

# Study on the Assessment of Internet-Financial Risk Based on Fuzzy Analytic Hierarchy Process

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**Abstract:** The rapid development of Internet finance has changed people's traditional way of life, Internet finance has greatly improved financial efficiency and positive innovation of financial model. The current economy has entered a new normal, we use financial innovation to stimulate economic growth at the same time, the Internet financial risk problems emerge, so to strengthen the Internet financial supervision is imminent. And puts forward some suggestions on the risk management of Internet finance in China from the aspects of perfecting credit system, laws and regulations and supervision system. In this paper, we use fuzzy analytic hierarchy process (AHP) to quantify these influencing factors by fuzzy analytic hierarchy process (AHP) using five representative influencing factors, so we can compare the risk. Finally, the Internet network security risk is greatest, and the Internet financial industry there is a big risk.

**Keywords:** Internet finance; risk management; model

## 1. Introduction

The public is constantly innovating the form of the financial field, and the Internet financial operation is also bringing great changes to people's lives. For example, the emergence of financial management on the Internet, the public mode of fund-raising and new loan methods have promoted the progress of the development mode of the financial field. In the typical way of financial development industry, the opportunity of using network platform is also bringing more surprising changes to the new way of financial development [1].

In 2013, with the rapid development of Internet technology and the interest rate becoming more and more market-oriented, the innovation of financial industry has been greatly promoted. 2014 is a year of significant information in the Internet finance industry. At the beginning of this year, Renren loan in the Internet finance industry all over the world reached the highest position with only a single registered capital of US \$130 million. Third, Ping An also released its first Internet finance product, including many service items, which also represents Ping An's official entry into the Internet finance industry. Fourth, the Internet finance industry the rapid development of red envelope has changed people's

way of life. From the above description, we can see that the spread of Internet finance is imperceptibly changing people's trading habits [2]. In the convenience of participating in this network environment, there are also risks of unknown, solid and capital loss. There is a huge difference between Internet Finance and traditional finance. Internet Finance covers a wide range and involves many fields, including both financial risks and Internet risks [3].

China's Internet finance is developing in full swing, and many Internet financial enterprises are born. Compared with the traditional financial enterprises, the number of Internet financial enterprises is low, and the number of personnel management is low, but the resulting financial risks are diverse. The neglect of Internet financial risk prevention is caused by market organizations occupying the market in order to obtain the current interests. This is not only related to the rapid development of Internet Finance covering a wide range of areas, but also related to the current legal regulatory system can not keep up with the changes of Internet finance. It is also because of the wide coverage of Internet finance, its rapid response and civilian characteristics, which makes this great harm. Its turbulence can even affect the entire financial industry. Financial industry is nip in the bud. The harm caused by improper precaution will jeopardize the whole economic development [4]. Therefore, the exploration of financial risks should also be focused on the prevention of the unexpected.

## 2. Internet financial risk type

### 2.1. Technical Risks

The operation of Internet finance can only rely on the background of network technology. The technical loopholes threat caused by this threat have greatly hindered the development of Internet finance, mainly including the following: 1. Computer virus or malicious attack; 2. The encryption technology of Internet is important, so relevant encryption technology needs to be updated in time to prevent information leakage. 3. The IP used by users through the Internet is very easy to leak. 4. because the Internet technology in China has not reached the advanced level abroad, it is necessary to use foreign

hardware and software facilities to solve internal problems at some times. This also implies a great technical risk [5].

## 2.2. Platform Risk

Internet finance is the integration of traditional finance and Internet technology. As an open source information sharing and collection platform, Internet contains a large amount of information data, which leads to the difficulty of information identification. Illegal customers can use hidden virtual platform to defraud and money laundering. In addition, Internet finance is a trading platform, all transactions are carried out on the Internet platform, which also leads to the difficulty of effective supervision of the flow of funds, which hides the payment risk.

## 2.3. Operational Risk

The operation of Internet finance relies on the operation of each step. The operational threat mainly includes: the change of operators, the difficulty of operation process, the identification of the true and false of virtual currency, etc. The operation of Internet finance is a standardized step. If you are not familiar with the relevant operation treaties before using, there may be completely avoidable risks, and of course, it may be the operational risk that users cannot avoid, that is, the loopholes of the trading system itself.

## 2.4. Credit Risk

In the financial operation, the state organs, social organizations or the common people should adhere to the moral concept of integrity, because we must build an honest and trustworthy Internet financial concept. There are mainly credit risks; 1. At present, many financial products do not have effective guarantee. 2. The greater the profit, there is a huge threat of asset loss in the investment products. 3. At present, many Internet financial companies have not yet asked to take the strength to make risks for their financial services

## 2.5. Legal Risk

Due to the rapid development of Internet finance, the law of our country can not keep up with the pace of Internet finance development, which leads to the gap in the legal level. In some aspects, the old law also limits the development of Internet finance. There is no matching legal policy, which leads to the emergence of legal risk [6].

## 2.6. Regulatory Risk

Internet Finance in China is still in its infancy, its development speed is fast and involves many fields. Over time, Internet finance will have more and more influence on the whole economy. However, the regulatory authorities still use the traditional financial supervision methods, which leads to the constraint development of Internet Finance and can not play a good role in promoting. The innovation and development of financial industry has a great conflict with the traditional financial supervision mode, so we must accelerate the

improvement of Internet financial supervision mode.

## 3. The Importance of Internet Financial Risk Management

Financial regulators should accept the concept of market liberalization, that is, regulators should take no or less regulatory measures on the market

First, if the market information is correct, then market liberalization, that is, the market's own regulatory system, will help the market to bear and control risks.

Second, market competition will raise the entry threshold and kick out the problem financial institutions.

Third, new changes in the financial industry will automatically survive the fittest under the market-oriented conditions. An excellent and qualified financial organization will also produce and develop things with appropriate risks, and provide consumers with investment methods that are more in line with their own conditions. For regulators, the judgment of financial innovation is not more effective than the market, so the construction management may hinder the development of financial innovation. The above situation is only in the ideal state, so in the current situation of Internet finance, it needs the appropriate supervision of the regulatory authorities [7].

## 4. Overview of Internet Financial Model in China

At present, Internet finance has become a new development direction and has been involved in various fields, and the trend of financial model innovation is emerging. The media payment and the anywhere movable payment method are used in the mass life to become the most profound Internet financial instruments. Just like P2P and other network financing loans of financial services. There are many forms of Internet finance.

### Third party payment and mobile payment

The new payment method connects the communication between the financial institutions of the user company on the network, which enables users to break through the time limit and speed up the capital transaction and other businesses. In the transaction, the third party payment relies on software technology and hardware technology to provide customers with convenient and fast payment methods. Portable payment mode is a new way of payment for intermediate materials through communication tools and wireless communication in our real life.

### 4.1. P2P Platform for Internet Investment and Financing

P2P network lending is a new lending mode which is born by the Internet and information technology. It takes the network platform as the carrier and big data as the core, and connects the lender and borrower directly. This way breaks down the obstacles of offline transactions in the past. Both sides of the borrower are no longer limited by time and space, and the intermediate links of financial institutions such as banks are exempted. The lenders can directly audit and manage the borrower through big data analysis and timely grasp their needs and trends; and the

borrower can also reduce the intermediate costs through P2P platform, and can easily and quickly reduce the intermediate costs for each lender. The debit makes comparison and selection. There are two main ways to realize P2P lending platform in China. First, the lender and the small loan company cooperate directly. This is also the most common way. In this case, the lender is equivalent to the “dealer” of the small loan company in a sense, which can not only use its platform to expand the market, but also effectively share the risks; secondly, the lender can build its own self-management and use its own to expand the market and effectively share the risks; secondly, the lender can build its own self-management and use its own to expand the market. The existing or not scale of the strength of the market mining [8-10].

#### 4.2. Internet Investment and Financing - Crowdfunding Platform

Crowdfunding refers to the financing behavior of the power of the crowd by using Internet media, which realizes the direct and efficient information and capital interaction between the financing party and the investor. For the financing parties, crowdfunding method breaks the obstacles that have ideas but difficult to have capital channels in the past; for investors, it is conducive to improve their understanding and understanding of specific projects and increase investment channels on the basis of realization intention. Meanwhile, the direct financing realized by crowdfunding can reduce the cost and risk of both sides, promote the emergence of many professional intermediary service institutions and facilitate the systematic construction of capital market. There are four main crowdfunding methods, one is non profit gift, mainly used for charity and infrastructure services for the public; the second is credit based lending, which is P2P mode mentioned above; third, pre purchase with reward as the core, mainly used for marketing activities in emerging industries or early stage of entrepreneurship; fourth, the way of raising funds and entering shares is used by many cities. Small enterprises with insufficient market size and capital scale are favored [9-12].

### 5. The Problems of Internet Financial Risk Management in China

At present, the development trend of each small industry in China’s Internet finance industry is not consistent, and the risks and the regions and degrees involved in the risks are different. Therefore, problems emerge in endlessly in risk management. The main reasons are as follows:

#### 5.1. The Supervision System of Internet Finance is not Perfect

China’s Internet financial regulatory system is not perfect, which is also the collapse of a large number of Internet Financial platforms. The main reason is the lack of social supervision in China, which can be extended to the credit system. The development of Internet finance mainly depends on Internet technology and big data, and

users trade on the Internet. But in the transaction, information asymmetry often appears between users, the main reason is that the credit system is not mature. The immaturity of personal credit system also hinders the development of supervision system. Internet finance is different from traditional finance, which can not verify the information of both sides at every step. Therefore, in the Internet financial supervision, the credit problem should be solved as soon as possible.

#### 5.2. Multi Sector Government Regulation Leads to Regulatory Gaps

Although China has a traditional financial regulatory system of “one bank, three meetings” and regulatory model, the differences between Internet Finance and traditional financial industry lead to problems such as unenforceable and unsolvable supervision, regulatory loopholes or wrong supervision. And regulatory loopholes and wrong regulation not only affect the development and innovation of Internet finance, but also are not conducive to the protection of the rights and interests of users [13].

#### 5.3. Lack of Internet Financial Supervision Talents

Internet finance is a new financial model. However, the new form of financial industry has brought great challenges to supervision. The main reason is the lack of supervisors. Internet finance is the integration of Finance and Internet technology, which requires regulators not only to be familiar with financial knowledge, but also to be proficient in Internet technology. However, few talents have both financial knowledge and Internet technology. The government and enterprise supervision departments should innovate ideas, pay attention to the study of information technology knowledge, and cultivate comprehensive supervisors.

### 6. Internet Financial Risk Assessment Based on Fuzzy Analytic Hierarchy Process

#### 6.1. Establish a Hierarchical Structure Model

Internet financial risks are complex and diverse, and the size and importance of each risk are not the same, so it is impossible to select all the risk factors, mainly the representative risk factors. Taking the Internet financial risk as the research object, this paper analyzes it as a whole business, that is, the target layer. Then, according to the importance of each influencing factor, the first level index and the second level index are determined to establish the hierarchical structure of Internet financial risk model index.

According to the analysis of the actual situation, as shown in Table 1, this paper sets the first level index as 5, and the second level index as 15. System vulnerability J1, network regulatory vulnerability J2, webpage hanging horse risk J3, malicious attack J4, internal fraud risk J5, external fraud risk J6, liquidity risk J7, market change risk J8, interest rate change risk J9, trading mode innovation risk J10, industry correlation risk j11, consumer operation risk j12, legal liability risk j13, virtual currency risk J14 Online money laundering risk

j15.

**Table 1.** Three-level Hierarchical Chart

Level 1	Level 2	Level 3
Internet finance risk Y	Internet safety risk M1	System vulnerability J1
		Network supervision vulnerability J2
		Webpage virus risk J3
	Credit risk M2	Hostile attach J4
		Internal fraud risk J5
		External fraud risk J6
	Business risk M3	Liquidity risk J7
		Market change risk J8
		Interest rate change risk J9
	Operational risk M4	Transaction mode innovation risk J10,
		Industrial relevancy risk J11
		Consumer operation risk J12
	Legal riskM5	Legal responsibility risk J13
		Virtual currency risk J14
		Online money laundering risk J15.

6.2. Establish Appraisal System

In this paper, as shown in Table 2, 5 internet finance risk evaluation standards were established, their

sequence is from high to low, i.e.: very high, high, medium, low, very low; their evaluation set is known as I = (I1, I2, I3, I4, I5). Standards:

**Table 2.** Evaluation form

Grade	Standard	Description
5	Very high	Once it occurs, it will cause serious influence to economy and society.
4	High	Once it occurs, it will cause major influence to economy and society.
3	Medium	Once it occurs, it will cause influence to economy and society.
2	Low	Once it occurs, it will cause low influence to economy and society.
1	Very low	Once it occurs, it will not cause influence to economy and society.

6.3. Risk Assessment and Analysis

According to the weight and scoring of each factor relative to the total target, the multi factor fuzzy evaluation matrix is constructed, and then  $i = w(n)$  is

adopted according to the fuzzy synthesis method. According to the weighted average of R format, the risk distribution is calculated.

**Table 3.** Multifactor Fuzzy Evaluation Matrix

Weight of factor	Evaluation results				
	Very high	High	Medium	Low	Very low
0.063	0.7	0.2	0.05	0.05	0
0.123	0.4	0.25	0.2	0.1	0.05
0.291	0.6	0.2	0.1	0.1	0
0.033	0.4	0.3	0.15	0.1	0.05
0.103	0.5	0.25	0.15	0.1	0
0.034	0.3	0.4	0.1	0.15	0.05
0.045	0.4	0.3	0.15	0.1	0.05
0.02	0.25	0.5	0.2	0.05	0
0.005	0.1	0.4	0.3	0.1	0.1
0.013	0.05	0.1	0.15	0.3	0.4
0.05	0.15	0.3	0.4	0.1	0.05
0.006	0.2	0.3	0.4	0.1	0.1
0.138	0.1	0.4	0.25	0.15	0.1
0.056	0.05	0.2	0.3	0.25	0.2
0.023	0.1	0.4	0.3	0.15	0.05
I	0.395	0.27	0.176	0.117	0.047

In the end, as shown in Table 3, the risk set, i.e.: I = (0.395, 0.27, 0.176, 0.117, 0.047). In view of the rule of maximum membership value, the grade corresponded by the maximum number is the internet finance risk grade. According to the risk set I, the maximum value of 0.395 can be obtained. The one corresponding to it is the internet security risk; the credit risk corresponding to the value of 0.27 is also higher. Therefore there are huge risks in Chinese internet finance, especially the internet

security risk, credit risk; the rapid development of internet finance will result in the financial risk to accumulate rapidly, so the one to prevent from internet finance risks is very important.

6.4. Analysis of Model Results

From the operation of the model, we can see that there are great risks in Internet finance. Among the first level indicators, Internet security risk accounts for the largest

proportion. Therefore, Internet security is an urgent problem. The second is credit risk. Many financial activities are highly dependent on credit. The regulatory authorities should strengthen the improvement of the credit information system in order to reduce operating costs and information asymmetry. The Internet is an open and shared information platform, and it is more difficult to distinguish the true from the false. Therefore, Internet Finance faces huge credit risk. With the development of Internet business, the third important thing is not to follow up with the weight of legal risk and operational risk.

## 7. Policies and Suggestions

### 7.1. Follow the Pace of the Times and Strengthen the Innovation of Internet Financial Management

Under the situation of China's Internet finance, regulators should focus on strengthening the prevention of the overall risk of the Internet finance industry, especially the systemic risk, focusing on risk prevention, not just risk reduction. At the same time, to promote the progress of the security mechanism of the financial environment, the public must also participate, which requires the information to be open, and the concept of public risk prevention to be deepened. In the future, innovation should become the leader of China's Internet financial risk management, integrate innovation and risk management, adjust the connection between the two, and provide assistance for the better and faster development of China's Internet Finance in the future.

### 7.2. Establish and Improve Internet Finance Laws and Regulations and Management Measures

At present, the legal system of Internet financial management is very lacking, which requires us to start to pay attention to the establishment of China's Internet financial security legal provisions and the improvement of the current relevant laws. Only when the law is perfected can effective supervision be realized. First, we should speed up the promulgation of relevant administrative measures and supervise the current financial investment and management. Second, special management of customer information on the platform. Third, change the original financial institutions that do not meet the requirements, and speed up the updating of Internet financial regulatory methods. Fourth, Internet finance needs reasonable development standards. We need to prevent regulatory loopholes, pay attention to the regional span of Internet finance, the huge threat and means and other characteristics. China's current regulatory system should be based on the spirit of cooperation, the principle of openness, multi sectoral cooperation, and the combination of national regulation and industry automatic regulation to build the Internet financial supervision and management system with the widest coverage and the best structure.

### 7.3. Establish and Improve Credit System

The Internet finance industry in the EU has a high threshold of access, strictly stipulates the authority of

electronic payment business, and stipulates that only the service institutions of bank nature or enterprises with the qualification of bank operation can use electronic payment business. This is also to draw on European regulations to define new payment methods as the financial sector. In terms of the development of Internet Finance in China, it can not meet the EU implementation standards, but it can be our development direction. The application of financial license has higher requirements on the Internet financial enterprises in talent reserve, infrastructure construction, risk control and other aspects. Relevant audit departments must investigate the relevant qualifications and experience of the applicant in detail, and strictly check the process of financial license approval. Financial license is the most authoritative credit embodiment of the enterprise. For small and medium-sized enterprises with good credit and qualified guarantee, relevant departments should give corresponding assistance and guidance, encourage the vigorous development of small and medium-sized enterprises and the expansion of new financial models, and promote the birth of more excellent financial products. On the contrary, for enterprises with low credit rating and wandering on the edge of law, we should strengthen management system, strictly implement elimination policies, and even set up blacklist system. They are exempted from applying for financial license again to meet the punishment effect on the bad enterprises.

### 7.4. Build an effective supervision system and Standardize the Supervision Process

We will strengthen and improve the construction of special laws on Internet finance. Improve the efficiency of the use of the law, so that law enforcement must be strict, there are laws must be in accordance with. In view of the current situation of China's Internet finance development, we should improve the targeted legal documents as soon as possible. In order to limit the Internet trading behavior and ensure its legitimacy, we must put an end to the illegal acts caused by the use of network technology loopholes, and ensure the security of the Internet financial market. The legal provisions should clearly distinguish the requirements of financial services and the rights and interests enjoyed. Then, create a fair and secure network trading environment. Using anti-counterfeiting technology to improve the security of digital signature, make clear the legal binding force of digital signature, and formulate relevant rules and regulations on the effective time of keeping customers' electronic transaction records, so as to avoid the theft of people's personal information and ensure the security of Internet finance. Although the development of China's virtual currency is not mature enough, we should learn the management methods of foreign virtual currency in advance and take precautions.

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