# Risk Management and Control Countermeasures of P2P Network Lending Platform Under Internet Financial Environment

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**Abstract:** With the development of information technology, the popularity of the Internet, the financial industry continues to develop, and new models and formats continue to emerge. Finance and the Internet continue to merge, the emergence of a new model of Internet finance. As an Internet financial model, P2P network lending provides convenience for solving the problems of SME financing and personal financing. However, while P2P network lending has developed rapidly, many risk issues have emerged, such as legal risks, operational risks, credit risks, liquidity risks, and other risks. It is necessary to seek a reasonable path for the risks that exist and to do a good job in risk management and control. This paper uses AHP to construct the AHP model of the P2P network lending platform. Finally, the weight of the expert group and the investment group is integrated. The results show that the credit risk is the first in the P2P network lending platform, and then the liquidity risk, operational risk, Legal Risk. Targeting different risks, we will strengthen risk management and control, improve relevant laws and regulations, and effectively reduce the risk of P2P network lending platforms.

#### 1. Introduction

## 1.1 Research background and significance

As early as 2015, the Chinese government proposed the "Internet +" action plan to implement the strategy of becoming a cyber power, the continuous integration of the Internet and the traditional industry has become an important part of the innovation-driven development of China's economy under the new normal. The Internet is playing an important role in China's economic transformation and upgrading. The financial industry and the Internet continue to merge, and the scale of the Internet financial market continues to expand, becoming a hot spot of concern. The P2P network lending platform is a model of Internet finance. The pioneer of the P2P network lending platform is microfinance, and personal-to-person credit is its source. The P2P network lending platform is an intermediary platform established by a qualified website. On the platform, the financier issues the financing bids, and then multiple investors or an investor bid to provide loans to the lender. The P2P network lending platform is an innovation in the financial industry. It started from the first P2P platform in 2005 and developed rapidly. In 2005, Richard and others, the UK's largest online banking promoters, founded zopa and established branches in Italy and Japan, which is the earliest P2P online lending platform. In 2006, Prosper was established and has grown to more than 900,000 members, making it the world's largest P2P network lending platform. China established ppdai in 2007, which is the first P2P network lending platform. Subsequently, China's P2P network lending platform has developed rapidly. By the end of 2016, there were 2,448 P2P network lending platforms in normal operation. To some extent, the development of P2P online lending platforms has filled the gap in the financial market, and has flowed social idle funds into the real economy and promoted the development of China's economy. However, problems of P2P online lending platforms keep emerging. Financial fraud, running with money, bankruptcy and suspension, etc., have caused the P2P network lending platform to fall into a severe credibility crisis and arouse multiple doubts on P2P online lending platforms. Analysis of the risk management and control of the P2P network lending platform and the proposed management and control countermeasures are the key issues to promote the healthy development of the P2P network lending platform.

#### 1.2 Literature review

The development of Internet finance in China is not long. Since the introduction of ppdai in China, the concept of P2P network lending has only around for about ten years. With the development of P2P network lending, relevant research will be more and more. In the book "Financial Revolution", Wu Chengpi (2013) explored the innovation of Internet finance mode with the Internet finance group owned by Alibaba as the background. On the research of risk management and control of P2P network lending platform, Liu Yang et al. (2017) established a risk evaluation model through empirical analysis, and considered that the operation of the platform is the most important risk. The good operation indicates that the platform has high market identity. Good capital base, relatively stable profit model, platform trading, potential risk, and borrowing impact are all important points for evaluating P2P network lending platform. Therefore, in risk management and control, it is necessary to strengthen beforehand prevention and establish a sound risk accurate fund system. The regulatory authorities should strengthen supervision and effectively manage the online lending industry. Zhou Jingyue (2016) believed in her research that the main risks faced by P2P network lending include moral hazard, platform management problems and imperfect credit information system, etc. Therefore, it is necessary to improve the supervision system, establish a professional team, and improve the risk management and control capabilities, and gradually improve the credit investigation system. Li Jing et al. (2017) explored the default risk problem of P2P network lending platform, and believed that the main reasons for default includes credit system, imperfect regulatory system, and lack of personal credit information sharing mechanism. The risk management mechanism of the platform was too simple, and the presence of some P2P network lending platform illegal business problem. Therefore, it is necessary to improve the information system, strengthen supervision and management, strengthen internal control within the platform, improve the ability of risk management and control, perfect the financial risk management system, and strengthen the management of liquidity risks. Lin Tianwei et al. (2017) used the Renrendai platform as an example to explore the internal control of China's P2P network lending platform, and proposed to establish a risk control management department, formulate an effective risk emergency plan, strengthen communication and collaboration among various departments, and reduce the risk of P2P network lending platforms. Zhao Hongyu (2016) and others believe that China's P2P network lending industry lacks legal and regulatory rules, and there are cases of bad competition in the industry, the overall risk management system is relatively weak. At present, the risks faced by the P2P network lending industry are internal risks, Including management decision-making, risk prevention, etc., as well as external risks, namely systemic risks, such as regulatory systems, laws and other issues. Therefore, we must pay attention to supervision, accelerate the construction of the credit system, strengthen internal supervision and information disclosure, and control platform risks.

The research of P2P network lending platform in domestic academic circles focuses on the development of P2P network lending, influencing factors, operation mode, risk prevention and control, etc. The risk perception of P2P network lending platform is relatively uniform, and most of them adopt qualitative analysis methods. Relevant management recommendations are presented for the risks and factors that are present. The P2P network lending platform is affected by many factors and the risks are more complicated. This is a recognized view and puts forward higher requirements on the risk management of the platform. This study combines qualitative analysis and quantitative analysis to clarify the degree of impact of various risks in the P2P network lending platform, further understand the risks of the P2P network lending platform, and propose corresponding measures to improve the applicability and pertinence of risk management.

In the UK, the first P2P online lending platform Zopa was first established in 2005, which has achieved considerable development, impacting the traditional financial industry, and related research is increasing. Pavina (2009) argued in the study that, under other things being equal, the clearer the borrower's photo, the easier it is to obtain a lower loan interest rate. Assadi (2009) studied the information of borrowers and believed that networked joint guarantee loans played an important role

in preventing risks. Rocholl (2010) believes in his study that in order to obtain higher intermediary fees, the platform will ignore the possible risks and increase the risk of loan loss. Berger (2009) believes that an effective regulatory system should be established to reduce the risk of the network loan market and increase the interest rate of the network loan market. GAO (2011) believes in the study that borrowers in the P2P network lending platform not only face the same risks as traditional financial institutions, but also face some unique risks, among which the privacy protection of borrowers is the main problem. Foreign scholars have relatively more research perspectives, including risk sources, subject behaviors, risk management, etc. Foreign credit information systems are relatively complete, financial systems, credit evaluation self-control, and regulatory mechanisms are relatively mature, and the risk of online loans is lower than domestic, related research is not much, and the scope and methods of research are extensive.

This paper first introduces Internet finance and P2P network lending platform, then analyzes the operation mode and main risks of P2P network lending platform, and finally takes ppdai as an example to analyze its risk control system, and proposing measures to strengthen the risk management and control of P2P network lending platform.

## 2. The main risks of P2P network lending

#### 2.1 Credit risk

Credit risk is the most common risk of P2P network lending platform, and it is also the risk of the most frequently occurrences. Platform borrower credit risk refers to the possibility of principal loss of borrowers due to the default of borrowers on the network lending platform. If the borrower fails to repay the funds on time due to the expiration of the agreement, the lender will suffer losses and credit risk will appear. Credit risk is caused by a variety of reasons. Fundamentally, on the one hand, environmental changes, borrowers cannot repay on time due to various objective reasons such as economic downturn and investment failure. On the other hand, there is information asymmetry, due to the asymmetric information of the P2P network lending platform, borrowers and lenders, and the lack of understanding of each other's situation, it is impossible to accurately judge the other party's credit level, and there is a problem that the repayment unable to repay when due. Due to the information asymmetry between the borrower and the platform, the platform may approve some unqualified borrowers to enter the online lending market.

The borrower may maliciously borrow from different online lending platforms, and all or part of the default will bring losses to the online lending platform. On the other hand, the lending decision made by the lender is largely based on the credit information published on the platform after the borrower has reviewed the third-party online lending platform. The access to the information channel is single. The lender lacks understanding of the information on the production status, assets and liabilities of the enterprise involved in the operation of the borrower, except for the public release of the online lending platform, at the same time, the borrower's personal financial status, family situation, etc. are ignorant, and the default may bring losses to the lender.

#### 2.2 Operational risk

The direct performance of operational risk is the suspension of business for rectification. The business operation of the P2P network lending platform is similar to part of the business of traditional banking. Due to the imperfect internal control system of the P2P network lending platform, operational risks will arise. The development time of the P2P network lending platform is relatively short, and many operating procedures take European and American countries as the reference. However, China's economic environment and legal environment are quite different from those in European and American countries. Therefore, potential operational risks must exist. Operational risks are endogenous risks, which are related to the governance, unsound regulation, software and hardware vulnerabilities, and low quality of practitioners of P2P online lending platforms. The virtuality of online operations, lending business is widely distributed, and irregular audit processes has also increased the risk of operations. The P2P network lending model has a short

development time in China. At present, the internal control measures and network lending business operation process of China's P2P network lending industry mainly refer to European and American countries. Because China's national conditions are different from those of European and American countries where P2P network lending development is relatively mature, there are big differences in legal environment, economic environment and social environment. Therefore, China's network lending platform will inevitably have potential operational risks. Secondly, the credit auditing process is not standardized, the number of the loan business is large, the value is small, the distribution is extensive, and the online operation is virtual, all these have led to many paper leaks in the internal control of China's P2P network credit platform, such as fraudulent loans, illegal misappropriation of platform funds, and private fund pools, which result in the loss of funds for many investors and lenders.

## 2.3 Legal risks

China's specific specifications for P2P network lending platforms are still not perfect. The legal definitions of relevant economic behaviors are still unclear, which will bring legal and policy risks to the development of P2P network lending platforms. The involvement of criminal investigation is the most direct form of risk expression. Legal risk is whether the daily business behavior of the P2P network lending platform conforms to the legal norms and policy requirements. Many P2P network lending platforms in China have developed investment products that guarantee capital and interest to attract investors. However, the relevant laws of China stipulate that individuals and units without qualification for guarantee cannot engage in financing guarantee business. The guarantee behavior of the P2P network lending platform is already related to the financing guarantee business, and there are certain legal risks. If the P2P network lending platform first absorbs deposits and then issues loans, there is a suspicion of illegally absorbing public deposits. The P2P network lending platform has no business qualifications for some businesses and is not recognized by law.

## 2.4 Liquidity risk

The direct performance of liquidity risk is difficult to withdraw cash. Although the P2P network lending platform has sufficient solvency, for some reasons, it is unable to obtain sufficient funds in time to deal with the risk of payment of matured debts or principal and interest. The P2P network lending platform is a third-party intermediary structure that cannot absorb deposits. Unlike commercial banks that have national guarantees, P2P online lending platforms lack the guarantee of capital adequacy ratio. If liquidity risk occurs, investors will panic and a large-scale run on the bank will occur, unable to respond in time, and it is easy to cause runaway or bankruptcy. Liquidity risk is the most harmful to the P2P network lending platform and is ubiquitous. P2P network lending platform liquidity risk means that the P2P network lending platform has sufficient solvency, but for some reasons it cannot obtain sufficient funds in time or cannot obtain sufficient funds in time at a reasonable cost to cope with the asset growth, payment of due debts or timely payment of investors' principal and interest. The risk of paying debts or paying the investor's principal and interest on time. Because the P2P network lending platform cannot absorb deposits as the H-party intermediary, and lacks the guarantee of capital adequacy ratio, when liquidity risk occurs, unlike traditional financial institutions such as commercial banks, there are often countries as final guarantors and through interbank lending and rediscounting. Such tools complement the liquidity and effectively suppress the occurrence of large-scale crowds. The P2P network lending platform is a newly emerging things, there is no guarantee institution or national government to do it, also do not have effective financial tool can be used Once there is liquidity risk, it will easily trigger investor panic, and then break run on the bank. The vicious circle that makes the online lending platform into insufficient liquidity even leads to run away or bankruptcy.

## 2.5 Other risks

There are still market risks and technical risks in the P2P network lending platform. Regardless of the operating mode of the P2P network lending platform, it faces market risks. China's P2P network lending platform is facing fierce market competition. In order to seize the market, some platforms

will have vicious competition and private misappropriation of customer funds. Adverse market competition will affect the healthy development of the entire online lending market.

The P2P network lending industry is in a transitional period. From initial start-up to growth, it is difficult to estimate and measure the negative impact of the economic cycle, so it faces economic cycle risks. The technical risk is the endogenous risk of the P2P network lending platform, which affects the normal operation of the P2P network lending platform. The P2P network lending platform relies on Internet information technology. Therefore, if there are problems such as information processor defects, hacker attacks, and computer viruses, they will not be able to operate normally and bring losses to investors.

## 3. Empirical analysis

This paper adopts analytic hierarchy process (AHP) to combine qualitative analysis with quantitative analysis to construct an AHP model for P2P network lending platform. The basic steps of the AHP are as follows: to establish a hierarchy structure model, on the basis of in-depth analysis of the actual problem, the relevant factors are decomposed into several levels from top to bottom according to different attributes, and the factors of the same layer are influenced by the factors of the upper layer or the factors of the upper layer, and at the same time, it also dominates the next layer of factors or is affected by the underlying factors. Based on the identification of risk factors of Internet P2P network lending platform, this paper constructs a multi-level indicator system of target layer, criterion layer, sub-criteria layer and program layer.

Target layer: risk analysis of internet P2P network lending platform (hereinafter referred to as the lending platform).

Criteria layer: We have established four criteria layers factors: credit risk, operational risk, legal risk and liquidity risk, which represent the main risks faced by the lending platform.

Sub-criteria layer: Based on the analysis of the relevant risk factors affecting the credit platform, this paper selects some representative sub-factors that can influence the factors of the criterion layer to form the sub-criteria layer.

Solution layer: According to the current risk platform situation, we listed four major countermeasures for risk management.

## 4. Data sources and preliminary calculations

#### (1) Data source

After conducting literature research and discussing with the relevant experts to determine the hierarchical structure and the influencing factors at each level, this paper designs the expert scoring table of the judgment matrix under each level and each factor, and invites seven expert panelists consisting of experts and scholars and investment groups. The expert and scholar group select senior managers who have more than 5 years of banking experience and have solid and ability of comprehensive professional knowledge and risk assessment capabilities and work in the bank credit department, sales department and risk control department, and have more than 10 years of relevant teaching work in the colleges and universities, Professor of Finance College with solid risk management and financial theory. The investor group selects users who have 5 years of experience in online lending and have completed at least 20 P2P network lending investments.

Table.1. P2P network credit platform risk prevention and control target layer and criteria layer indicator table

Target layer	Criteria layer P1	Sub-criteria layer P2		
P2P network credit platform risk prevention and control (D)		Compensation and bankruptcy liquidation system (A1)		
	Credit risk (A)	Degree of capital protection (A2)		
		Completeness of filing registration (A3)		
		Disclosure of financing information (A4)		
		Disclosure of business management information (A:		
	Operational risk (B)	Organizational structure (B1)		
		Risk management process (B2)		
		Staff quality (B3)		
		Corporate Governance (B4)		
	Legal risk (C)	Legal and online loan contract performance rate (C1)		
		Lagging nature of laws and regulations (C2)		
		Proactively regulate online lending behavior (C3)		
		Ability to deal with legal disputes (C4)		
		Investment in legal system construction (C5)		
	Liquidity risk (D)	Epidemic monitoring system (D1)		
		Risk reserve system (D2)		
		Repayment method design (D3)		
		Fund management system (D4)		
		Platform size and financing enterprise (D5)		

(2) Data analysis. Redefining the average random consistency indicator RI

Table.2. In this paper, 10<sup>6</sup> random positive reciprocal matrix samples are generated by software, and the more accurate 1-15 order matrix RI values are recalculated and used in other numerical calculations. The validated 1-15 order matrix RI values are shown in the following table:

n	1	2	3	4	5	6	7	8
RI	0	0	0.5250	0.8842	1.1090	1.2491	1.3402	1.4045
n	9	10	11	12	13	14	15	-
RI	1.4506	1.4859	1.5136	1.5359	1.5548	1.5704	1.5837	-

(3) Judging matrix main eigenvector and weight calculation

Through calculation, we found that among the 126 judgment matrices of the scale of 7 experts, all of them passed the single-level consistency test, and the weighted value of each risk was obtained through matrix operation, and the weighted average was normalized.

Sample weight indicator: 
$$Pk = \frac{1}{1 + aCR^k}$$
, (a>0, k=1, 2, 3, .....n)

The normalized sample weight is: 
$$P*k = \frac{P_k}{\sum_{k=1}^{n} P_k}$$

Determine the sample subject weights and make it clear that the combined weight is: Wi=  $\sum_{k=1}^n w_i^k \cdot P_k^*$ 

The comprehensive weight is: 
$$W*i = \frac{W_i}{\sum_{k=1}^{n} W_i}$$

Through calculations, we found that of the 126 judgment matrices of the reigning expert scale, 62

matrices did not pass the single-level consistency test; the overall consistency test was passed in the overall consistency indicators of the 28 criteria or sub-criteria. The relevant weights are calculated as follows:

Table.3. Weight test results

Risk	Investors group	Sort	Expert group	Sort	Comprehensive	Sort
Credit risk	0.511	1	0.378	2	0.431	1
Operational risk	0.262	2	0.094	4	0.166	3
Legal Risk	0.077	4	0.112	3	0.096	4
Liquidity risk	0.158	3	0.417	1	0.307	2
CR	0.052		0.042		0.046	
CI	0.045		0.038		0.042	
λmax	4.141		4.115		4.125	

## (4) Analysis of results

In the criterion layer judgment matrix, both the investment group and the expert group pass the test. The CR of the expert group is lower than the investment group, and the judgment quality is better. According to the formula, the two groups of sample weight investors are 0.427, and the expert group is 0.573. The expert group evaluates the risk of the P2P network lending platform, and believes that the riskiest is liquidity risk, followed by credit risk, then legal risk and operational risk. Investors' evaluations are different. The first is credit risk, followed by operational risk, then liquidity risk and legal risk. According to the comprehensive weight, the first is credit risk, followed by liquidity risk, then operational risk, and finally legal risk. The test results can explain the performance of China's P2P network lending platform to a certain extent.

The expert group mainly conducts risk assessment based on the mechanism of risk generation of P2P network lending platform, the broad coverage and the means of transmission, and gives the greatest weight to liquidity risk. Liquidity risk is the risk with the most extensive impact and the greatest harm. China's P2P network lending platform is still not perfect, and it is prone to phased liquidity risk. The weight of credit risk is second. In social reports, it is more common for borrowers to default and P2P network lending platforms to run. Investors mainly proceed from the actual situation and focus on their own losses to conduct risk assessment. Giving the greatest weight to credit risk means that credit risk has a greater impact on investors. If credit risks occur, it will cause huge losses to investors, and it will have a greater impact on the investor's family and social economy, which conforms to the laws of sociology and general psychology. The second is operational risk, which has strong concealment, and is endogenous risk, affects investors and the platform itself, and is generally concerned by both P2P network lending platforms and investors. When formulating the risk management and control countermeasures of the P2P network lending platform, it is necessary to consider the opinions of experts and investors, not only the generation and development of risks should be fundamentally restrained, but also the interests of investors should be paid attention to. Compensatory and prohibitive provisions should be made for the risk factors causing losses to investors.

## 5. Risk management and control of P2P network lending platforms

## (1) Pay attention to the management and control of credit risk

Information asymmetry is the root cause of credit risk, can build a changeable information dynamic linkage mechanism, strengthen information links between P2P network lending platforms, P2P network lending platforms and users, users and related institutions, P2P network lending platforms and related structures, real-time sharing of registration information, financing information, business management information, etc., so that investors can grasp the operation of the P2P network lending platform, the flow of investment funds, the status of investment projects, etc., curb credit risk, and strengthen P2P network lending Management of the platform. It is necessary to strengthen the protection of investors' funds, establish a post-loan fund tracking and feedback system, track the flow of funds in real time, and improve the protection of funds. China has made it clear that the P2P network lending platform needs to isolate the funds of borrowers and lenders, and strengthen the

protection of funds through qualified bank financial institutions, depositing funds of lenders and borrowers.

(2) Strengthen the company's operation and management and reduce operational risks

The P2P network lending platform should strengthen the company's governance structure, improve its ability to prevent operational risks, and reduce possible operational risks. China's P2P network lending platform generally has the problem of investment institutions. The highly centralized management rights and ownership provide the possibility of encroaching on the interests of shareholders, which affects the independence of the risk control department and directors. Many P2P network lending platforms have not set up a supervisory board, which increases the operational risk of the P2P network lending platform. The P2P network lending platform should focus on improving the quality of staff, establish a strict review and assessment system, strengthen the training of staff, standardize operations, improve risk identification ability and management, and reduce operational risks. It is necessary to establish a sound staff quality assessment system to improve the staff's ideological quality and professional skills. For decision makers of the P2P network lending platform, it is necessary to carry out ideological training and improve their understanding of risks. For operating employees, it is necessary to improve risk management skills, standardize operations, and strengthen risk awareness. For professionals in the risk management department, it is necessary to strengthen background monitoring and improve the ability to identify risks.

## (3) Standardize the application of fund management to control liquidity risk

The establishment of risk reserve fund system is conducive to the management and control of liquidity risk of the P2P network lending platform, and it is necessary to standardize and manage the risk reserve fund system. When the system of risk reserve fund, it is necessary to clarify the repayment standard of the risk reserve fund, clearly define the illegal behavior and standards, and determine the specific amount of reimbursement, and the method of reimbursement. It is necessary to clearly stipulate the accrual standards for risk reserve funds and management standards, and extract a certain percentage from the inflow funds of the P2P network lending platform as a static risk reserve, a certain proportion is drawn from the borrowed funds as a dynamic risk reserve fund. Clear regulations should be formulated for each link of the risk reserve fund, including withdrawal, custody and supervision, etc. It is necessary to perfect the disclosure system of the risk reserve fund and use the risk reserve fund publicly and safely. The funds of the P2P network lending platform include the funds of the platform itself, borrowers and lenders. It is necessary to strengthen the management and control of funds, reasonably arrange and accurately predict the capital flow, strengthen the supervision of the capital movement process and reduce liquidity risks.

# (4) Improve relevant laws and regulations

China's laws are mainly constrained. In order to guide the healthy development of the P2P network lending platform, we can try to formulate incentive laws to improve the law-abiding awareness of P2P network lending platforms and reduce risks. The P2P network lending platform is a new thing, in the continuous development, through perfect laws and regulations, is conducive to curb the illegal behavior of the platform. Incentive laws and regulations have a positive guiding role and can circumvent legal risks from the dynamic. If a P2P network lending platform performs well, a policy or spiritual reward can be given to encourage it to operate in accordance with the law. For the P2P network lending platform, a national self-regulatory organization can be established to uniformly guide and manage the P2P network lending industry, share industry resources and promote the development of the industry. Before the improvement of relevant national legislation, the formulation of sound industry standards and self-discipline rules can fill gaps in regulatory laws, reduce legal risks and improve the overall competitiveness of the industry.

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