How much should I invest? The influence of reputable investors and platform investors in online lending

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Short Paper

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Abstract

This paper draws on signaling theory to examine the joint effects of platform investment and investment of reputable investors on the investment behavior of ordinary investors in online lending. We tested our hypotheses with a dataset of 2,276,380 bidding records pertaining to 46,140 loans posted on an online lending platform. Our results show that (1) The investment of reputable investors as a quality signal can increase the investment amount of subsequent investors. (2) Platform investment signal and reputable investment signal are complementary. In the loan projects with platform investment (compared to those without), investment of reputable investors exerts greater influence on the investment amount of subsequent investors. (3) Focusing on loan projects with platform investment, the investment of reputable investors has greater impact on the investment amount of subsequent investors after the platform investment. This paper offers important theoretical and practical implications.

Keywords: Online lending, signaling theory, reputable investor, platform investor

Introduction

With the accumulation of personal wealth, investors' demand for investment in financial assets continues to increase (Lu et al., 2020). However, traditional financial institutions require borrowers to provide asset collateral when lending, which small and medium-sized enterprises, as the main body of enterprises, often fail to meet (Akorsu & Agyapong, 2012). This results in a serious mismatch between personal investment demand and corporate financing difficulties. Online lending, powered by big data analytics, cloud computing, and other technologies, has the potential to facilitate the supply-demand integration of financial resource and address the financing difficulties faced by small- and medium-sized enterprises (Wang et al., 2017).

P2P lending as a form of online crowdfunding has garnered extensive discussion in academia (Bachmann et al., 2011; Wei & Lin, 2017; Xu & Chau, 2018). P2P lending, which allows borrowers to acquire loans directly from other people without financial intermediaries (Ge et al., 2017; Zhang & Liu, 2012), is not a new financing mode; similar forms have long been used in traditional lending, such as borrowers obtaining funds from family members or friends (Wang & Greiner, 2011; Xu & Chau, 2018). However, enabled by advanced internet technologies, P2P lending platforms have significantly reduced transaction costs (Ge et

al., 2017) by matching the needs of both sides of the loan, thus making financing more convenient and efficient.

In P2P lending, investors typically lack professional knowledge in or time to conduct online lending (Kim & Viswanathan, 2019), making it impossible for them to accurately assess the quality of an investment project (Agrawal et al., 2014; Barber & Odean, 2008). As a result , they may observe the investment behavior of previous investors' and imitate/follow their investment behavior to reduce cognitive effort (Bettman et al., 1998). Platform investors and reputable investors (Kim & Viswanathan, 2019) often become the objects of learning and imitation. In this paper, platform investor refers to a P2P platform that invests funds into loans posted on the platform. Reputable investors are investors with high credit scores on the platform based on their educational level, salary, credit report, payment history, bank account information, credit card payment history, and other relevant information. While prior research has examined the impact of platform investors and that of reputable investors, separately, on outcomes such as financing efficiency (Zhou et al., 2017), decision making effectiveness (Mollick & Nanda, 2015), and lenders' investment behavior (Kim & Viswanathan, 2019; Petit & Wirtz, 2022), there is a paucity of exploration on the joint effects of platform investment and investment of reputable investors on the investment behavior of potential investors in online lending, an omission that we aim to address in this paper.

Theoretical Foundation and Hypothesis Development

Signaling theory, first proposed by Spence (1973) to demonstrate how job candidates can signal their ability or quality to potential employers by attaining a higher education level, is often used to explain how signals alleviate the information asymmetry between two parties (e.g., seller and buyer) in a market transaction (Spence, 2002). In order to reduce buyers' uncertainty, sellers may send pre-purchase signals about the quality of products or services (Dean & Biswas, 2001; Kirmani & Rao, 2000).

An extensive body of research in different disciplines has revealed a large variety of potential signals (Connelly et al., 2011; Kirmani & Rao, 2000; Wells et al., 2011). Researchers in economics and management have discussed how to assess signals of individual ability in the job market through the signals' cost or through guarantees of the signals' reliability (Spence, 1973). At the corporate level, signals that reflect corporate quality include dividend distribution (Bhattacharya, 1979), board reputable (Certo, 2003), private equity information (Janney & Folta, 2003, 2006), IPO lock-up periods (Arthurs et al., 2009), and earnings statements (Michael, 2009). In marketing, researchers have examined the influence on consumer purchase behavior of signals such as brand (Erdem & Swait, 1998), seller reputable (Chu, 1994; Van Der Heide et al., 2013), users' evaluations (Goh et al., 2013; Zhang et al., 2014), third party approval (Aiken & Boush, 2006; Biswas & Biswas, 2004; Wang et al., 2004; Yen, 2006), advertising investment (Aiken & Boush, 2006), celebrity credibility (Hussain et al., 2020; Karanges et al., 2018), and repeated purchases (Nelson, 1970). Information systems (IS) researchers have explored the impact of online reputation systems (Gregg & Scott, 2006), third-party guarantee seals (Song & Zahedi, 2007), brand reputable (Chu et al., 2005), social presence (Pavlou et al., 2007), website quality (Wells et al., 2011) on users' trust, satisfaction and transaction willingness. In P2P lending market, many individual investors lack the expertise and time to collect the information they need for optimal decision making (Barber & Odean, 2008). We expect that the investment of platform investors and that of reputable investors, as informational signals, will also influence lenders' investment decisions.

On an online lending platform, potential investors can easily access information about a loan and its investors posted on the platform, such as current investors' credit scores (which indicate whether the investors are reputable) and investment amount. The investment behavior of reputable investors exerts strong influence on potential investors (Kim & Viswanathan, 2019). More specifically, when investors observe increasing investment from reputable investors (a signal of high-quality loan), they may find the loan project more trustworthy and increase their own investment amount. Thus, we hypothesize:

Hypothesis 1: Investment from reputable investors positively influences the investment amount of subsequent investors.

Similarly, information about platform investment (i.e., a uniform platform investment ID) is also easily accessible. An online lending platform mainly relies on intelligent screening technology (on the basis of big data) to select loans for investment (Jiang et al., 2018). In addition, the platform has access to more transaction information, such as the precise amount of borrowing, the exact time of repayment, the specific

days overdue, and the total amount of the loan. The platform therefore has the ability to make more accurate decisions, and studies have shown that recommendation algorithms do enable consumers to make higher quality decisions (Diehl et al., 2003). When a platform participates in investing in a loan, it sends a strong informational signal to potential lenders, suggesting its endorsement of the loan and thus further enhancing the effect of reputable investors on potential lenders' investment amount. Hence, we hypothesize:

Hypothesis 2: Platform investment positively moderates the relationship between investment from reputable investors and the investment amount of potential investors.

Method and Data

Data Collection

We obtained our data from PPDAI, one of the largest P2P lending platforms in China. Our dataset includes all the transactions associated with the pat bao (which is a financial product launched by PPDAI) from July 2015 to April 2016, including 206,261 loan requests from 166,392 borrowers, and 3,080,452 bid records from investors. We matched each project with its borrower information, and removed the incomplete matching project data. Finally, 46,140 loan requests and 2,276,380 bidding records were used in this paper, including 20,918 loan projects without platform participation and 25,222 loan projects with platform participation.

Measures

Dependent Variables.

We use the investment amount of the next investor to measure the investment amount of the investor, and construct the dependent variable (*Userfunds)*.

Independent Variables.

In order to measure the impact of reputable investors on subsequent investors, we identified investors with the top 10% credit score as reputable investors, and the others as ordinary investors. In each project, we calculate the proportion of the investment amount of reputable investors in the accumulated financing amount of the project, and take this proportion as the independent variable (*Reputable_rate)*.

We constructed a dummy variable (*Platform investment*) to indicate whether the platform invests in this project. It takes the value of "1" if there is platform investment. Otherwise, it takes the value of "0".

We constructed a dummy variable (*PhbEnter*) based on the time of platform investment. It takes the value of '1' after the platform investment, and the value of '0' before the platform investment.

Control Variables.

We controlled for the effects of loan project, borrower characteristics, as follows:

LI represents loan-related characteristics, such as loan amount (*Totalfunds*) (log valued), interest rate (*Rate*), and repayment period (*Repayperiod*). The platform assigns each loan a credit rating from AAA (lowest risk) to F (highest risk), and based on this grade we constructed a scaled variable *Risk*, which we then converted into numerical values (i.e., AAA = 1, AA = 2, A = 3, B=4, C=5, D=6, E=7, F = 8, etc.). Based on the time when a loan was posted (2015/7-2016/4), we also constructed a categorical variable *Month*, which as later converted into numerical values (i.e., 2015/7 = 0, 2016/4 = 9, etc.).

BI represents borrower-related characteristics, such as age (*Age*), number of past borrowings (*Borrowtimes*), the number of successful borrowings in the past (*Successtimes*), repayment credit record (*Positive_traderecord*), late repayment record (*Negative_traderecord*), and the score of the borrower providing information (*Data_score*). We controlled for the borrower's gender with a binary variable with '1' for female and '0' for male. We controlled for job types through a scaled variable (*Job_type*), with '0' when the job type is not clear, '1' when the job type is student, '2' when the job type is worker, and '3' when the job type is private entrepreneur. We constructed four binary variables for video authentication (*Hasvideo*), academic certification (*Hasdiploma*), mobile authentication (*Hasphone*), and bank card

authentication (*Hascard*), respectively, assigning '1' to represent the presence of the borrower's authentication and '0' otherwise.

Variable	Definition	Mean	Std dev.	Min	Max
Userfunds	The investment amount of the next investor in the project (logarithm)	4.15	1.11	0.00	10.82
Reputable_rate	The proportion of the investment amount of reputable investors in the accumulated financing amount of the project.	0.34	0.21	0.00	1.00
Platform investment	Whether there is platform investment in the project	0.71	0.46	0.00	1.00
PhbEnter	Whether the platform has already entered the loan investment or not	0.71	0.46	0.00	1.00
LI	Loan information				
Totalfunds	Loan amount (logarithm)	9. 21	1. 09	5.29	13.12
Risk	The credit grade of the loan	5.33	0.80	1.00	6.00
Rate	Rate of the loan	0.19	0.02	0.07	0.36
Repayperiod	Repayment period (month)	11.19	2.34	3.00	24.00
BI	Borrower Information				
Gender	Coded '1' for female, and '0' for male	0.19	0.39	0.00	1.00
Age	Age	30.66	6.56	18.00	56.00
Job_type: Other	Borrower's job is other jobs	0.09	0.29	0.00	1.00
Job_type: Student	Borrower's job is student	0.03	0.17	0.00	1.00
Job_type: Worker	Borrower's job is worker	0.49	0.49	0.00	1.00
Job_type: Entrepreneur	Borrower's job is private entrepreneur	0.39	0.49	0.00	1.00
Borrowtimes	The total number of past borrowings	4.28	8.08	0.00	403.00
Successtimes	Number of successful past borrowings	0.85	0.22	0.00	1.00
Hasvideo	Whether the borrower carried out video authentication	0.17	0.38	0.00	1.00
Hasdiploma	Whether the borrower carried out diploma certification	0.45	0.49	0.00	1.00
Hasphone	Whether the borrower carried out mobile authentication	0.84	0.37	0.00	1.00
Hascard	Whether the borrower carried out bank card certification	0.64	0.48	0.00	1.00
Positive_traderecord	Repayment credit score	9.98	7.01	0.00	76.00
Negative_traderecord	Late repayment record	0.06	0.44	0.00	13.00
Data_score	The score of the borrower providing information	4.11	4.19	0.00	46.00
Table 1. Variable Definitions and Descriptive Statistic					

Model

In the lending environment, investors can easily observe the previous investors' investment choices. Each project presents its financing progress and investor list in real time, so investors can easily observe changes in financing progress and other people's investment choices. When an investor invests in the project, will it be influenced by investments from the platform or reputable investors? Based on the previous research hypothesis, we build the basic model as follows:

$$Userfund_{ij} = b_0 + b_1 Reputable\_rate_{ij} + b_2 LI_i + b_3 BI_i + u_i \quad (1)$$

In this model, *Userfund$_{ij}$* represents the investment amount of the jth investor in project i. *Reputable_rate$_{ij}$* indicates the ratio of the investment amount of reputable investors in the project to the current financing amount with the entry of the jth investor in the project i. *LI$_i$* captures time-invariant project characteristics, including *Totalfunds, Risk, Rate,* and *Repayperiod*; BIi captures time-invariant borrower characteristics, such as *Gender, Age, Job_type, Borrowtimes, Successtimes, Hasvideo, Hasdiploma, Hasphone, Hascard, Positive_traderecord, Negative_traderecord,* and *Data_score*.

Results

Reputable Investment and Investment Amount

In order to measure the reaction of investors to reputable investment signal, we use model (1) for empirical analysis. The regression results are shown in Table 2.

	Userfunds
Reputable_rate	0.36*** (39.91)
LI	Controlled
BI	Controlled

Table 2. A table of Reputable investment and investment amount

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. T values are reported in parentheses. The direct effect of platform investment is absorbed by the fixed effects

The results in Table 2 show that the coefficient of reputable_rate is positive and significant (coefficient = 0.36, $p < 0.01$), indicating that with the cumulative investment ratio of reputable investors increasing by 1%, the investment amount of the next investor in the project will increase by 0.36%. The proportion of investment from reputable investors do increase the investment amount of the next investor, thus supporting H1.

Moderation of Platform Investment

Moderation of Platform Investment

To further test the joint impact of platform investment and reputable investment signals on investment behavior, we add the interaction term (*Reputable_rate_platform*) of the cumulative investment ratio of reputable investors and platform investment to the model (1), and build the model (2) as follows:

$$Userfund_{ij} = b_0 + b_1 Reputable\_rate_{ij} + b_2 Platform_{ij} + b_3 Reputable\_rate\_platform_{ij}$$
$$+ b_4 LI_i + b_5 BI_i + u_i \quad (2)$$

The empirical analysis results are shown in Table 3.

	Userfunds
Reputable_rate	-0.04*** (-2.62)
Reputable_rate_platform	0.12**** (6.61)
Platform investment	Controlled
LI	Controlled
BI	Controlled
Table 3. A table on the moderation role of the platform investment.	

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. T values are reported in parentheses. The direct effect of platform investment is absorbed by the fixed effects

The results in Table 3 show that the coefficient of interaction term is positively significant (coefficient = 0.12, p < 0.01). This result shows that, compared with the loan projects without platform investment, the cumulative reputable investment proportion has a greater effect on the investment amount of the next investor in the loan projects with platform investment. Based on the above results, the signal of platform investment and the signal of reputable investors are complementary. In loan projects of platform investment, the effect of investment from reputable investors is stronger on the investment amount of subsequent investors. Therefore, H2 is supported.

Moderation of Phbenter

To further examine the moderating role of platform investment, we focus on the loan projects with platform investment, comparing lenders' investor behavior before and after platform entry, and studying the difference between the reputable investment signal and the investment amount. We construct the interaction term (*Reputable_rate_Phbenter*), which is the product term of the dummy variable (*Phbenter*) and reputable investment ratio. We add the interaction term (*Reputable_rate_Phbenter*) to model (1) for empirical analysis, and build the model (3) as follows.

$$Userfund_{ij} = b_0 + b_1 Reputable\_rate_{ij} + b_2 Phbenter_{ij} + b_3 Reputable\_rate\_Phbenter_{ij}$$
$$+ b_4 LI_i + b_5 BI_i + u_i$$

$$(3)$$

The empirical analysis results are shown in Table4.

	Userfunds
Reputable_rate	0.09*** (7.22)
Reputable_rate_Phbenter	0.89*** (31.78)
Phbenter	-0.004 (-0.38)
LI	Controlled
BI	Controlled
Table 4. A table on the moderation role of the platform investment.	

Note: *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. T values are reported in parentheses. The direct effect of platform investment is absorbed by the fixed effects

Table 4 shows that the coefficient of interaction term is significantly positive (0.89). This result suggests that, after the platform participates in the investment, with the increase of the cumulative investment

proportion of reputable investors, the investment amount of investors further increases. The above analysis shows that the impact of investments of reputable investors increases significantly after the platform invests, further confirming H2.

Conclusion

Major Findings

This paper examines the joint impact of platform investors and reputable investors on lenders' investment behavior. Our empirical test reveals three notable findings: (1) The investment of reputable investors as a quality signal can increase the investment amount of subsequent investors. (2) Platform investment signal and reputable investment signal are complementary. In the loan projects with platform investment (compared to those without), investment of reputable investors exerts greater influence on the investment amount of subsequent investors. (3) Focusing on loan projects with platform investment, the investment of reputable investors has greater impact on the investment amount of subsequent investors after the platform invests.

Theoretical Implications

This paper offers important theoretical implications. While extant research has examined the individual signaling effect of platform investment (Zhou et al. 2017)[1] and investment of reputable investors（Kim and Viswanathan 2019）, this research enhances our understanding of lenders' investment behavior on online lending platforms by considering the joint influence of these two quality signals.

Practical Implications

This paper provides valuable practical implications for both platform managers and investors. Platform managers can benefit from the insights obtained in this study. Our findings demonstrate that an increase in the proportion of investment from reputable investors positively influences the investment amount of potential investors, and this effect is further strengthened by platform investment. To leverage these findings, platform managers can enhance investor participation by highlighting the salience of these two quality signals. For instance, they can ensure that information regarding the investment proportion of reputable investors and the platform's participation investment is prominently displayed on the project summary page.

This paper also holds significant implications for investors. Our findings confirm that platform investment and investment from reputable investors can serve as high-quality signals. Therefore, when selecting a loan, lenders can evaluate the loan's quality by considering whether the platform or reputable investors have made investments, as well as the proportion of the platform's investment. These insights can guide lenders in making informed decisions regarding loan selection.

Next Steps

This paper focuses on the joint impact of reputable and platform investors on the investment amount of subsequent investors. Next, we will continue our investigation of investment behavior on online lending platforms in the following areas: (1) We will compare the impact of reputable investors and that of platform investors on the lending behavior of subsequent investors; (2) we will identify additional outcome variables (besides amount of investment) that may be influenced by reputable and platform investors; (3) we will identify additional quality signals in online lending that may influence lenders' investment behavior; (4) we will explore contextual variables that may influence the salience/impact of quality signals.

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[1] Zhou primarily focused on the impact of platform signals on *investment speed*, whereas our study focuses on the role of platform signals in influencing *investment amount*.

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