

Does Herd Behavior Occur Within The Peer-to-Peer Lending Environment?

An Empirical Analysis of Small Business Peer-to-Peer Loans

Robert A. Jordan

Student of Business Administration, Nova Southeastern University, Fort Lauderdale, Florida
email: rj362@nova.edu

Abstract

The financial landscape for consumer loans is changing, not from the recession of recent years, but by a progression in technology and interconnectedness. Peer-to-peer lending is pioneering this change and represents an uncharted area of debt market research. Journal articles have just begun to delve deeper into the implications of unsecured loans between lenders and borrowers administered over the internet. The initial findings of this research have identified that lenderherding behavior, loan funding duration, and the length of the borrower's loan description impact the probability of default. The additions of these factors to a borrower's FICO score increases the predictive ability of default from an R^2 of .656 to .759.

Introduction

Modern theories of corporate finance are predicated on the notion that the lending market is limited to financial institutions subjected to imperfect and asymmetric information, as well as, irrationally exuberant behaviors. However, these axioms of finance may or may not remain steadfast within the emerging peer-to-peer lending market. Peer-to-peer lending is the collective financing of a project or a venture by a group of investors or lenders that may or may not have a relationship or knowledge of one another. In comparison to traditional financial institutions, peer-to-peer lending occurs without any intermediary enabling entrepreneurial firms to solicit a large crowd of investors and typically raise small amounts of money directly from individuals. The transactions between lender and borrower are facilitated through the internet reducing overhead cost and labor resources incurred in traditional lending (Lin, Prabhala et al. 2013). The relationship lending literature established in the mid 1990's now needs to account for a new type of relationship where ordinary people operate as the banking institution. This is a significant paradigm shift from the traditional rating concepts in place since Louis Tappan, Robert Dunn, and John Bradstreet developed credit rating agencies in the 1840s and 1850s (Hagerman and Ratcliffe 2011).

The purpose of this paper is to provide the foundation for forthcoming research and introduce the research questions that if answered properly will lead to significant contributions to the field of finance. The remainder of the paper is organized by discussion leading to hypotheses creation, procedures for collecting data, results, conclusions, references, and acknowledgments.

Discussion and Hypothesis

Peer-to-peer lending by design encourages group participation and spreads the risk of default across multiple lenders. Lambert and Schwienbacher (2010) describe this phenomena as “an open call, essentially through the Internet, for the provision of financial resources”(Schwienbacher 2010). The success of this model is creating the peer-to-peer lending market that enables ordinary individuals to participate in crowdfunding a project or venture (Schwienbacher 2010). Enabling multiple lenders to witness the decisions of other lenders in the market has proven to have a herding or signaling according to research conducted by Lin and Viswanathan(Lin, Prabhala et al. 2013). In line with these findings Shiller (2003) documents that there are several ‘investor psychology’ and ‘investor sociology’ phenomena which cannot be explained by purely ‘rational’ behavior that involve some type of herding (Shiller 2003). The herding phenomena includes:

1. Dependence of behavior upon the observed behavior of others, or the results of their behavior;
2. convergence by actors such as firms or individuals upon mistaken actions based upon little investigation and little justifying information;
3. the tendency for actors to delay decisions and then suddenly rush to act simultaneously;
4. imitation as sub-rational mechanism that induces an individual to be influenced by another to behave the same way;
5. contagion in the emotions of individuals interacting as groups

(Hirshleifer and Hong Teoh 2003)

The aforementioned behavioral characteristics of herding are quantifiable in peer-to-peer lending introducing new variables for the determination of credit-worthiness. Lin (2013) analyzed 4,139 social groups on the Prosper.com peer-to-peer lending platform. As of the Lin (2013) study, 41% of Prosper’s borrowers were associated with a social group on Prosper’s site(Lin, Prabhala et al. 2013). The results demonstrate that social networks played a statistically significant role on the funding of loans. A borrower that had verified friends, a friend that accepted a friend request from a borrower with a validated account, signals positively at the 1% significance level to lenders (Lin, Prabhala et al. 2013). The research showed that creating a group and being listed as a group leader positively signaled and resulted in a higher likelihood for a borrower being funded. This research extends the literature by analyzing the signals created by the number lenders participating within a window of time and the information asymmetries mitigated by the borrower’s loan description. This line of thought is consistent with Froot and Stein (1992). Froot and Stein (1992) found that informational inefficiencies exist in markets and have both negative and positive information spillover effects. Informational spillovers can cause traders to focus on one source of data rather than a diverse set (Froot, Scharfstein, & Stein, 1992). Lenders in a peer-to-peer environment may also be following the herd in respect to funding loans and not solely basing decisions on FICO scores but also the actions of other lenders. These questions form the foundation on which hypotheses can be constructed.

H₁: Fewer lenders increase the likelihood of a fully paid loan

H₂: Shorter loan duration decreases the likelihood of a fully paid loan

Existing literature also establishes that in a frictionless capital market funds will always be available to firms with positive net present value investment opportunities (Petersen and Rajan 1994). However, managers of small firms are not always able to access capital at reasonable rates. Stiglitz and Weiss (1981) suggest that market frictions such as information asymmetries and agency costs may explain why capital does not always flow to firms with profitable investment opportunities (Stiglitz and Weiss 1981). Petersen and Rajan (1994) as well as Leland and Pyle (1977), Campbell and Kracaw (1980), Diamond (1984), Fama (1985), Haubrich (1989), and Diamond (1991) describe how creditors can reduce these frictions by producing information about the firm and using it in their credit decisions (Brealey, Leland et al. 1977, Campbell and Kracaw 1980, Diamond 1984, Fama 1985, Haubrich 1989, Petersen and Rajan 1994). Empirical studies on the reduction of informational asymmetries, as expected, benefits firm-creditor relationships. These papers include Hoshi, Kashyap, and Scharfstein (1990a, 1990b, 1991) that demonstrate firms with close ties to their lender are able to borrow when they are financially distressed (Aschauer 1989). Petersen and Rajan (1996) measures of the strength of firm-creditor relationships and estimates the effects of relationships on both the availability and the price of credit. This research test relationship banking research by identifying if information asymmetries can be reduced by providing loan description and observing the behaviors of other lenders.

H₃: Longer loan description word counts increase the likelihood of a fully paid loan

Procedures for Collecting Data

The data is used in this study is from the Lending Club database which is a peer-to-peer lending site currently in operation. The data set contains 123,107 loans that have the status of current, late, paid in-full, or charged off with the accompanying interest rate, loan information, and borrowers FICO score. This dataset has been filtered to only evaluate small business loans with the status of “Fully Paid” and “Charged Off”. The new dataset has 1,130 small business loans containing a binary dependent variable of “Fully Paid” represent by a 0 or 1. The control variable is the FICO score of the borrower which is the credit score observable to all lenders. The herding effect and information asymmetry in this analysis are tested through independent variables average number of lenders per day, length of the loan description, funding duration, and number of investors while controlling for FICO score. These variables extend Lin’s (2013) group association based signaling to include time and volume measures. Mitigation of information asymmetry is captured through a word count of the loan description and herd behavior is accounted for by counting the numbers of lenders participating on a single loan, as well as, the duration of time between loan issuance and fully funding. Multiple linear regressions are used to test the binary dependent variable “Fully Paid”.

The analysis of the data was done for all 1,130 loans and by quartiles. The interquartile ranges were established to determine if an optimal number of lenders exist that change the likelihood of a loan being “Charged Off” or “Fully Paid”. The first quartile is from 1 to 78 lenders, the second quartile is from 79-126, the third quartile is from 127 – 190, and the fourth quartile extends from 191 to 562. To create a baseline for improvement in the explanatory power of R^2 the binary dependent variable was first analyzed with only the control variable FICO score.

The results from only observing the FICO credit score and binary variable “Fully Paid” produced a correlation of .81 and R^2 .656 and establishes the baseline along with the descriptive statistics in table 1 below.

Table 1 Lending Club Small Business Loan Descriptive Statistics

Quartile	Average Loan Duration	Average Investors Per Day	Average Number of Investors	Average Description Word Count	Average Loan Amount	Total Loan Amount	Total Number of Lenders	Total Loans	Total Fully Paid
Q1	9.58	7.35	48.43	90.49	\$5,476.79	\$1,873,060.93	16563	282.5	240
Q2	9.92	12.93	102.37	88.62	\$7,828.51	\$2,035,411.84	26617	282.5	177
Q3	11.61	15.47	157.00	92.07	\$11,628.75	\$3,163,019.26	42703	282.5	175
Q4	12.26	22.46	255.36	100.66	\$16,573.26	\$4,242,754.35	65371	282.5	146
Total	10.75	14.01	133.85	92.75	\$10,012.61	\$11,314,246.39	151254	1130	738

Results

The analysis for herding and information asymmetry provided in the tables 2 through 5 demonstrates statistical significance for multiple social and information asymmetry variables. Table 2 demonstrates statistical significance at for all independent variables. Notably, the number of lenders is shares a negative relationship with the likelihood of a loan being paid in full. This supports H_1 that a herding effect may be present in peer-to-peer lending. H_2 is also supported for the duration variable. The shorter the duration the more likely a loan will not be paid in full. This also may be a result of a herding effect that expedites reduces the timeframe a loan is funded due to lender based on the momentum of other lenders. The variables combined are significant and increase the explanatory power of R^2 .7597 for determining a loan being “Fully Paid”. Specifically, the number of words in the description and number of lenders is significant at the 5% significance level, while the duration of the loan is significant at the 10% level.

Table 3 provides the results from the first quartile which represents loans with 1 to 68 lenders participating. In the first quartile of loans the number of words in the description, number of lenders is significant, and duration of the loan are significant at the 10% level. This is interesting because in Table 4, Table 5 and Table 6, representing the second, third, and fourth quartile respectively, there is a dramatic change in significance. The independent variables lose significance with the only exception being the description word count in the third quartile. This may be preliminary evidence that an optimal number of investors and herding behavior exists in peer-to-peer lending. As stated in Hirshleifer (2003) herding is the dependence of behavior upon the observed behavior of others, and convergence of firms or individuals upon mistaken actions based on little investigation and little justifying information (Hirshleifer and Hong Teoh 2003). Under this herding definition, H_3 the loan description word count is the justifying information, and is insignificant in both the second and fourth quartile. However the average number of words has high 100.66 words in the fourth quartile creating more questions on the optimal number of words in a description. The fourth quartile with 184 to 562 lenders has the

highest R^2 value of .8066, but the number of investors is insignificant and has a negative relationship indicating the more investors the less likely loan is to be paid in full. The data found in this study contradicts the wisdom of crowds and supports the herding philosophy, and is consistent with previous information asymmetry literature that more accurately predict the borrower credit worthiness.

Table 2 All Quartiles: 1130 Lenders Regression= R^2 0.7597

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	T-Value to test $H_0:B(i)=0$	Prob Level	Reject H_0 at 5%?	Power of Test at 5%?
Intercept	-1.9234	0.0523	-36.801	0.0000	Yes	1
Description Word Count	0.0002	0.0001	2.731	0.0064**	Yes	0.7796
Duration	-0.0041	0.0022	-1.845	0.0652*	No	0.4544
FICO Score	0.0041	0.0001	60.770	0.0000**	Yes	1
Number of Lenders	-0.0003	0.0001	-2.171	0.0301**	Yes	0.5835

The significance levels of .10 and .05 are represented by * and ** respectively

Table 3 Quartile 1: 1-68 Lenders Regression= R^2 0.7169

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	T-Value to test $H_0:B(i)=0$	Prob Level	Reject H_0 at 5%?	Power of Test at 5%?
Intercept	-1.7393	0.1057	-16.46	0	Yes	1
Description Word Count	0.0002	0.0001	1.961	0.0506*	No	0.4984
Duration	-0.0054	0.0031	-1.755	0.0802*	No	0.4169
FICO Score	0.0039	0.0001	28.848	0.000**	Yes	1
Number of Lenders	-0.0012	0.0007	-1.798	0.073*	No	0.4339

The significance levels of .10 and .05 are represented by * and ** respectively

Table 4 Quartile 2: 68-119 Lenders Regression = R^2 0.7557

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	T-Value to test $H_0:B(i)=0$	Prob Level	Reject H_0 at 5%?	Power of Test at 5%?
Intercept	-1.7516	0.1505	-11.642	0	Yes	1
Description Word Count	0.0002	0.0001	1.283	0.2005	No	0.2484
Duration	-0.0057	0.0049	-1.172	0.2424	No	0.2149
FICO Score	0.0039	0.0001	28.718	0.000**	Yes	1
Number of Lenders	-0.0012	0.0011	-1.08	0.2812	No	0.1895

The significance levels of .10 and .05 are represented by * and ** respectively

Table 5 Quartile 3:119-183 Lenders Regression = R2 0.7756

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	T-Value to test H0:B(i)=0	Prob Level	Reject H0 at 5%?	Power of Test at 5%?
Intercept	-2.1169	0.1566	-13.516	0	Yes	1
Description Word Count	0.0002	0.0001	2.134	0.0338**	Yes	0.566
Duration	-0.0024	0.006	-0.403	0.6874	No	0.0687
FICO Score	0.0042	0.0001	30.816	0.000**	Yes	1
Number of Lenders	0.0003	0.0008	0.434	0.6649	No	0.0717

The significance levels of .10 and .05 are represented by * and ** respectively

Table 6 Quartile 4:184-562 Lenders Regression = R2 0.8066

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	T-Value to test H0:B(i)=0	Prob Level	Reject H0 at 5%?	Power of Test at 5%?
Intercept	-2.175	0.1454	-14.961	0	Yes	1
Description Word Count	0.0001	0.0001	0.742	0.4588	No	0.1146
Duration	0.0015	0.0085	0.177	0.8594	No	0.0536
FICO Score	0.0043	0.0001	33.207	0.000**	Yes	1
Number of Lenders	-0.0002	0.0003	-0.533	0.5944	No	0.0829

The significance levels of .10 and .05 are represented by * and ** respectively

Conclusion

The test results provide insight on the probabilities associated with loan descriptions, funding durations and the number of lenders as it relates to a loan being paid in full by a borrower. Of the 1,130 loans tested the length of the loan description and number of investors proved to be statistically significant at the 5% significance level. The duration of time required to fully fund the loan also was significant at the 10% significance level. The direction indicates that less loan duration and more lenders increase the likelihood of default and longer loan descriptions signal better borrower creditworthiness. These findings provide the foundation for deeper analysis on information asymmetry and herding within peer-to-peer lending. Additional analysis and thought can be given to the increase in explanatory power for the largest quartile. This research should be extended to focus on exclusively on large lending groups ability to identify borrower credit worthiness. Also, the description word count can be furthered by establishing quartiles for word counts to test the relationship between each quartile and loan repayment. The limitations of multiple regression can be overcome by using re-calculating the data using a logistical regression. The limitations of this study will hopefully lead to meaningful contributions to the field in papers to come.

International and Managerial Implications

The financial landscape is evolving in parallel to the advances in technology and communication giving birth to new sources of capital. One form of this new wave of capital is peer-to-peer lending. The larger concept of crowdfunding, which encompasses both debt and equity markets has global implications. The first crowdfunding (peer-to-peer) lending company was the United Kingdoms based Zopa company established in 2005. The largest U.S. based firm was Prosper.com and has one million members and \$217 million in funded loans as January 1, 2011. In April 2011 it was estimated that there were around 250 active crowdfunding platforms that can be found online. The platforms most recognizable are Sellaband.com, Kiva.com and Kickstarter.com. As of 2013 The Lending Club peer-to-peer site had completed \$1.9 billion dollars in loans issued. Growth in both equity and debt crowdfunding platforms are gaining media attention and revenue and will be more prevalent due to recent legislation.

In the spring of 2012, President Obama passed the American Jobs Act that changes access to capital by empowering crowdfunding. The American Jobs Act creates an exemption to the Securities Act of 1933 which requires all public offerings to be registered with the SEC. The American Jobs Act went into effect January 1st, 2013 and provided the guidelines that make crowdfunding more accessible to individuals that do not meet the criteria of accredited investors. The U.S. participation in in this form of capital will act as a catalyst for the spread of crowd based financing around the world and additional research on this new form of finance will be essential.

References

- Aschauer, D. A. (1989). "Does public capital crowd out private capital?" Journal of monetary economics 24(2): 171-188.
- Brealey, R., et al. (1977). "Informational asymmetries, financial structure, and financial intermediation." The Journal of Finance 32(2): 371-387.
- Campbel, T. S. and W. A. Kracaw (1980). "Information production, market signalling, and the theory of financial intermediation." The Journal of Finance 35(4): 863-882.
- Diamond, D. W. (1984). "Financial intermediation and delegated monitoring." The Review of Economic Studies 51(3): 393-414.
- Fama, E. F. (1985). "What's different about banks?" Journal of monetary economics 15(1): 29-39.
- Hagerman, L. A. and J. Ratcliffe (2011). "Increasing access to capital: could better measurement of social and environmental outcomes entice more institutional investment capital into underserved communities?" Community Development Investment Review: 43-64.
- Haubrich, J. G. (1989). "Financial intermediation: Delegated monitoring and long-term relationships." Journal of Banking & Finance 13(1): 9-20.
- Hirshleifer, D. and S. Hong Teoh (2003). "Herd behaviour and cascading in capital markets: A review and synthesis." European Financial Management 9(1): 25-66.
- Lin, M., et al. (2013). "Judging borrowers by the company they keep: friendship networks and information asymmetry in online peer-to-peer lending." Management Science 59(1): 17-35.

Petersen, M. A. and R. G. Rajan (1994). "The Benefits of Lending Relationships: Evidence from Small Business Data." The Journal of Finance 49(1): 3-37.

Shiller, R. J. (2003). The New Financial Order: Risk in the 21st Century Princeton, Princeton University Press.

Stiglitz, J. E. and A. Weiss (1981). "Credit rationing in markets with imperfect information." The American economic review 71(3): 393-410.

Acknowledgment

The author gratefully acknowledges the cooperation and efforts of many professors at Nova Southeastern University H. Wayne Huizenga School of Business and Entrepreneurship. Correspondence is welcomed at: rj362@nova.edu