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Herding behavior in Peer to Peer Lending Market of China

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Abstract: ***Since the difference between China's P2P lending market and others', it is necessary to figure out if there is any herding behavior and the factors which will affect the herding. This work used a model which used previous sum of the biddings as one of the explaining variable to test the China's P2P lending market and drew the conclusion that China's market has herding behavior and time-unvarying variables will change the direction of the effect when lenders taking previous funded number because people suppose there must be some private information when the time-unvarying variables do not persuade as much as other good credited ones.***

Keywords: P2P, microloan, herding behavior, influence, linear regression

1. Introduction

Peer to Peer lending, also known as web-based micro lending, social lending or crowed funding as explained by Zhang and Liu(2012), is defined by many researchers, for example Mingfeng Lin(2009), as "a lending where individual investors provide unsecured loans directly to individual borrowers without the intermediation of banks." The platform companies play the role as information intermediary agents. They can provide services like information disclosure, credit rating, money settlement, etc. The profits of the companies come from handling charge mainly.

In 2005, ZOPA (www.zopa.com) became the first peer to peer lending company in the world which was launched in United Kingdom. By August 17, 2015, ZOPA topped £1 Billion in Loans and became the first in UK reported by Crowdfund Insider. PROSPER (www.prosper.com) is the largest peer to peer company in the world, which was established in 2006. By JULY 9, 2015, it was reported by Lend Academy that crossed $4 Billion in total loans issued since inception. Apparently, peer to peer lending becomes one of the choices beside the traditional investment, and begins to spread to the rest of the world.

Herding behavior describes many social and economic situations. In peer to peer lending, herding behavior was described by Binjie Luo and Zhangxi Lin (2013) as" individuals follow the behaviors of other people and generally ignore their own information which might cost them too much to obtain or analyse".

In previous studies, researchers proved that the herding behavior exists in peer to peer lending market（Krumme & Herrero, 2009; Juanjuan Zhang & Peng Liu, 2012）by using the data from Prosper.Com. However, will situation be the same in China? This paper is an empirical study using data from China's P2P lending platform named RENRENDAI.com.

2. Literature Survey

More and more researchers begin to pay attention to P2P lending market. Lenders cannot get borrowers' other information like annual report in stock market, and most of the studies focus on the factors that influence the success. Previous studies can be mainly divided into three aspects as followed. And positivism models used can be classified to three kinds.
Influence factors

The first aspect will be the influence of borrowers' information and resource to success loan. Herzenstein and some other researchers found that borrowers' credit ratings are very important to success loan while demographic attributes play less important role in their work, "The democratization of personal consumer loans? Determinants of Success in online peer-to-peer loan auctions", in 2008.Besides, Klaff (2008) found that it is not quit possible for bad credit record person to get loan from P2P lending market in his work, online peer-to-peer lending: A lenders' perspective, in 2008. Ravina (2012) found that borrowers with more clear pictures can get loans easier with lower interest rate. Laura Gonzalez and Yuliya Komarova Loureiro qualify these findings in their work, "When can a photo increase credit? The impact of lender and borrower's profiles on online peer-to-peer loans".Beck and Güttler found that female loan officer are doing better in screening and supervising loan in their work, "Gender and banking: Are women better loan officers?" in 2009.Lin and other researchers found that social network can help mitigate information asymmetry using data from Prosper.com in their work, "Can Social Networks Help Mitigate Information Asymmetry in Online Markets?" in 2009. As well as Katherine and Sergio in the same year, "Lending behavior and community structure in an online peer-to-peer economic network". In general, borrow information such like purpose of the loan, number of the loan, interest of the loan will have important impact on loan decision. Though from different aspect, demographic attributes do impact loan decision. And Social capital can help mitigate information asymmetry, lower the risk.The second aspect will be the influence of lenders decision to success loan. Juanjuan Zhang, Peng Liu used data from Posper.Com to verify the herding behavior and found that herding behavior can help lenders achieve better investment performance, "Rational Herding in Microloan Markets", in 2012.Ding jie and other researchers studied about the factors that will affect the willing to lend from psychological aspect in China.The last aspect will be study about platform. Garman and other researchers found P2P lending market grows very quickly because they are convenient, they can make small amount of money loan available, and they can spread the risk by divide the loan into different parts. But the risk must be high because of the high interest rate.

a) Positivism Models

Positivism model used in P2P lending market can be divided in three mainly.The herding behavior is discussed a lot in stock market, but is a start in peer to peer lending market. I found three methods to describe herding behavior in peer to peer lending market.

First is made by Eunkyoung Lee & Byungtae Lee (2012), which used the mount of one bidding in both money and times for one day to measure herding behavior via one of the biggest P2P lending platform in Korea. They think lender's personal decision on the bids cannot be observed. But lenders' decisions can be indicated by daily bidding on specific loan item. If herding behavior exists, then the daily bidding (both money and number of bids) will increase.

Another is made by "Binjie Luo and Zhangxi Lin (2011)", which used time interval to measure the herding behavior. They think that before lender begin to make a decision; lender will consider the numbers of total bids and friend bids. If the both numbers are larger, the herding behavior will be more obvious, the loan will success sooner. They built a linear regression including friend bids, total bids, and time interval after control other variables.

The last one is used by Zhang & Liu (2012), which use bidding in a unit time to measure the influence of the previous total amount of the bidding via the data of prosper.com. They think if the larger current bids the more bids in next unit time, then there is herding behavior in P2P lending market.

3. Methodology

a) Model Building

The knowledge of lenders can be very hard to get while their decisions are available. Among three modelsmentioned before, the first two uses the amount of one bidding or time interval to measure herding behavior, which did not explain herding behavior directly. Herding behavior is someone gives up their own private information and follows previous investors. The third method can explain "follow behavior" because we use previous total amount of the bidding as one of the explanatory variables. If we can draw the conclusion that previous total percent or amount of the bidding, previous bidding times has significant effect on the bidding during next unit time, that we can say lenders follow previous behavior directly. So we can choose the simple model to exam sample of Chinese P2P lending market.

In Zhang & Liu's model, they selected the bidding lists last for 7 days which is the typical duration of a bidding list last from start to the end. They took a snapshot at the end of every day and achieve a set of panel data. They used cumulative amount of funding as measure herding.

Follow their thought, I assign $\boldsymbol{i}^{th}$ loan item achieve $\boldsymbol{y}_{it}$ during $\boldsymbol{t}^{th}$ time unit (one minute or two minutes or three minutes depends on which data set).

$\mathbf{Y}_{i,t-1}$stands for $\boldsymbol{i}^{th}$ loan item achieve total amount of money before $\boldsymbol{t}^{th}$ time unit.

$\mathbf{X}_{i,t}$ stands for time-varying variables which are changeable during the biding process such like total times of bidding before $\boldsymbol{t}^{th}$ time unit, and total percentage of bidding before $\boldsymbol{t}^{th}$ time unit.

$\mathbf{Z}_i$ stand for time-unvarying variables which are not changeable during the whole bidding period such like total amount, interest rate and attributions of the borrowers. ε_{it} is the error item. A basic model can be like this.

$$\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+\varepsilon_{it} \ldots\ldots(1)$$

After preliminary analysis, I need to control for unobserved heterogeneity and payoff externality. Here $\varepsilon_{it}= u_j+v_{j,t}$. Variable "$u_j$" means unobserved factors which is only decided by the object but not relevant with time. Variable "$v_{j,t}$" is the error item now.

$$\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+\boldsymbol{\upsilon}_j+\mathbf{v}_{it} \ldots\ldots (2)$$

And then, I will check the interactive variables between time-unvarying variables and $\mathbf{Y}_{i,t-1}$.

$$\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+\mathbf{Y}_{i,t-1}\cdot\mathbf{Z}_i\cdot\beta_3+\boldsymbol{\upsilon}_j+\mathbf{v}_{it} \ldots\ldots (3)$$

b) Variables Explanation

Variable $\boldsymbol{y}_{it}$ is the dependent variable, $\mathbf{Y}_{i,t-1}$ is the independent variable, $\mathbf{X}_t$ will be time-varying variable and $\mathbf{Z}_i$ will be the time-unvarying variables.The data of RENRENDAI.com can be viewed by every registered user. I used the software named GOOSEEKER（GOOSEEKER.COM）to download every bidding records from 2016/3/1 to 2016/6. All contain more than 30000 bids with more than 3200000 records.

Table 1: Variables explanation

variables		Stands For
y_{it}		Achievement during tth time unit(T Amount)
$Y_{i,t-1}$		Ith loan item achieve total amount of money before I*th* time unit(Lag Amount)
X_t (lagged)	Lag percent	Ith list achieved total percentage of loan before I*th* time unit
	Lag times	I*th* loan item achieve total number of times before tth time unit
Z_i	IR(Interest Rate)	I[th] loan item's interest rate
	BA(Borrowing Amount)	I[th] loan item's loan amount
	DM(Duration MONTH)	How long the ith loan item ask for money
	BA(Borrower Age)	The age of the borrower
	BM(Borrower Marriage)	3 for widow or widower, 2 for married, 1 for unmarried and 0 for divorced
	BE(Borrower Education)	Borrower's education level, 3 for master and above,2 for bachelor and 1 for below
	CLL(Credit Level)	I[th] loan item's credit rating, from AA to HR, assign 7 to 1
	HP(House property)	House property, 1 for yes and 0 for no
	HL(House Loan)	House loan, 1 for yes and 0 for 0
	CARP(Car property)	Car property,1 for yes and 0 for no
	CARL(Car loan)	Car loan,1 for yes and 0 for no
	BI(Borrower income per year RMB)	1 for less than 1000,2 for 1001-2000,3 for 2000-5000, 4 for 5000-10000, 5 for 10000-20000, 6 for 20000-50000,7 for more than 50000
	OH(Overdue History)	Times of overdue during paying back

4. Results

We can see from the table above that there are a lot of descriptions of the borrowers' information. During the test, some of the variables were found not significant. The results are as followed.

a) Preliminary Analysis

Table 2: Result of preliminary analysis

Variables	3[rd] min	4[th] min	5[th] min	6[th] min	7[th] min	8[th] min	9[th] min
Lag Amount	-0.176208	-0.109	-0.087076	-0.055971	-0.1558	-0.17587	-0.15879
Lag Percent	-8237.626	-10005	-7639.769	-8887.131	-9528.3	-14265.2	
Lag Times	49.90855	29.8048	18.78489	16.90588	24.1644	35.0393	10.00303
T Amount	0.311758	0.23571	0.191702	0.153992	0.28898	0.349674	0.259017
Interest Rate	560.2088	589.16	326.1293		——	——	——

There are totally 20 listing attributions about the borrowers and the loan lists, plus 3 lagged variables. I used OLS to estimate their coefficient and significance, the process and the result are as followed.

Because different bidding lists have different duration time from start bidding to finish bidding, such like some of the bidding objects ended in 3rd minute after their first bidding while the other ended in 7th minute. I cannot put them together as a big sample. Because if the test period I choose is longer than 3 minutes, the data after 3rd minute will not be matching pervious 3 minutes; If not, the data from 7th minute group cannot represent the final part of the bidding. Zhang & Liu chose the duration of 7 days because 7 days are typical on prosper.com. But situation here is much shorter than one day. So I have to separate the data in groups and test them 7 times.

I used software Eviews6.0 to estimate the correlation between the amount of money received in Tth time unit and all the 16 variables. The results are described in table 2.

We can see from the table that effects of Lag Amount, Lag Percent, Lag Times and T Amount (T Amount means money received in Tth time unit, and the meanings of the variables are present in section 4.2) are basically significant because most of the P-values are less than 0.01. Interest Rate is significant at the level that p-value is less than 0.1 in the data group 3rd minute, 4th minute and 5th minute. The rest variables' correlation with the amount of money received in unit time are not significant. But in Zhang & Liu's work, all the time-invariant variables are significantly correlated with the "T Amount" which means the money received in unit time.

However, "Lag Amount" and "Lag Percent" show negative effects on the amount of money received in one unit time. This means that with the forward of the lending process, the lending amount in one unit time interval will decrease instead of increase. The more the accumulated amount, the less lending amount will happen in next unit time. The more the accumulated bidding percent, the less lending amount will happen in next unit time. In Zhang & Liu's work, the result was opposite, where lending amount in one unit time will increase as the previous sum "Lag amount" increase.

"Lag times" shows the positive effect on the amount of money received in one unit time. This means that the amount of money received in unit time will increase as the previous bidding times increase. In Zhang &Liu's work, the result was opposite, where lending amount in one unit time will decrease as the previous bidding times sum "Lag Times" increase. The result was totally opposite to the result of Zhang & Liu's work. We will see in next section if there is any unobservable heterogeneity or payoff externality which leads to the result.

b) Herding test

Table 3: Result ofherding test

Variables	3^{rd} min	4^{th} min	5^{th} min	6^{th} min	7^{th} min	8^{th} min	9^{th} min
Lag Amount	0.673199	0.637362	0.5676	0.468257	0.409447	0.610844	0.431919
Lag Percent	-84775.1	-69536.8	-53516.4	-50804.7	-72710.1	-84173.2	-56778.3
Lag Times	-30.3642	——	——	11.33462	——	20.12411	——
Lag Amount*Lag percent	-0.96269	-0.84853	-0.74664	-0.62594	-0.76617	-1.23746	-0.75869

In the model, first equation ($\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+\varepsilon_{it}$), the software treated error item$\boldsymbol{\varepsilon}_{it}$ as $E(\boldsymbol{\varepsilon}_{it})=0$. However, there may be some other mechanisms which have effects on the result. $E(\boldsymbol{\varepsilon}_{it})=0$ can be not rigorous. Zhang & Liu discuss two more reasons to explain the results, and after they controlled these two reasons, they achieved the Herding results.

Unobservable heterogeneity refers to the unobserved factors which have effects on the dependent variable. This means for each object, the equation will has specific intercept because the object's own factor the equation represents. The first equation ($\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+\varepsilon_{it}$) will change into the second equation ($\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+u_j+v_{j,t}$), where $\varepsilon_{it}=u_j+v_{j,t.}$ Variable "u_j" means unobserved factors which is only decided by the object but not time. Variable "$v_{j,t}$" is the error item now. In my case, gender for example, cannot be achieved by the listing information. I use u_j to represent those unobserved factors.

Payoff externalities refer to that people tend to choose the biddings with higher Lag Amount or Lag percentage because these biddings can become a successful loan easier so that they do not need to get their money back and suffer the opportunity costs. Their choices of such higher degree of completion biddings are not because they got qualified information from previous lender but just because the externality of "higher chance to make the lending become a loan". Zhang & Liu took Payoff externality as another factor which affects the result but not treated this reason as a herding factor because herding behavior in their model are not based on payoff externalities. Follow their model, I created the interactive variable "Lag Amount*Lag percent" to represent payoffs externalities. In Zhang & Liu's herding test, money received before t^{th} time interval (similar with my "Lag Amount") has positive effect on money received in t^{th} time (similar with my "T Amount") , percentage needed to complete the bidding (equal to 1-"Lag percent") has negative effect on money received in t^{th} time (similar with my "T Amount"), the interactive variable of the two independent variables has positive effect on money received in t^{th} time (similar with my "T Amount"). The result of their herding test means that the larger the "Lag Amount", the more the effect of "percentage needed to complete the bidding" (With the increasing number of "Lag Amount", the percentage will keep encourage the lender to bid in one unit time more and more heavily. This is the payoff externality.); the result of their herding test also means that the less the "percentage needed to complete the bidding", the less the effect of "Lag Amount" (With the bidding getting close to complete the bidding, the coefficient of "Lag Amount" will become smaller.).

The unobservable heterogeneities cannot be separated from time-invariant variables "Z_i" because there is multi-collinearity between "u_j" and "Z_i", I tried to input both kinds of variables, but the software "E-views" returned "near singular matrix". So I used "cross-section fixed" and "period fixed" function in E-views to get the unobservable heterogeneities controlled result without"Zi" (which means I treat all "Z_i" as part of unobservable heterogeneities "u_j"). As present in table 3, the coefficients of variables "Lag Amount" and "Lag Times" are positive in group 3^{rd} minute, 4^{th} minute, 5^{th} minute, 6^{th} minute, 7^{th} minute, 8^{th} minute and 9^{th} minute except for "Lag Times" in 3^{rd} minute group, which means the more previous sum of bidding amount and bidding times, the more amount of money received in one unit time. The coefficients of the interactive Variable "Lag Amount*Lag percent" is negative, which means with the decrease of the interactive variable, the amount of money received in unit time will increase. Payoffs externalities do not have effects on the independent variable which can be mistaken as the herding effect.

After we controlled the two reasons, we can see from table 3 that, "Lag Amount" and "Lag Times" are both positive. "Lag Percent" is negative. The amount of money received in one unit time will increase as the previous amount sum and times sum increase. This result means that the herding exits in the sample.

c) First Momentum

Table 4: Result offirst minute

Variables	3rd min	4th min	5th min	6th min	7th min	8th min	9th min
Borrow Amount	0.182	0.131	0.122	0.275	0.275	0.314	0.243
Interest Rate	-5711.869	——	——	——	——	-15331.089	-23080.763
Credit Level	-3512.359	——	——	——	——	——	-13827.041
House Property	3300.69	——	——	7020.675	7020.675	——	——
House Loan	-4330.851	——	——	-7926.227	-7926.227	——	——
Car Property	——	-3377.92	——	——	——	——	——
Duration Month	474.133	——	——	——	——	——	1962.579
Age	-91.334	——	——	——	——	——	——
Marriage	——	——	-2052.103	——	——	——	——

Then we take a look at what kind of factors will lead to a better momentum. We know that herding means subsequent lenders give up their own information and follow decision made by previous lenders. However, there must be the first man who has no information to follow and has to make his own choice. Here we take every bidding list's first unit amount sum to form a cross-section data. We analyze the correlation between variables "First unit amount sum" and "Z_i".

As presented in table 4, If we use "p<0.1" as the significance standard, we can see from the 3rd minute group that "Borrowing Amount", "Duration MONTH" and "House Property" are positive correlated with the amount of money received in first unit time; And the variables "interest rate PERCENT", "Credit Level" and "House Loan" in 3rd minute group have negative correlation with the amount of money received in first unit time. But in the 4th minute group, only two variables have significant effect on the first momentum. "Borrowing Amount" has positive correlation with the first momentum while "Car Property" has negative correlation with the first momentum. Every group has different result from each other. In 5th minute group, the coefficient of "Borrowing Amount" is positive while the coefficient of the marriage is negative. In 6th minute group, the coefficients of "Borrowing Amount" and "Education" are positive and "Marriage" is negative. In 7th minute, the coefficients of "Borrowing Amount" and "House Property" are positive and "House Loan" is negative. In 8th and 9th minute, "Borrowing Amount" is positive, and "interest rate" is negative.

If we take all groups as the consideration, most variables did not show strict correlations with the first momentum "amount of money received in first unit time". Only variable "Borrowing Amount" shows the positive effect on first momentum, which means larger amount of borrowing request, will lead to higher amount of money received in first unit time.

d) Interactive Variables

Table 5: Result ofinteractive Variables

Variables	3rd min	4th min	5th min	6th min	7th min	8th min	9th min
Lag Amount	-0.181606	——	-0.98722	-0.96446	-2.68265	——	-4.2831
Lag Percent	-76711.73	-56527	-41316.27	-35504.1	-49622.3	-62518	-48190
Lag Times	-94.27264	-48.215	——	-20.5186	——	——	——
Lag Amount*Lag percent	-1.161161	-1.021	-0.842115	-0.77779	-0.84313	-1.363	-1.0948
Lag Amount*Lag Times	0.001	0.0007	0.000364	0.000468	0.000301	0.0006	0.0006
Lag Amount*BA	-0.00181	——	0.000519	0.000262	0.00107	——	——
Lag Amount*IR	0.089359	0.0606	0.135233	0.109978	0.224855	0.1314	0.4663
Lag Amount*CLL	——	——	——	0.08305	——	——	0.2660
Lag Amount*BI	——	——	——	0.009569	——	——	-0.0239
Lag Amount*HP	-0.034161	0.0217	——	-0.04415	——	——	——
Lag Amount*HL	0.045107	——	-0.041117	0.029972	——	——	——
Lag Amount*CARP	0.025271	0.0571	——	——	——	——	——
Lag Amount*CARL	——	——	0.099597	0.062256	——	——	——
Lag Amount*DM	-0.005748	——	-0.006177	-0.0074	——	——	-0.0345
Lag Amount*Age	0.000852	0.0013	——	-0.00141	——	——	-0.0061
Lag Amount*BM	——	——	0.03297	——	0.023048	——	——

Then we take a look at interactive variables. Still, we take p<0.1 as the significant standard. In all groups, "Lag Amount*IR" Interacted by "Lag Amount" and time-inverting variable "Interest Rate" has positive effect on the amount of money received in one unit time. And if we look back in herding test and first momentum, we can find that "Lag Amount" has positive effect while the "Interest Rate" has negative effect. This can be explained in this way: though "Interest Rate" showed negative affect on the current funding momentum which means people do not want to bid for the high interest rate because usually borrower will not pay more to get the loan if they can get the loan in average level rate, but seeing more people chasing one bidding, they choose to follow their decision. “Lag Amount*Lag Times” is positive, the same with the result in herding test. More “Lag Amount” and “Lag Times” will attract more bidding; this result is different from the result of “Zhang & Liu’s work”. In Zhang & Liu’s work, “Lag Times” is negative effect in herding test. Lenders will hesitate if the bidding has more “Lag Times” at the same “Lag Amount” level, mainly because lender might think more “Lag Times” at the same “Lag Amount” as a signal showing previous lenders consider this as a high risk investment so that they choose to lend less amount (more bidding times at the same lending Amount).

“Lag Amount*Lag percent” is negative. In herding test, we can find that “Lag percent” is negative and “Lag Amount” is positive. This result means that when taking previous money amount and previous percent into consideration, the lenders showed a phenomenon that people tend to lend their money out when the bidding lists are not fully funded. This result is very different from previous study.

And the results “Lag Amount*CLL”, “Lag Amount*BI”, “Lag Amount*HP”, “Lag Amount*HL”, “Lag Amount*CARP”, “Lag Amount*CARL”, “Lag Amount*DM”, “Lag Amount*Age”, “Lag Amount*BM”, “Lag Amount*BE”, “Lag Amount*OH” and “Lag Amount*BA” are not significant in this test.

5. Discussion

In Zhang & Liu’s work, they first test the correlation between “T Amount” and most of the variables using model: $\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+\boldsymbol{\varepsilon}_{it}$ (1) and achieved the result that $\mathbf{Y}_{i,t-1}$ (Lag Amount, the amount of money received before t^{th} time) is significantly positive correlated to the $\boldsymbol{y}_{it}$ (T Amount, the amount of money received in t^{th} time interval). And then they propose the possibility that the correlation was reinforced by the unobserved heterogeneity and payoff externalities. They improved the model: $\boldsymbol{y}_{it}=\alpha\cdot\mathbf{Y}_{i,t-1}+\beta_1\cdot\mathbf{X}_t+\beta_2\cdot\mathbf{Z}_i+\boldsymbol{\upsilon}_j+\boldsymbol{\nu}_{it}$ (2) to control the unobserved heterogeneity and then introduce interaction term to control the payoff externalities. The result showed that after controlled unobserved heterogeneity and payoff externalities, the R^2 become much higher and “Lag Amount” has significantly positive effect, meaning the existence of the herding. Zhang & Liu then test whether the herding is rational or irrational, and found that all variables which have negative effects on first momentum (such like risky borrower risk, debt to income rate which show fewer trustworthy of the borrower) will have positive effects interacted with “Lag Amount” because people think that previous lenders must have same private information if they are will to bid the list lack of trustworthy. At the same time, variables which have positive effects on first momentum (such like friends endorsing which will increase the trustworthy of the borrower) will have negative effects interacted with “Lag Amount” because people think that the choice made by previous lenders can give the credit to borrowers’ good credit situation. And the variables do not have significant effect on first momentum also do not have significant effects interacted with “Lag Amount”.

In my preliminary result, coefficient of “Lag Amount” is also significant but negative which might be affected by unobserved heterogeneity and payoff externalities. Then I controlled unobserved heterogeneity and payoff externalities, and coefficient of “Lag Amount” becomes significantly positive which is the same with the result of Zhang & Liu’s work. This means that after I controlled unobserved heterogeneity and payoff externalities, herding exists (however, I did not found the payoff externalities in my data). Then I tried to find the effects of the time-unvarying variables using the interactive variables, I first test the effects of time-unvarying variables on the first time unit, and only “Borrow Amount” has significantly ($p<0.01$) positive effect on the amount of money received in first time interval in all the 7 groups, which means larger “Borrow Amount” will lead to a better first momentum. The rest variables are not at the same significant level in different groups (such like “Duration Month” is significantly positive in 3^{th} minute and 9^{th} minute groups, but not significant ($p>0.5$) in other groups). And if we see into every group, we will find that in 3^{rd} minute group and 9^{th} minute group, “Interest Rate” and “Credit Level” have significantly negative effects on the amount of money received in first time interval while “Duration MONTH” has the significantly positive effect. And if we see into the interactive variables of these two groups, we can find that “Lag Amount*Interest Rate” is significantly positive and “Lag Amount*Duration Month” is significantly negative. If we compare these two results, we will find that time-unvarying variables will change the direction of effect interacted with “Lag Amount” which means at the same level of previous money sum, lenders tend to choose those bidding with higher “Interest rate” and lower credit level because they believe there must be some information or quality they do not lead to the bad credit bidding achieving just about the good credit bidding achieving. In 3^{rd} minute and 7^{th} minute groups, “House property” and “House Loan” are at the same situation mentioned above.

6. Conclusion

In this thesis, I followed Zhang & Liu’s thoughts in “Rational Herding in Microloan Markets”; I tested the p2p lending markets in China using lending records in RENRENDAI.COM to see if there is herding effects and whether the time-unvarying variables have effects on the herding.

My empirical result showed that herding exists in China’s P2P lending market. The more previous money sum, the more potential lenders will tend to lend their money. But percentage does not have positive effect on lenders which is different from the result of Zhang & Liu’s work. This might because the percentage is not showed on the website (I calculated this variable using other variables.) so that potential lenders may not notice the lending percentage of the bidding. My results partly present the time-unvarying variables’ effects on the herding behaviour, which is that variables presented the good creditworthy of the borrowers usually cause a good start but will weaken the herding signal included in pervious bidding records because people will contribute the gathering of bidding to good quality of the creditworthy.

The reason why some of my data are not significant in some groups during the time-unvarying variables tests might be that some of the groups' time- series are only 3 or 4 (I cannot achieve smaller meaningful time unit because minute is the shortest time interval I can get in this website, and most of the bidding length gathered in first three minutes. Things are similar in other websites platforms), the variables in 9th minute group are more significant in robustness checks for the time- series are 10.

Though time-unvarying variables have different levels of significance in different groups, borrowers especially those with lower credit ranks should give more detailed information in order to improve the success rate of the loan. And for the platform, platform should not only focus on the information borrowers provided, but also pay attention to the potential "self-lending" which means borrowers trying to lend themselves in order to get a better start.

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