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Jianqing CHEN
University of Texas at Dallas

Ling GE
City University of Hong Kong

Zhiling GUO
Singapore Management University, ZHILINGGUO@smu.edu.sg

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Jianqing Chen
Jindal School of Management
The University of Texas at Dallas
chenjq@utdallas.edu

Ling Ge
College of Business
City University of Hong Kong
lingge@cityu.edu.hk

Zhiling Guo
School of Information Systems
Singapore Management University
zhilingguo@smu.edu.sg

Abstract

Prosocial crowdfunding platforms can work through direct peer-to-peer (P2P) lending or through intermediaries, incurring different costs to borrowers and lenders. This study investigates the incentives of lenders and borrowers' and how they would choose between the two types of platforms. We model the intermediary as a profit maximizer who filters projects, provides high quality borrowers with access to the platform, and ensures repayment rate to lenders. Our initial findings suggest that the introduction of direct P2P lending platform enables the intermediary to reduce its interest rate and to raise its screening threshold on the intermediated platform. The P2P lending platform also incentivizes more altruistic lenders to shift to the direct funding platform, which enables riskier borrowers to get funded. These findings suggest that the introduction of disintermediated P2P platform improves social welfare on the prosocial crowdfunding platforms.

Keywords: Crowdfunding, Field Partner, Kiva, KivaZip, Digital Intermediary

Introduction

Crowdfunding represents a paradigm shift for investing in projects. Rather than raising fund from venture capital or private equity, crowdfunding platforms directly connect entrepreneurs to individual investors. They could dramatically reduce the cost of capital, comparing to traditional fund-raising channels. This emerging mechanism is rather promising for donation-based platforms. For instance, Kiva.org is a non-profit platform that allows people to lend money via the Internet to low-income entrepreneurs in over 80 countries. Kiva's mission is "to connect people through lending to alleviate poverty."

In the past several decades, financing for projects of poverty relief has mainly been through microfinance institutions (MFIs), which commit to provide financial services to low-income households that may be denied credit with traditional financial institutions. MFIs finance projects and charge interest to sustain themselves. Due to the high-risk nature of poverty projects, the interest rate of microfinance institution is considerably higher than traditional banks, in the range of 20% to higher than 50% (Morduch 1999).

Kiva.org is one of the earliest and largest crowdfunding platform that that allows people to make small loans to people in poverty for their small business projects around the world. It operates by partnering

with local MFIs, i.e. field partners in Kiva's term. When a project is posted on Kiva, gets funded and the loan is repaid with installments, the field partners are responsible to vet and present the project, take the fund, and monitor repayments. Kiva lenders do not earn any interest on these loans, while field partners charge regular interest rate on borrowers (averagely 34.65%). This high interest rate has been widely criticized. Kiva has been under tremendous pressure to get rid of "middlemen" and create real direct link between borrowers and lenders.

As part of the efforts to cut borrowers' costs through technology, Kiva later launched a new platform, KivaZip, offering zero interest loans to borrowers via direct transfer from the platform. On KivaZip, lenders can support borrowers from the US and Kenya. Kenya has M-Pesa, a mobile money system that allows anyone with a Kenya ID to deposit, withdraw, and transfer money easily with a mobile device, so direct disbursement and repayment is possible. There is no field partner on KivaZip, but each borrower is endorsed by a third-party trustee. A trustee can be any individual or organization that vouches for the character and creditworthiness of a borrower, but plays no active role in monitoring or assuring repayments, nor co-signs the loan. Although borrowers would have truly zero interest, the repayment rate on KivaZip (87.9%) is significantly lower than the original Kiva (99%).

The newly introduced KivaZip model seems promising. The spirit of crowdfunding is rooted in the conversations and idea-sharing between entrepreneurs and funders. On KivaZip, Each borrower profile includes a private area for conversation and messages between borrowers and lenders. Those conversations can happen without an intermediary. The wisdom of crowds – a crowd of proper size and diversity can provide sufficient and unbiased information – helps funders make collective informed decisions in the absence of the field partners' project monitoring and selection. However, bypassing the intermediary may also increase the risk for lenders. It is possible that borrowers who go on KivaZip might have been rejected by local MFIs. Without being scrutinized, vetted and monitored, borrowers are more likely to default. It seems that such screening and risk monitoring function of the intermediary cannot be easily substituted by technology.

In this paper, we examine the original Kiva model (the intermediated platform alone) and the new KivaZip model (co-existence of the intermediated and P2P crowdfunding platforms). We ask the following research questions: How does the newly launched P2P platform affect the original intermediated business model on the crowdfunding platform? Will lenders and borrowers be better off in the presence of both platforms? How would lenders and borrowers choose between the two types of platforms? Our analytic model explicates the role of the intermediary, as well as the impact of P2P funding on the prosocial crowdfunding platform.

Literature

Several types of funding mechanisms have been studied in the crowdfunding literature: loan-based (Lin and Viswanathan 2013), reward-based (Agarwal et al. 2011), equity-based and donation-based (Burtch et al. 2014a). Prior research on donation-based crowdfunding has examined the impact of geographic, social, economic and demographic characteristics on fundraising success. Lin and Viswanathan (2013) find evidence of an apparent home bias. Agarwal et al. (2011) suggest lenders' aversion to geographic distance. Using Kiva data, Burtch et al. (2014b) conclude that pro-social lenders prefer to contribute funds locally and to culturally similar others.

Literature in other disciplines has also studied factors that affect charity fundraising success. Psychologists have demonstrated that individuals are more likely to support borrowers in need when they can empathize (Piff et al. 2010), or when they view themselves as part of the same "in-group" (Baron and Szymanska 2011). Beyond these "soft" factors, studies have confirmed that donors consider rationally about risk factors, such as credit rating, debt-to-income ratio, and the number of delinquencies. Since Kiva offers no financial return, we only consider lenders' psychological and social motivations rather than the monetary incentives.

Our model is also related to the literature on price discrimination. Current theories suggest that consumers can be segmented into two groups who have different preferences for quality (Varian 1985, Tirole 1988, Inderst, and Shaffer 2009). DeGraba (1990) demonstrates similar results for markets with intermediary. Diamond (1982) provides a general analysis of the effect of diversification on resolving

incentive problems between borrowers and lenders. We complement this line of research by showing the intermediary's role of market segmentation in the presence of P2P direct lending.

The Model

We consider the operation of two platforms in the crowdfunding market, Kiva and KivaZip. Kiva has a field partner that monitors the projects funded on the platform and charges an interest rate r, thus is an intermediated platform, while KivaZip support P2P direct lending. Each borrower needs $1 loan. Each lender lends $1. Since the lender does not charge interest, she gets back $1 if the project is successful is 0 otherwise.

We denote the expected return on Kiva as k and that on KivaZip as z. Because the field partner monitors the repayment of loans, the repayment rate is higher on Kiva than KivaZip. So $k > z$ in general. Also, because lenders use their fund paid back by the borrowers to fund other projects, in equilibrium the probability of funding equals to the repayment rate. Therefore, k and z are the average repayment rates (and the probabilities of funding) on Kiva and Zip, respectively.

Lenders' utility consists of two parts: leading utility and altruism utility. We assume that the lenders have heterogeneous lending utility v, where $v \in U[0,1]$, and heterogeneous altruism level α, where $\alpha \in U[0,1]$, both from a uniform distribution. Lenders on Kiva only get base lending utility v. We assume that the lender's utility on Kiva is

$$U_k = v + k - 1$$

Lenders on KivaZip enjoy an additional altruism utility αv. We assume the higher the base lending utility, the higher the altruism utility. Hence, the lender's utility on Zip is

$$U_z = (1 + \alpha)v + z - 1$$

Borrowers have different repayment ability θ, $\theta \in U[0,1]$, which can also be interpreted as the success probability of each borrower's project. The project, if successful, will generate net gain g, which can be understood as the return $1 + g$ subtracts the project cost 1. In the presence of both Kiva and KivaZip, borrowers who are qualified to raise fund on Kiva can choose one of them to participate. The tradeoff is that, they may have higher likelihood of getting funded on Kiva, although it is more expensive. Borrowers who are not qualified to raise fund on Kiva (due to the field partner's screening) will choose to borrow on the KivaZip platform.

Equilibrium Analysis

To establish a benchmark analysis, we first develop an intermediated model to represent Kiva's operation before KivaZip was introduced. We then analyze the co-existence of the intermediated and P2P platform, which is the current business model.

The Intermediated Model

The timing is as follows on the Kiva platform. First, the field partner announces interest rate r and screens borrowers on Kiva. Then lenders lend on Kiva and borrowers on Kiva get funded. If the project is successful, borrowers replay the loan back to Kiva.

We assume the field partner screen the borrowers such that the high quality borrowers whose success probability is higher than θ will be listed on Kiva. So a total of $(1 - \theta)$ borrowers will be listed on the platform. With probability k the borrower gets funded. The platform average success rate or repayment rate is determined by the average repayment ability of borrowers on the platform. The average repayment rate on kiva is $k = \frac{1+\theta}{2}$. Because the field partner's revenue is linear in r, the field partner charges as high an interest rate as possible, so $r = g$.

We assume that the filed partner incurs a monitoring cost, which is an increasing but convex function of the total number of projects. In particular, we assume the cost to be $c(1 - \theta)^2$. The filed partner's problem is to determine the interest rate and the monitoring threshold to maximize its profit:

$$\max_{\theta} k^2(1-\theta)r - c(1-\theta)^2 \quad (1)$$
$$\text{s.t. } k = \frac{1+\theta}{2}$$
$$r = g$$

The first term in the objective function is the expected profit, which is calculated as the funding probability k times the expected demand $(1-\theta)$, times the repayment probability k, and multiplied by the interest rate r. The second term is the monitoring cost. Solving this optimization problem we have: $\theta^k = \frac{2\sqrt{4c^2+8cg+g^2}-(4c+g)}{3g}$.

The lender's net utility of lending on Kiva is $U_k = v + k - 1 \geq 0$. So lenders whose utility $v \geq \frac{2g+2c-\sqrt{4c^2+8cg+g^2}}{3g} = v^k$ will be willing to lend. Proposition 1 shows the market equilibrium outcome.

Proposition 1 (Intermediated Model Equilibrium). *On the intermediated platform, the intermediary charges an interest rate g, and screen borrowers with repayment ability higher than $\theta^k$to be funded on kiva, and the lenders whose lending utility is higher than v^kwill be willing to lend on the platform.*

The Intermediated and P2P Model

We next consider both Kiva and KivaZip. Because the lender's net utility of lending on Kiva is $U_k = v + k - 1$, and her net utility of lending on KivaZip is $U_z = (1+\alpha)v + z - 1$. The lender's platform choice is determined as follows.

Lemma 1 (Lender's Incentive). *The lenders' incentive to lend on Kiva and KivaZip depends on the their lending utility and altruism levels:*
(i) When lending utility $v \in [0,1-k)$, if the altruism level $\alpha < \frac{1-z}{v} - 1$, the lenders do not lend; otherwise, the lenders lend on KivaZip;
(ii) When lending utility $v \in [1-k,1]$, if the altruism level $\alpha < \frac{k-z}{v}$, the lenders lend on Kiva; otherwise, the lenders lend on KivaZip.

Lemma 1 shows that both the lending utility and the altruism level are critical factors that determine the lenders' platform choices. Figure 1 illustrates the segmentation of the lenders.

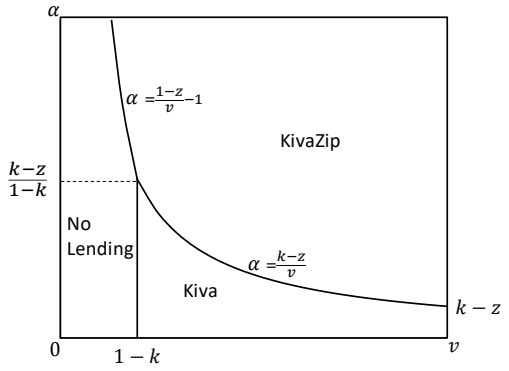

Figure 1: Lender Segmentation on Kiva and KivaZip

Assume the field partner screen the borrowers so that only borrowers whose repayment probability is higher than θ goes to Kiva. So the average repayment rate on Kiva is $k = \frac{1+\theta}{2}$ and the average repayment rate on zip is $z = \frac{\theta}{2}$.

With probability k the borrower gets funded on Kiva. With probability k the project is a success and the expected return is $kk(g-r)$. Similarly, there is probability z that the borrower can get funded on KivaZip. After the project is funded, with probability z the project is successful with gain g. Therefore, the expected return is zzg. The borrower's incentive compatibility requires that $\frac{\theta}{2}\frac{\theta}{2} < \frac{1+\theta}{2}\frac{1+\theta}{2}(1-\frac{r}{g})$,

so that higher repayment borrowers prefer Kiva rather than KivaZip. The condition is $r \leq g[1 - \left(\frac{\theta}{1+\theta}\right)^2]$. Because the field partner's revenue is linear in r, the inequality binds. Therefore, we have the following result.

Proposition 2 (Field Partner's Interest Rate Rule). *The field partner charges an interest rate* $r = g[1 - \left(\frac{\theta}{1+\theta}\right)^2]$*, which increases in the project gain and decreases in the lowest repayment borrower on kiva.*

Proposition 2 shows that the interest rate charged by the filed partner is a decreasing function of θ. The higher the filtering criteria, the higher the repayment rate, and the lower the interest rate. The interest rate is negatively correlated with the repayment ability. On the other hand, if the average project gain is high, Kiva is able to charge a high interest rate. This is consistent with the observation that the filed partner would bear some repayment risks. The interest rate charged on the Kiva platform is a risk-sharing rule that trades off the repayment risk and the gain of the funded project.

The filed partner's problem is to determine the interest rate and the monitoring threshold to maximize its profit:

$$\begin{aligned} &\max_{\theta} k^2(1-\theta)r - c(1-\theta)^2 \\ &\text{s.t. } k = \frac{1+\theta}{2} \\ &r = g[1 - \left(\frac{\theta}{1+\theta}\right)^2] \end{aligned} \tag{2}$$

Proposition 3 (Field Partner's Filtering Rule). *The field partner only supports borrowers with repayment rate higher than* $\theta^* = \frac{8c+g}{8c+4g}$, where θ^* increases in the monitoring cost c, and decreases in the project gain g.

Proposition 3 shows that, if the monitoring cost is high, then the filed partner would prefer to set a high screening criterion and support fewer borrowers. If the average project gain is high, than the field partner tends to support more borrowers.

Proposition 4 (Intermediated and P2P Model Equilibrium). *The market equilibrium is as follows:*
(i) Borrowers with repayment rate higher than $\theta^* = \frac{8c+g}{8c+4g}$ *borrow on Kiva and those with repayment rate lower than* θ^* *borrow on KivaZip;*
(ii) The field partner charges interest rate $r^* = \frac{g(24c+6g)(8c+4g)}{(16c+5g)^2}$*;*
(iii) Lenders with lending utility $v \in [\frac{3g}{16c+8g}, \frac{1}{2\alpha})$ *lend on Kiva and with lending utility* $v \in [\frac{1}{2\alpha}, 1]$ *lend on Zip.*

Comparing Proposition 1 and Proposition 4 we see the following impacts on Kiva platform after KivaZip was introduced: (i) the screening threshold on Kiva is increased; (ii) the interest rate on Kiva is reduced; (iii) more lenders shift to KivaZip. Importantly, some high-risk borrowers who otherwise would not be able to get funded on Kiva now get funded on KivaZip. These changes would lead to positive social welfare on the prosocial crowdfunding platform. On one hand, although there might be welfare loss by the reduced number of borrowers supported by Kiva, this is compensated by the increase in the average repayment rate so that the expected return would be higher on the intermediated platform. On the other hand, KivaZip is supported by the high altruism lenders on the platform. The direct P2P lending enables some high-risk borrowers who were not able to obtain funding and who had to pay high interests previously to gain access to zero-interest funds. The overall welfare gain on KivaZip is also positive.

Conclusion

The study enriches the literature on crowdfunding by examining two variations of the prosocial crowdfunding platform structures. Our analysis shows that the introduction of P2P direct lending is

beneficial for both borrowers and lenders. The co-existence of the intermediated and the P2P platform seem to be essential for the success of crowdfunding platform operations.

We contribute to the literature on P2P as a market mechanism and its impact on traditional markets. On the one hand, with innovative payment technologies such as mobile payments, entrepreneurs may raise funds directly rather than paying the commission required by most platforms. In this study, we find that the introduction of direct P2P lending platform enables the intermediary to reduce its interest rate and to raise its screening threshold on Kiva. This creates a potential threat to the intermediary's long-term survival. They need to think about ways to provide more value to borrowers and funders since the P2P direct lending would eventually will push them to make other functional adjustments on the platform. On the other hand, we find that the intermediary still plays an important market segmentation role on the crowdfunding platform. When the average project gain is not very high (these are often the cases), and there is risk of not getting back the repayment, the lenders would have less incentive to lend on Kiva. With the intermediation of the field partner, the borrowers are separated into two groups. The high-quality borrowers are able to secure the fund to the project, and the ability to pay back the fund to the lenders offers the lenders incentive to lend money on the platform. Although the low-quality borrowers are left out to KivaZip, some altruistic lenders are willing to take the risk to lend to them. Overall, the intermediary plays an essential and strategic role of market segmentation. By offering non-zero interest rate fund, the field partner effectively screen and price discriminates the borrowers. This effectively solves the market failure issue under asymmetric information.

Overall, the P2P platform incentives some lenders to shift their funds to KivaZip, which enables some high-risk borrowers to get funded. These findings suggest welfare improvement on the prosocial crowdfunding platforms. Despite the convenience and efficiency of P2P transactions, the crowdfunding platform needs to further consider how to more effectively mitigate risks and differentiate borrowers for sustainable developments.

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