within a social network. With the above definition of social capital, it would not be an exaggeration to categorized community's rating as social capital. The categorization was done by Collier & Hampshire (2010) as well.

The social capital serves as a key component which differentiate Peer-to-Peer Lending Platform from traditional banking system. Although there may exist other components which are significant to the working of community system, such as, reputation, a clearly visible and

observable credit rating should play a major role in influencing the mechanism of Peer-to-Peer Lending Platform. The paper aims to compare both market and seek out the improvement which the new system provides. Part (1) constructs the basic model of traditional banking system. By utilizing of Principal-Agent theory, we hope to build a benchmark for comparison purpose. Part (2) adds the element of social network into the basic model, hoping to imitate the mechanism of P2P Lending Platform. Modification of traditional credit market implies that P2P Lending platform evolve from banking system. There should exist a improvement to the old system in some forms. Conditions which are necessary for an efficient market are scrutinized. Part (3) describes general application of the model. It discusses on similar situation which can be explained. Part (4) identifies limitations and aspect which further research could work on. Finally, Part (5) offers a short conclusion to the whole research.

Theoretical Model of Traditional Banking

In order to explain and compare the mechanism of the both credit market, I construct models based on the foundation of principle-agent theory. Similar to the real world, the models consist of two individuals, bank and borrower. Both agents are risk-neutral. Bank can diversify its risk through multiple channel of loan generation. With a large pool of loan with different level of risk and direction of change in response to the everchanging market, bank would construct a portfolio which would not contain any unnecessary risk within it. On the other hand, an individual tends to be risk-averse. A normal person prefers a certain amount of reward to a lottery whose value is higher based on the expected utility concept. However, borrower is assumed to be risk-neutral within the model. Since the objective of the paper is a simple model, the assumption is in place for simplicity purpose. With the assumption of risk-neutral, utility function can be viewed as profit function as well. This allows borrower to be either a single individual or a profit-seeking business entity.

Borrower has a project which he would love to do. The project can be considered as a business project. At the end of the project, it returns a value R (Success) and 0 (Failure) with the probability e and $1 - e$ respectively. e (effort) is an endogenous variable which borrower could choose. Since e (effort) stands for the probability of an outcome, its value is restricted such that $e \in [0,1]$. As long as it is within the bound, borrower is free to choose any value of e. However, a better outcome is more likely to occur if the value of e is high. There is a cost of effort which borrower is subjected to, $-\frac{1}{2}ce^2$. Borrower has to take in account the cost and benefit in order to exert the optimal level of effort.

Since the borrower lack the necessary cash to finance the project, he decides to seek loan from bank. The model assumes that bank is willing to lend a cash for certain. As it is usually the case with lending-borrowing activities, the two agents write a contract which is enforce by laws. The contract states that borrower must pay back the principal and interest, r, if the project is successful. Otherwise, borrower need to give up the collateral W which could not be utilized to fund the project due to its characteristic of illiquid asset. In case of a contract violation, an agent could ask a court for legal action. This serve as a deference for both sides. Hence,

Bank's Payoff (Profit) function is

$$\pi_l = er + (1 - e)W$$

Borrower's Payoff (Profit) function is

$$\pi_b = e(R - r) + (1 - e)(-W) - \frac{1}{2}ce^2$$

Unfortunately, credit market suffers from the problem of asymmetric information. We focus primarily on the aspect of moral hazard. Bank could not perfectly observe how borrower use the fund it provided. Academically, this is known as "second-best" solution. This mean that e is neither observable nor contractable upon. Once the borrower receives a handful of cash, he may not spend the money as he has stated earlier. Although it may not be an extreme case where

borrower spend all the money on a luxury car and a nice holiday in the Caribbean, borrower may not work as hard as the bank may expect or hope him to be so. Rather than the maximum level of effort possible, he may take an extra day off work when he is not supposed to do so. This is beyond the supervision of the bank. Nevertheless, the bank is not completely blind on the matter. At the very least, the bank can anticipate that borrower will choose a level of e which maximize his own payoff. Given that the borrower is rational, he would be lazy at a "optimal" level for himself. Upon weighting the benefit of an extra hour at bed and the profit he could have generated at work, he would pick the best option for his private utility. Hence, bank would construct a contract by incorporating this fact. This is usually known as 'incentive-compatibility constraint'.

$$\underset{e}{\operatorname{argmax}}\{e(R-r)+(1-e)(-W)-\frac{1}{2}ce^2\}$$

By first order condition, we get

$$e=\frac{R-r+W}{c}\in[0,1]$$

The constraint could be rewritten as

$$r=W+R-ce$$

Theoretical Model of P2P Lending Platform

As mentioned before in the introduction, borrower could choose to engage in lending-borrowing activities with other entities than bank. In this paper, we examine a type of online lending platform, Peer-to-Peer Lending Platform. Instead of acting as a lender itself, P2P lending platform bring two strangers together.

Borrower still want to finance the same project as it is in the previous case. In P2P lending platform, borrower could choose to join a community, an assembly of individuals with similar characteristic. The community provides its community credit score s, which is classified as a social capital. The probability of each outcome no longer solely depends on borrower's personal effort e. The project yields R (success) and 0 (failure) with the probability of $\theta e + (1-\theta)s$ and $1-[\theta e + (1-\theta)s]$ respectively. θ serves as the degree of importance e has in affecting the probability distribution. It is assumed that the real probability of an event occurring is the same as the valuation by both parties. Identical to e, s and θ take on a value between 0 and 1, $s, \theta \in [0,1]$. Moreover, s is an exogenous variable which is beyond borrower's control. This implies that borrower is ordered to join a certain community without one own judgement.

From lender's perspective, member of a community obeys the norm of the group to a certain degree. Through the process of peer pressure and group monitoring, member uphold the standard which is based on the history of the community. This means that evaluation of the community should partly reflect the action of its member. Effort of borrowers alone cannot serve as a single determinant of the final outcome. Lender adjusts the possibility of each outcome by adding social capital into his assessment.

From borrower's perspective, joining a community helps him achieve a better outcome. Member of the same group could provide advice for him on how to make his project successful. The others' action may prove to be beneficial to his project. Thus, probability distribution is subjected to modification by community's credit rating, or social capital.

We assume that there is no cost in acquiring such social capital. However, he is subjected to a new cost constraint which I would call "deviation punishment", $-\frac{1}{2}d(s-e)^2$. By becoming a member of a community, he is placed under monitor by other members. Before receiving permission to be a part of the group, borrower must show commitment to stick to the norm of the group. Member of the group would punish its peer for failure to maintain the community's credibility. The higher the difference between e and s, the more severe the punishment is.

Usually Peer-to-Peer lending platform offers tools for lender to diversify his portfolio. Both sides are risk-neutral. Borrower pays r^* and 0 to lender in case of a successful and failed project respectively. Hence,

Lender's Payoff (Profit) function is

$$\pi_l = [\theta e + (1-\theta)s]r^* + [1-(\theta e + (1-\theta)s)]W$$

Borrower's Payoff (Profit) function is

$$\pi_b = [\theta e + (1-\theta)s](R - r^*) + +[1 - (\theta e + (1-\theta)s)](-W) - \frac{1}{2}ce^2 - \frac{1}{2}d(s-e)^2$$

The implication is that borrower faces a tradeoff from acquiring social capital. He could gain better credit evaluation by becoming a member of a community. In return, he is subjected to "group monitoring" which, in some case, negatively impact his utility.

This leads us to the first assumption.

Assumption 1

$$\boldsymbol{s \geq e}$$

For those who got better credit evaluation than a community's, there is no reason for them to join the community. Hence, this assumption is to eliminate those who have no necessity to acquire social capital out of the analysis.

Following the incentive-compatibility constraint, lender would set up a contract based on the knowledge that borrower exert effort which maximizing his private payoff.

$$\underset{e}{\text{argmax}}\{[\theta e + (1-\theta)s](R - r^*) + +[1 - (\theta e + (1-\theta)s)](-W) - \frac{1}{2}ce^2 - \frac{1}{2}d(s-e)^2\}$$

By first order condition

$$\theta(R - r^* + W) - ce + ds - de = 0$$

$$\theta(R - r^* + W) + ds = (c+d)e$$

$$e = \frac{\theta(R - r^* + W) + ds}{c+d} \in (0,1)$$

The constraint can be rewritten as

$$r^* = R + W - \frac{ce}{\theta} + \frac{d(s-e)}{\theta}$$

However, instead of using first order condition as we usually do, I impose a new constraint, zero profit constraint, an approach once used by Maitreesh Ghatak in LSE lectures. In perfect market, entrepreneur could not seek positive economic profit. This implies that utility of lender equal to 0.

$$\pi_l = [\theta e + (1-\theta)s]r^* + [1 - (\theta e + (1-\theta)s)]W = 0$$

Substitute $r^* = R + W - \frac{ce}{\theta} + \frac{d(s-e)}{\theta}$ into the equation.

$$[\theta e + (1-\theta)s][R + W - \frac{ce}{\theta} + \frac{d(s-e)}{\theta}] + [1 - (\theta e + (1-\theta)s)]W = 0$$

$$[\theta e - \theta s + s]\left[R - \frac{ce}{\theta} + \frac{d(s-e)}{\theta}\right] + W = 0$$

To solve for e, rearrange the equation into a polynomial form of e.

$$\theta Re - ce^2 + dse - de^2 - \theta Rs + cse - ds^2 + dse + Rs - \frac{cse}{\theta} + \frac{ds^2}{\theta} - \frac{dse}{\theta} + W = 0$$

$$-(c+d)e^2 + \left(\theta R + 2ds + cs - \frac{cs}{\theta} - \frac{ds}{\theta}\right)e + \left(W - \theta Rs - ds^2 + \frac{ds^2}{\theta} + Rs\right) = 0$$

$$(c+d)e^2 - \left(\theta R + 2ds + cs - \frac{cs}{\theta} - \frac{ds}{\theta}\right)e - \left(W - \theta Rs - ds^2 + \frac{ds^2}{\theta} + Rs\right) = 0$$

$$(c+d)e^2 - \left(\theta R - \frac{(1-\theta)cs}{\theta} - \frac{(1-2\theta)ds}{\theta}\right)e - \left(W + \frac{(1-\theta)ds^2}{\theta} + (1-\theta)Rs\right) = 0$$

With a binomial of $\boldsymbol{ax^2 + bx + c}$, binomial equation is applicable if and only if $\boldsymbol{b^2 - 4ac \geq 0}$. In this model,

$$\boldsymbol{a} = (c+d)$$

$$\boldsymbol{b} = -\left(\theta R - \frac{(1-\theta)cs}{\theta} - \frac{(1-2\theta)ds}{\theta}\right)$$

$$\boldsymbol{c} = -\left(W + \frac{(1-\theta)ds^2}{\theta} + (1-\theta)Rs\right)$$

With a close examination, the model has

$$\boldsymbol{b^2 - 4ac} = \left(\theta R - \tfrac{(1-\theta)cs}{\theta} - \tfrac{(1-2\theta)ds}{\theta}\right)^2 - 4(c+d)\left[-\left(W + \tfrac{(1-\theta)ds^2}{\theta} + (1-\theta)Rs\right)\right] > 0$$

As a result, binomial equation could be utilized to find the value of e in the model. From binomial equation,

$$e = \frac{\left(\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta}\right) \pm \sqrt{\left(\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta}\right)^2 + 4(c+d)\left(W + \frac{(1-\theta)ds^2}{\theta} + (1-\theta)Rs\right)}}{2(c+d)}$$

However, the lower root would provide lower utility to the lender; thus, rendering the market inefficient. In other word, pareto optimal is not achieved. The answer can only be the higher root of the binomial equation.

$$e = \frac{\left(\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta}\right) + \sqrt{\left(\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta}\right)^2 + 4(c+d)\left(W + \frac{(1-\theta)ds^2}{\theta} + (1-\theta)Rs\right)}}{2(c+d)}$$

Condition to sustain the existence of P2P lending platform

Borrowers receive greater benefit from joining community with great credit rating; however, they are obliged to exert higher effort in return in order to maintain the community's credibility. In other word, the existence of social capital should positively affect personal effort to succeed on the project and repay the loan. If it is not the case, the whole system would break down from the problem of free rider. Instead of rising personal effort in response to an increase in community's credit score, its member would slack off and the reputation of the group would fall to the lowest level possible. If that is the case, social capital would not serve as a useful signal anymore, resulting to the destruction of the whole system. Thus, a boost in group's rating should incentivize individual to follow suit.

First, let's simplify our equation,

$$\alpha = \left(\theta R - \frac{(1-\theta)cs}{\theta} - \frac{(1-2\theta)ds}{\theta}\right)^2 + 4(c+d)(W + \frac{(1-\theta)ds^2}{\theta} + (1-\theta)Rs)$$

We can rewrite the dynamic of e as

$$e = \frac{\left(\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta}\right) + \sqrt{\alpha}}{2(c+d)}$$

We hope for a condition where the level of effort rise in response to a positive change in community's credit score, or social capital. The condition is achievable by the method of differentiation. By differentiate e with respect to s, we get the following equation.

$$\frac{\partial e}{\partial s} = \frac{\left(d - \frac{(1-\theta)(c+d)}{\theta}\right)}{2(c+d)}$$

$$+ \frac{\alpha^{-\frac{1}{2}}\left[2\left(\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta}\right)\left(d - \frac{(1-\theta)(c+d)}{\theta}\right) + 4(c+d)\left(\frac{2(1-\theta)ds}{\theta} + (1-\theta)R\right)\right]}{4(c+d)}$$

At first glance, the result of differentiation may be a headache. It would involve complex equation solving to find the strictest condition where $\frac{\partial e}{\partial s} > 0$. However, on a closer examination, there are only a few terms which we are not certain about the sign, whether it is a positive term or a negative term. Those term are $d - \frac{(1-\theta)(c+d)}{\theta}$ and $\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta}$. The result that we wish could be achieve if the two term are positive in value. To capitulate, if $d - \frac{(1-\theta)(c+d)}{\theta} \geq 0$ and $\theta R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta} \geq 0$, we would get $\frac{\partial e}{\partial s} > 0$ for sure.

We may need two inequalities to satisfy the property of $\frac{\partial e}{\partial s} > 0$. Let's us first look at the term $d - \frac{(1-\theta)(c+d)}{\theta} \geq 0$.

$$d \geq \frac{(1-\theta)(c+d)}{\theta}$$

$$(2\theta - 1)d \geq (1 - \theta)c$$

The value of θ must higher than 0.5, $\theta \in (0.5,1]$, or else this inequality is not possible. This does not contradict our economic intuition. Personal appraisal should provide more information on individual than a general evaluation. For example, we want to predict how an employee will behave on the next inter-firm meeting. The evaluation of the firm should not be a better indicator of action than the personal behavior assessment of that member. This means that e's impact on probability distribution is higher than those of s.

Next, we have one more inequality left. However, let us observe the first condition carefully. It could be rewritten as

$$\theta d + (\theta - 1)d \geq (1 - \theta)c$$

$$\theta d - (1 - \theta)d - (1 - \theta)c \geq 0$$

$$ds - \frac{(1 - \theta)ds}{\theta} - \frac{(1 - \theta)cs}{\theta} \geq 0$$

$$\theta R + ds - \frac{(1 - \theta)ds}{\theta} - \frac{(1 - \theta)cs}{\theta} \geq \theta R > 0$$

$d - \frac{(1-\theta)(c+d)}{\theta} \geq 0$ and $R + ds - \frac{(1-\theta)cs}{\theta} - \frac{(1-\theta)ds}{\theta} \geq 0$ are maintain the single condition of $(2\theta - 1)d \geq (1 - \theta)c$. Changes in s and e have the same direction. This leads us to the first condition.

Condition 1

$$\boldsymbol{d \geq \frac{(1 - \theta)}{(2\theta - 1)} c}$$

The cost incurs from deviating from group's credit rating, d, must be higher than the product of the cost of effort, c, and a coefficient which consisted of weight lenders place on borrower's effort, θ.

Condition for lower borrowing cost

Would it be possible for the new system to be more efficient than the traditional one? Although an improvement could be on various aspect, we focus on the cost of borrowing. Peer-to-Peer Lending Platform is more efficient if it offers lower cost of borrowing. We compare r the payment to traditional bank and r^* the reward lender receives. If Peer-to-Peer lending platform is better than banking system, then

$$r^* < r$$

$$R + W - \frac{ce}{\theta} + \frac{d(s-e)}{\theta} < R + w - ce$$

$$-\frac{ce}{\theta} + \frac{d(s-e)}{\theta} < -ce$$

$$d(s-e) < (1-\theta)ce$$

$$d < \frac{(1-\theta)}{(s-e)}ce$$

As a result, we get the second condition.

Condition 2

$$\boldsymbol{d < \frac{(1-\theta)}{(s-e)}ce}$$

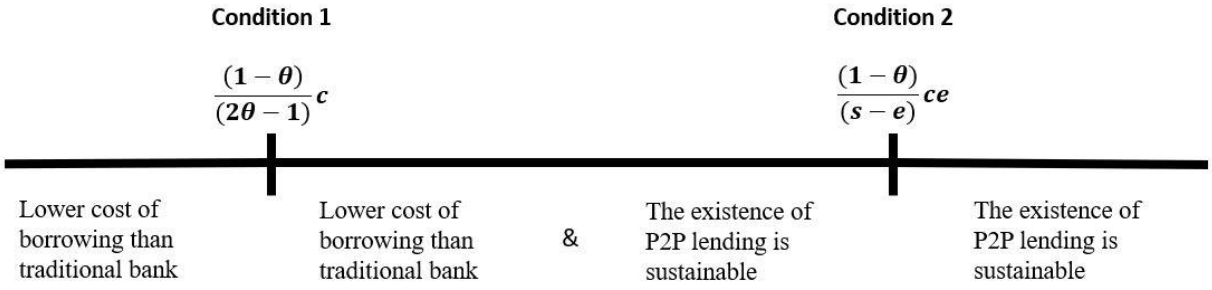
The severity of penalty on deviators, d, must not exceed a certain point. If it does not, bank would offer a lower degree of debt burden to those seeking loan.

Combining condition 1 and 2, we get the interval of d which satisfy both conditions.

$$\boldsymbol{d \in [\frac{(1-\theta)}{(2\theta-1)}c, \frac{(1-\theta)}{(s-e)}ce)}$$

Within this range, a rise of group's credit score would positively affect personal effort while ensuring that the cost of borrowing from Peer-to-Peer Lending Platform is lower than that of traditional banking system.

Implication



There exist many communities with disparity in the severity of punishment toward those who fail to follow the norm, d. Those with light punishment on deviation tend to achieve lower debt burden than traditional bank. However, there is a risk that it could endanger the existence of Peer-to-Peer lending platform, since personal effort e may dwindle when group's rating s rise.

On the other hand, heavy punishment incentivizes borrower to increase effort in response to an increase in s. But then, cost of borrowing may exceed those of banks. It is important to set an optimal level of penalty d in order to provide both characteristic to the new system.

What this tell us? We could see that cost of personal effort, c, play a role in determine both the upper bound and lower bound of the interval d. The credit market has different types of groups whose attitude toward a breach of standard, d. Borrower would receive the greatest benefit if he chooses to join a community appropriate with his own cost of effort c. As mentioned before, a community is an assembly of those with similar characteristic. This implies that setting an appropriate level of punishment is easier in case the flagship quality provides greater information on its member. For instance, Consider "Resident of town A" and "A group of males". Designing a suitable punishment level in the first group is easier than the second group, since being male provide little to no detail on the behavior of a gentleman.

General Application

Although the model is built to explain phenomena in Peer-to-Peer lending platform, it is also applicable to other situations as well. Chinese family business is one of them. Chinese family is famous in term of bond and solidarity. As the saying "blood is thicker than water," the existing family members are relevant to every stage of life. This includes even a very distant relative who you may not meet so often. The structure of Chinese family is quite unique. Hence, lending-borrowing activities within the Chinese family may not well explained by traditional banking model.

An offspring may ask for loan from elder family member for the purpose of expanding family business, based on his personal idea. The family may have mean and standard of business activities. Through a length of time, the mean is revised and improve by the process of trail-and-error. As a member of the family, the method is taught and transmitted to the youth. He receives partial benefit from it. However, older generation would know how well the business should flourish based on experience. If the expanded activity does not do well enough, elders could infer to the effort the child really put into.

In this context, the family is the community. Borrower gains a leverage from family's knowledge, but he is put under peer monitor. Lender could design the best penalty for failure to adhere to the standard since information on the child is plentiful.

Limitation

As it is the case with most economic models, the effort to simplify a complex reality into a simple mathematical equation tend to generalize the situation too much. Unfortunately, this model could not escape the grasp of this terrifying fact. There are several limitations to the model which deserve extensive analysis. These are aspects which further research could work on.

First, the model exogenously determined which community the borrower will join. While an individual suffers from limited choice on group he is qualified to enter, borrower still has the freedom of choice. A graduate from Oxford who is an employee for Apple could join a group of Oxford alumni and a community of Apple worker. After a careful consideration, he would join the group which is best suited to his taste. In other word, he can choose which value of s he prefers out of many options. In contrast, the variable s is outside of his jurisdiction within the model. It eliminates the entire process of searching and entering a chosen group. Moreover, it ignores the cost which may occur during the process of group selection. These mechanism and factors may prove crucial to the working of the system.

Second, no strict utility analysis is performed. Lower cost of borrowing may serve as an incentive for borrower to participate in P2P lending platform instead of asking loan from bank. However, the model does not show a higher gain in utility from shifting to the new credit market. The rise in efficiency projects itself in form of lower cost of borrowing. We left the analysis of participation incentive in each market out of the analysis. Further research could be based how borrowers choose to be a part of traditional system or a new entry in an online platform.

These are points which the model could be improved. The improvement could be a modification to the existing mathematical equation or an additional element.

Conclusion

Peer-to-Peer Lending Platform is new credit market which has grown rapidly for the past decade. It incorporates innovative technology, hoping to overcome constraints suffered by traditional banking system. Rather than a full system of systematic regulation, it includes an element of social network.

Those who are in need of cash can expect a lower cost of borrowing compared to traditional credit institution. However, this holds true under certain conditions. The undesirable action of betraying the norm of social group must be within an appropriate bound. Too soft punishment would not incentivize members to uphold the community's standard while a too severe penalty would cause loan's repayment to escalate.

Designing the appropriate level of penalty is crucial. As communities are groups of individuals with similar characteristic, a flagship quality which provide greater information on its owner is preferred. Participants of both sides would receive better benefit from it. Thus, there is hope that the new system, Peer-to-Peer Lending Platform, could enhance the efficiency in credit market.

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