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Crowdfunding innovations in emerging economies: Risk and credit control in peer-to-peer lending network platforms

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Abstract

Peer-to-peer (P2P) lending has emerged as a network form of crowdfunding that facilitates the loan originations outside the traditional banking model. In China, the combination of imperfect financial development and Internet technology has led to the widespread growth of a P2P network lending market. Using the theoretical lens of information asymmetry, we identify the key sources of risks facing contemporary Chinese P2P companies. Results from our two regression models reveal several factors that can be used as predictors for risk and financial management, including marriage, income, and house property. Our findings also show that collective inference by non-expert lenders can accurately draw an inference from soft/ nonstandard information. The construction of such a predictive system is important for ensuring the good operation of P2P network lending platforms in emerging economies<<Query: Please supply keywords for the article. Ans: Peer-to-peer (P2P) lending; Information asymmetry; Risk; Credit control; Soft/ nonstandardinformation; Chinese P2P enterprises>>.

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1 INTRODUCTION

During the past few years, the accelerating pace of innovation has triggered the rapid development of Peer-to-Peer (P2P) lending platforms, which play an important role in adapting credit supply to the changing needs of different target groups. In the UK and the United States, these newly established P2P financial platforms have contributed to support personal lending, generating small-business loans, facilitating invoice discounting, and foreign exchange transactions (Funk et al., 2015; Milne & Parboteeah, 2016). Generally speaking, P2P lending platforms lead to substantial cost savings through the effective utilization of technology. Several academics have asserted that P2P essentially represents a type of securitization in which individual loans can be divided into numerous notes issued to investors through the enhanced efficiencies of automation. As documented by Lin, Prabhala, and Viswanathan (2013), when allocating funds, P2P lenders usually take into account the ratings assigned by these platforms. While the traditional lending platforms (e.g., banks) approve loan operations by using information from risk analysts, both borrowers and lenders in the P2P industry are involved in a social network, which indicates that lenders will assess and select the borrowers themselves.

According to Savarese (2015), in many of the world's developed financial markets, traditional financial credit (e.g., bank loans) remains the most common source of external funding for most SMEs. For instance, in the UK, P2P lending constitutes less than 1% of the aggregate scale of bank lending (Milne & Parboteeah, 2016). Nevertheless, in terms of the number of platforms and the amount of raised capital, P2P lending has enjoyed exceptional growth in the aftermath of the 2008 global financial crisis. This fact is due to the onset of the credit crunch, which has posed a significant challenge to the traditional financial system. Allowing for cost efficiency issues, banks in the European Union (EU) have tightened access to credit (this is typically the case for loans of small volume).

Moreover, owing to risk management considerations, banks will not lend to SMEs without sufficient collateral. From the perspective of loan suppliers, it is evident that people are willing to maintain control over their funds in the case of saving and investing. Thus, today, rather than putting their money into banks, people choose to invest in specific projects. Another important reason for investing in P2P products is that most P2P platforms offer higher rates of return than banks do. For example, consumers residing in counties with a larger supply of traditional sources of finance seek loans at lower interest rates from an alternative source of finance than do similar borrowers residing in counties with poor access to finance.

P2P lending can be viewed as a new form of crowdfunding that facilitates the loan originations outside the traditional banking model (Bruton, Khavul, Siegel, & Wright, 2015). The four main crowdfunding models are commonly known as *lending*, *equity*, *rewards*, and *donations* (Vismara, 2016), reflecting the proliferation of the phenomenon. Borrowers can be connected directly with the lenders and numerous investors through Internet platforms. While a vast majority of the P2P lending platforms focus on the mortgages and credit card refinancing, other P2P companies tend to pay special attention to particular consumer lending segments such as small business lending or student loans, among others (Duarte, Siegel, & Young, 2012; Herzenstein, Sonenshein, & Dholakia, 2011). Before posting the loan on a P2P company's online platform, prospective borrowers need to apply to the platform for consideration. Following this, the P2P company generates a credit report on the loan applicant. By considering other important loan characteristics, the underlying P2P platform will assign a risk grade to the proposed loan. Therefore, P2P lending can be regarded as a segment of crowdfunding that is focused on loans (Gine & Karlan, 2008). The loans generated by online P2P platforms are deemed as a new approach to lending rather than the creation of a new financial product. It is worth noticing that many established online P2P firms do not afford investors the discretion to choose individual loans (Lee & Lee, 2012). Instead, they tend to offer investors various sets of pre-selected loan pieces based on the risk tolerance of specific investors.

Literature has also identified that most of the credit risk in P2P lending is carried by the investors rather than by the platform; thus, when the loans go wrong, it is the investors who assume losses (Einav, Jenkins, & Levin, 2013; Saunders & Cornett, 2003). In China, a large number of P2P lending offers business loans that are financed out of investment by households. Such a phenomenon arises because banks in China offer minimal funding opportunities to small businesses. The Chinese P2P platforms take varying forms, and many of them generally offer guarantees to the investors. Overall, based on the above analysis, it is understandable that P2P lending in China primarily evolves in a relatively undeveloped regulatory environment. Compared to P2P in the United States and the UK, lending support in China is proved to be riskier since there is no well-established framework to conduct credit referencing. Allowing for regulatory failures, the Chinese government has taken steps to impose closer oversight concerning P2P lending. Through studying the Chinese P2P platform—PPDAI.COM, this research aims to identify the key sources of risks facing contemporary Chinese P2P companies and untangle its clients' attitudes towards risk. We also investigate the key criteria that the company applies to manage the risk of its borrowers. The quantitative component of the research allows us to use a logistics model to explore the factors that influence the risk management of the company. The reason for choosing PPDAI.COM as the case-studied P2P enterprise in this study is that it is the first established and symbolic P2P lending firm that encompasses a wide range of “extremes.” These embedded “extremes” indicate that PPDAI.COM undertakes the prevailing risk and financial management practices in the Chinese P2P lending market. These “extremes” also make the company a perfect P2P example to study and help overcome the low degree of generalization associated with the case study method.

To be specific, this research aims to achieve the following research objectives: to identify the risk of P2P and the relevance of other factors; to investigate how these sources of risk can be managed; to explore the main features and trends in China's emerging P2P lending market, and to investigate how the P2P enterprise PPDAI.COM has conducted its credit risk management. Principally, P2P lending companies can offer low-interest margins thanks to their low administrative costs; these low-interest margins are due primarily to the fact that there is no assumed risk exposure. From the perspective of borrowers, P2P lending offers them lower levels of interest rates than those charged by traditional banking. On the investors' side, the acknowledged advantages brought about by P2P lending include higher levels of risk-adjusted returns, easy access to the high-yielding investment classes, and improved transparency and autonomy in selecting loans. Our study contributes to a better understanding of this evolving system by emphasizing the role that an effective evaluation system of borrowers can play in implementing a better-managed risk and control system. From the perspective of P2P platform credit risk, our research goal is the assessment of the borrower risk control, including the construction of the credit evaluation system of borrowers. The indicator system uses the data on the P2P network lending platform for personal loans.

The rest of the paper is organized as follows. The first section introduces our research framework. The next section discusses credit risk identification and risk assessment of the P2P network lending platform in the context of PPDAI.COM. To understand the development trend of the network lending industry and the credit

risk evaluation indicators of China's online lending platform, we then undertake quantitative research on the customer information data, the results of which are also reported in this section. The final section concludes and provides suggestions for further research in this new field of study.

2 ADVANTAGES OF P2P LENDING

At present, an increasing number of financial experts have been active in exploring the possibility that the rapidly growing P2P platforms will overturn the organizational structure of banks. By comparing the traditional bank loan business with the P2P network loan, the characteristics of P2P network loans can be identified, as summarized in Table 1. Compared to traditional banking, there are many unique benefits brought about by P2P lending, which play an essential role in bringing together lenders and borrowers. Principally, the various P2P lending companies have offered low-interest margins considerably due to the low administrative costs (Funk et al., 2015). Such a low level of interest margin seems reasonable in the P2P industry because no assumed risk exposure exists (Johnson, Ashta, & Assadi, 2010). Besides, P2P companies are capable of providing loans to clients that might be turned down for loans by commercial banking.

TABLE **Table 1** The characteristics of P2P network lending compared with traditional bank loan

	Traditional bank loan	**P2P network lending**	**The characteristics of P2P network lending**
Loan object	State-owned enterprises or large and medium-sized enterprises	Small and micro enterprises and individual investors	Lower borrowing amount
Business scope	Review information and issue loans	Collect information and assess borrower credit ratings	Only as an information intermediary; does not participate in lending transactions
Borrowing and lending	The borrower is the borrower and the bank is the lender	The lender is mainly an individual investor	Only provide trading platforms for both borrowers and lenders
Trading places	Fixed business outlets	Internet platform	Anytime, anywhere
Credit review method	Specialized credit reviewer counter review	The borrower proactively provides certified information and reviews it online	Simple process and low time cost
Loan program strictness	More strict	Investors choose their own target based on their credit rating	Convenient
Rate of return	All owned by the bank, around 6%	Part of the service fee charged by the platform is less than 5%. Another part of the vesting investor, generally 10%	Higher interest rates than bank deposits

Moreover, P2P lending tends to embrace the most innovative usage of technology. Importantly, this unique feature means that P2P lending could continuously improve its transparency and flexibility with rapid technological innovation, thus enabling it to provide more convenient services to its customers. Due to these acknowledged advantages of P2P firms, some academics have argued that it is mainly of higher social value than conventional banking is (Herzenstein et al., 2011; Milne & Parboteeah, 2016).

3 METHODOLOGY

Through studying the case-studied Chinese P2P platform—PPDAI.COM, this research aims to identify the key sources of risks facing contemporary Chinese P2P companies and untangle its clients' attitudes towards risk. By focusing on reports of past studies, the case study method facilitates the exploration and understanding of complex issues. The quantitative method is integrated into the whole framework of the qualitative study. The logistic regression model is applied to explore the risk-related factors and degree of each of these variables' influence on some key risk sources such as defaults and bad debt.

3.1 The P2P lending market in China

It is acknowledged that the P2P lending market in China differs significantly from the P2P industry in developed economies such as the United States and the UK (Wu, 2016). Xiangrong (2014) notes that the vast majority of China's P2P lending platforms are tailored to fulfill the funding needs of small businesses. In 2015, the market value of the Chinese P2P lending market accumulated to a staggering $150 billion more than 10 times the scale of that in the United States (Xinhua, 2016). Deer, Mi, and Yuxin (2015) report that the number of online P2P lending platforms in China has reached over 2000. Recently, it has been observed that P2P lending has experienced dramatic development in China as the online finance domain has expanded quickly to incorporate P2P lending. Figure 1 below illustrates the growing number of P2P lenders in China from 2010 to 2014, and Figure 2 shows the amount of P2P loans outstanding in China.

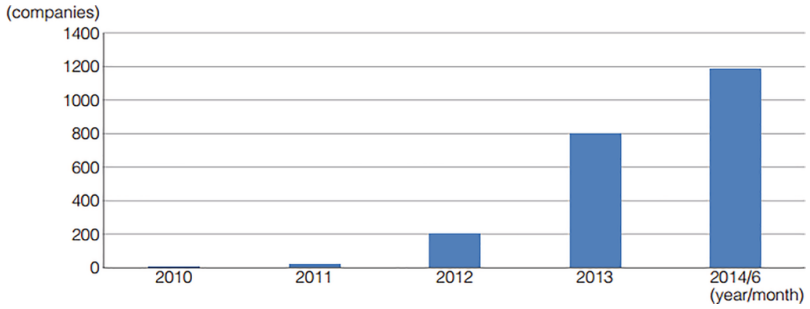

FIGURE 1 Growing number of P2P platforms in China (measured by the number of companies, from 2010 to 2014). *Source:* Nomura Research Institute

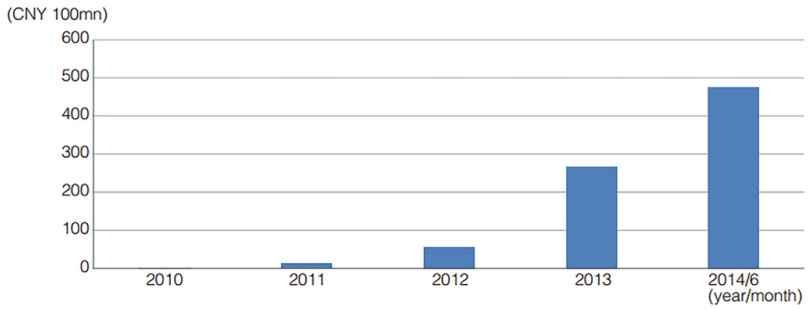

FIGURE 2 P2P loans outstanding (measured in CNY 100mn, from 2010 to 2014). *Source:* Nomura Research Institute (NRI, 2014)

According to the Nomura Research Institute (NRI, 2014), more than 180,000 P2P, borrowers have borrowed an aggregate amount of approximately 81.8 billion CNY during the first half of 2014. This amount of lending comes from over 440,000 investors. The average interest rate is paid at 20.17%. Besides, the NRI (2014) reports that most of the Chinese investors have a preference for online investment products

that offer liberalized interest rates; it also points out that P2P lending has been viewed as a key driver which accelerates the liberating reform of China's market-led interest rate. Rather than performing the role of facilitating borrowing and lending between individuals, China's P2P platforms have undergone a critical transformation. That is, they start to gather funds by using various online tools and subsequently lend to individuals and small businesses. Zheng-ping and Xia-lu (2013) note that, nowadays, Chinese P2P lenders are facing fierce competition to attract borrowers by using different incumbent microfinance firms.

4 P2P PLATFORMS: A RISK AND CREDIT CONTROL ANALYSIS

PPDAI.COM is China's first-ever online direct P2P lending provider principally for small unsecured loans. The main objective of establishing this company was to build a safe and effective network that is supported by innovative technologies. From the very beginning, the primary purpose behind PPDAI.COM has been to serve the under-banked sector in China. At that time, most of PPDAI.COM's services were free of charge for both of its investors and borrowers. After years of development, PPDAI.COM has made efforts to standardize personal behaviors of credit, which brings returns to both lenders and borrowers. In 2007, PPDAI.COM started to offer a range of unsecured online P2P microloans, which in turn provide vital support for numerous small “Taobao” shops (ACCA, 2018). By the end of 2015, PPDAI.COM claimed more than 1,200,000 active accounts on its online P2P platform—both borrowers and lenders. Among all of its registered members, approximately 42% of its borrowers come from the business sector, and 58% of its borrowers are personal borrowers (ACCA, 2018). According to the ACCA Survey (2018), more than 80% of its members choose a P2P provider for the low borrowing threshold (ACCA, 2018). They are also attracted by the easy audit process to access PPDAI.COM.

Furthermore, over half the PPDAI.COM members point out that they did not borrow from other financial institutions earlier. When making their bids on PPDAI.COM, the members of the P2P platform rank the borrower's credit rating as the most important factor. The majority of its members also note that they would take into account the interest rate level and the borrower's certification status to make their bids.

Therefore, to test the effectiveness of PPDAI.COM's credit system and its risk control, logistic regression is applied to the data provided by PPDAI.COM. The independent variables are the main features of each loan to borrowers. These features involve borrowers' education level, income level, and the features of the loans themselves, such as the amount and duration of loans. Furthermore, two main risk features of each loan are attached: they provide the information on whether the load is default and whether the load has become bad debt. Table 2 presents detailed descriptions of the independent variables.

TABLE **Table 2** Independent variable description

Variable	Description
Education	Education level of client: High school or below is denoted as 1; junior college is denoted as 2; undergraduate is denoted as 3; postgraduate or above is denoted as 4.
Marriage	The marriage status of the client: Married is denoted as 1; single or divorced is denoted as 0.
House property	A dummy variable: If the client owns his/her own house, then this variable will be denoted as 1, otherwise 0.
ID identification	A dummy variable: If the client can provide his/her official ID information, then the variable will be denoted as 1, otherwise 0.
Age	The client's actual age.
Income level	The monthly income level of the client. The income levels are divided into the following intervals: Less than 1,000RMB, between 1,000RMB and 2,000RMB, between 2,000RMB and 5,000 RMB, between 5,000RMB and 10,000RMB, between 10,000RMB and 20,000RMB, between 20,000RMB and 50,000RMB, 50,000RMB above. The corresponding values of the variable are denoted as 1, 2, 3, 4, 5, 6, and 7. For example, if one client's

Variable	Description
	monthly income is 5,680, that means it lies in the interval between 5,000RMB and 10,000RMB, then the variable will be 4.
Firm owner	A dummy variable: If the client owns a firm, then this variable will be 1, otherwise 0.
Credit rate	The website itself has a credit evaluation system. The value of this variable will be the credit rate provided by the website.
Debt term	The term of borrowing. It is accounted for by month. For example, if one borrows money for 1 year, then the variable will be denoted as 12.
Debt amount	The actual money (in RMB) borrowed by the client.
Debt burden	The average amount to repay each month to monthly income. For example, if one borrowed 3,000RMB for 6 months, and his/her monthly income is 2,000, then the average amount to repay will be 3,000/6 = 500, and the debt burden will be 500/2,000 = 0.25.

The logistic regression explores the probability of default and bad debt in relation to several loan features. The models are denoted as model (1) and model (2), respectively, and the results of the estimation are illustrated in Table 3. The DV of model (1) is the default of each loan. Thus, model (1) can be utilized to explain the probability of default. Specifically, only the credit rate, which is created by PPDAI.COM is significant at 0.01 level—that is, the credit system of PPDAI.COM is efficient. The credit rate created by the website itself is a valid predictor of risks.

TABLE **Table 3** Results of logistics regression estimation

	(1)		(2)	
Variable	**OR**	**Coefficient**	**OR**	**Coefficient**
Education	1.22491	.2028675 (0.44)	.8189926	−.1996802 (−0.83)
Marriage	.4736472	−.7472925 (−1.05)	.9088942	−.0955265 (−0.25)
House property	.5753344	−.5528039 (−0.71)	.1338865	−2.010763*** (−4.09)
ID identification	.628409	−.4645641 (−0.64)	1.25514	.2272467 (0.59)
Age	1.026723	.0263724 (0.55)	1.039893	.0391181** (2.02)
Income level	.8269198	−.1900476 (−0.48)	.8538115	−.1580449 (−0.73)
Firm owner	1.177836	.163679 (0.16)	.6182125	−.4809231 (−0.88)
Credit rate	.9410144	−.0607968*** (−6.22)	.9721471	−.0282482*** (−5.74)
Debt term	.8650869	−.1449253** (−2.47)	.959231	−.0416234 (−1.56)
Debt amount	.9999815	−.0000185 (−0.92)	.9999908	−9.15e-06 (−0.93)
Debt burden	.0892486	−2.41633* (−1.90)	.1568821	−1.852261** (−2.42)
N	1,019		1,019	
Pseudo R^2	0.8729		0.5175	

Note: *t* statistics in parentheses.

*$p < .1$.

**$p < .05$.

***$p < .01$.

Similarly, in model (2) whose DV is bad debt. The significance level of the credit rate is also at the 0.01 level. The two models verified the justification for creating its rating system of PPDAI.COM. It is the only predictor that is significant at the 0.01 level in both models. The two models imply that the loan whose borrowers who have high credit rate in their system are less likely to default or incur a bad debt.

Besides the credit rate created by PPDAI.COM, the two models also reveal some key factors that can be used as predictors for risk management, although some are not significant. First, marriage is a feasible factor to evaluate the probability of default or bad debt; it implies that people who have married are more creditworthy. House property is also a good predictor, and it is also reasonable that people with fixed assets are creditworthy, especially for predicting bad debt. Income is another good predictor; people with higher income are even more creditworthy. Interestingly, the debt burden will decrease the risk, which is contradictory to common-sense assumptions.

One of the key operational objectives at PPDAI.COM is its responsibility to create an effective and well-functioning secondary market. To provide liquidity, PPDAI.COM has made efforts to cooperate with many secondary market providers to help its investors trade notes and other claims to loans. In detail, PPDAI.COM allows the contracts to be sold short- and/or mid-term to other investors for a typical fee. Among all of its risk-management practices, the establishment of a provision fund plays a vital role because it affords investors a form of the contingency (reserve) fund. By definition, the provision fund can be viewed as a type of pooled money that is accumulated through charging P2P borrowers a so-called “separate one-time” fee based on their specific risk grade (Liu, Brass, Lu, & Chen, 2015). Notably, the provision fund is held separately from the other asset classes of the underlying platform. When a default takes place, the provision fund can claim the established fund and use it to pay back to its investors. Under this situation, any third party will be deemed deployed to collect repayment, which plays a vital role in reimbursing the contingency fund. PPDAI.COM has set up its target size of the provision fund. A core establishing criterion is that the calculated ratio (of the value of contingency fund/total value of originated loans) should surpass the ratio of historical loan default.

According to PPDAI.COM, in order to evaluate how well investors can be covered when defaults occur, they apply the coverage ratio. The coverage ratio is calculated as the value of the contingency funds/estimated defaulted loan. While the provision fund is considered a particular form of service to a P2P's investors in the developed economies (e.g., in the case of UK and US P2P firms), it is used as a guaranteed repayment among many Chinese P2P companies such as PPDAI.COM (Wu, 2016). The guaranteed repayment is, in fact, a key source of Chinese P2P companies' competitiveness in the market. Liu et al. (2015) point out that the vast majority of P2P companies adopting provision funds can repay the full amount of defaulted loans; however, the implementation of the provision funds is not without costs.

In most cases, the investors will need to accept a lower level of starting interest rate. At PPDAI.COM, the target size of the provision fund is also maintained above the level of the industrial default rate. This process helps ensure sufficient coverage of expected losses. P2P researchers have emphasized the transparency of the provision funds. Similar to other online P2P lending companies in China, PPDAI.COM has employed the usage of secured loans as a more direct form of prevention. When PPDAI.COM is offering housing and automobile loans. It also chooses to provide secured loans.

Besides, PPDAI.COM has chosen to protect its investors by requiring the diversification of investment. PPDAI.COM has been able to offer assets to its investors using a minimalist way. It encourages the construction of a diversified loan portfolio, which is made up of small loan sizes. Nevertheless, the actual selection right is still offered to the investors since PPDAI.COM allows them to participate in the underwriting process. Through these practices, the legal arguments of possible loan defaults can be largely prevented. PPDAI.COM implicitly assumes that it is the investors, not the platform itself that chooses the loan; it also points out that, in reality, most of the institutional investors tend to prefer to cooperate with the P2P platforms that can provide more independent decision making. The enhanced control over loan selection also facilitates the implementation of external analytical models. From a theoretical perspective, since most P2P firms typically receive commissions rather than profits from the spread, this mechanism will eventually pass on benefits to investors. In addition to the lower cost of operations than traditional lending channels, PPDAI.COM

could further increase the returns for its investors by making use of developed analytical techniques for credit evaluation. This procedure also allows PPDAI.COM to lower its interest rates.

The offering of more favorable rates will attract more investors from whom additional amounts of commission can be collected. In this way, the interests of both the online P2P companies and the clients can be aligned. Additionally, PPDAI.COM asserts that another main attraction of the P2P lending model is the advancement in credit evaluation. This is the major selling point of PPDAI.COM and other online P2P companies in China. Meyer, Heng, Kaiser, and Walter (2007) document that credit evaluation has arguably become one of the P2P firms' most valuable assets. Over its years of development, PPDAI.COM has actively learned the primary underwriting techniques from other banking institutions and credit-scoring firms. Nowadays, it can supplement the main components of the model using new data.

Based on the above analysis, it is evident that PPDAI.COM operates much like its western peers in the United States and the UK. However, it should also notice that many other online P2P companies in China still leverage their present distribution networks. In other words, different from PPDAI.COM and those P2P firms from developed economies, they are less focused on technology. During the past years, a large number of the P2P firms (some even operate without licenses) in China pay more attention to searching for creative ways to link borrowers to lenders who are not heavily dependent on the innovative technology. Interestingly, in the real world, combining both online and offline approaches offer a particular fit for the Chinese lending market. However, a significant number of potential P2P are only accessible online. Besides, different from the investors from developed countries, most of the Chinese investors do not care much whether their returns come from innovative online platform or databases from the paper-pushing system. What they are concerned with is whether the brand of the P2P firm can be trusted. This high level of flexibility in China has triggered the dramatic growth in its collective P2P market.

5 CONCLUSION

Peer-to-peer lending (P2P) can be defined as people lending money to others without a banking intermediary (Johnson et al., 2010). In this research, we investigate how P2P lending works in the Chinese market, the specific risks associated with P2P lending, and essential considerations concerning consumer credit regulation and regulation on the funding side of P2P platforms. Through using secondary data, we gain an in-depth understanding of the critical dimensions of the variability of default and assess the level of transparency. The research also explores how Chinese P2P lending platforms confront the risks of possible failure based on the data collected from a P2P company.

We find that the credit rate created by the website PPDAI.COM is a valid predictor of risks, justifying the validity of its rating system. This result implies that the loan whose borrowers who have high credit rate in their system are less likely to default or incur a bad debt. The two regression models also reveal some key factors that can be used as predictors for risk management. For instance, marriage is a feasible factor to evaluate the probability of default or bad debt; it implies that people who have married are more creditworthy than singles. Income is another good predictor; people with higher income are more creditworthy than those with lower income.

Similarly, house property is a good predictor, and it is also reasonable that people with fixed assets are creditworthy, especially for predicting bad debt. Based on these findings, we can obtain a set of a relatively complete evaluation system based on the credit-risk index. As suggested, the construction of such an index is important to dealing with the problem of information asymmetry and also ensuring the proper operation of a P2P network lending platform. Most of the credit risk in P2P lending is carried by the investors rather than by the platform. Most borrowers are better informed than lenders are. Therefore, as we demonstrated in this research, only a steady review of the borrower's credit information, and the actual evaluation results can better achieve the goal of effective control and risk reduction.

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