

Research on Risk Assessment of Internet Finance

-- Based on Analytic Hierarchy Process and Fuzzy Comprehensive Evaluation

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Abstract: Internet finance integrates online transaction data generated in different social networks, and completes credit consumption, loans and other lending behaviors by means of electronic payment through the research and judgment of customer credit, so that people can enjoy financial services while dealing with various problems. This paper takes Internet finance as the research object, analyzes it as a whole business form, and adopts a comprehensive evaluation method different from the traditional single factor analysis method, organically combines hierarchical analysis and fuzzy mathematics, effectively considers different types of risks in Internet finance, and adopts corresponding grade classification, so as to avoid too thin and idealized research. The results of empirical research show that China's Internet finance is generally in a state of high risk. Among these risk factors affecting Internet finance, the impact of network security is particularly prominent. This paper constructs the framework of risk management from the perspective of six first-level indicators, and puts forward corresponding suggestions and solutions.

Keywords: Internet finance risk assessment; Analytic hierarchy process; Fuzzy mathematics comprehensive evaluation method.

1. Introduction

Since its emergence, especially in the last two decades, the Internet has penetrated into People's Daily life comprehensively and deeply. "Big data", "we media" and "cloud computing" have appeared in people's perception. Under the background of the rapid development of network technology and electronic information technology, e-commerce based on the network has also begun to play an important role in people's lives. From the initial ordinary online shopping, the development of all kinds of financial transactions today, virtually gave birth to the "Internet finance" this new business form.

While internet finance greatly facilitates people's lives, the risks that may occur should not be underestimated. As a new model for the development of traditional financial business, Internet finance actually contains stronger risks than the latter. As we all know, both the financial industry and the Internet industry are high-risk industries, while the Internet finance belongs to the innovation and integration of the Internet and traditional finance. The "superposition" of the two industries undoubtedly makes the risk of Internet finance far greater than the risk of Internet and traditional finance itself, and its risk spreads fast and affects a wide area [1]. For Internet financial risks, it is not only necessary to grasp the risk assessment of some of them, but also to have a more comprehensive and detailed grasp of them from a macro perspective, so as to provide a basis for further accurate development of risk prevention measures.

2. Internet Financial Risks

2.1. Identification of Internet financial risk types

As a combination of traditional finance and the Internet,

Internet finance still has the characteristics of traditional finance and inherits the wind that has always existed in traditional finance[2]. While online financial services have become a new service field, they also bring various risks in the virtual world[3]. The extension of Internet technology to the financial industry is an effective channel to expand the financial market and business [4]. However, the development of Internet finance should pay timely attention to various hidden risks such as technology, business, law and management, which make financial supervision more difficult and lack of regulation within a certain range. In view of this, he proposed that various systems such as security, supervision and risk control of Internet finance should be improved to avoid various risks implied by Internet finance more effectively. When commercial banks conduct e-banking operations, they will face business risks, reputation risks, information security risks and legal risks [5]. Risk is contagious. When the network structure is highly concentrated, the correlation between nodes in A is low, so the infection is not easy to spread, and the probability of loss will be reduced. On the contrary, when the correlation degree of the internal system is high, the probability of loss increases [6].

This paper makes a detailed analysis of the possible risks in Internet finance, and puts forward six major risks faced by Internet finance at present, including network security risk, operational risk, credit risk, business risk, legal and reputation risk and information security risk.

2.2. Internet Financial Risk Assessment

This paper adopts the combination of quantitative analysis and qualitative analysis to establish the Internet finance risk evaluation index system, as shown in Figure 1.

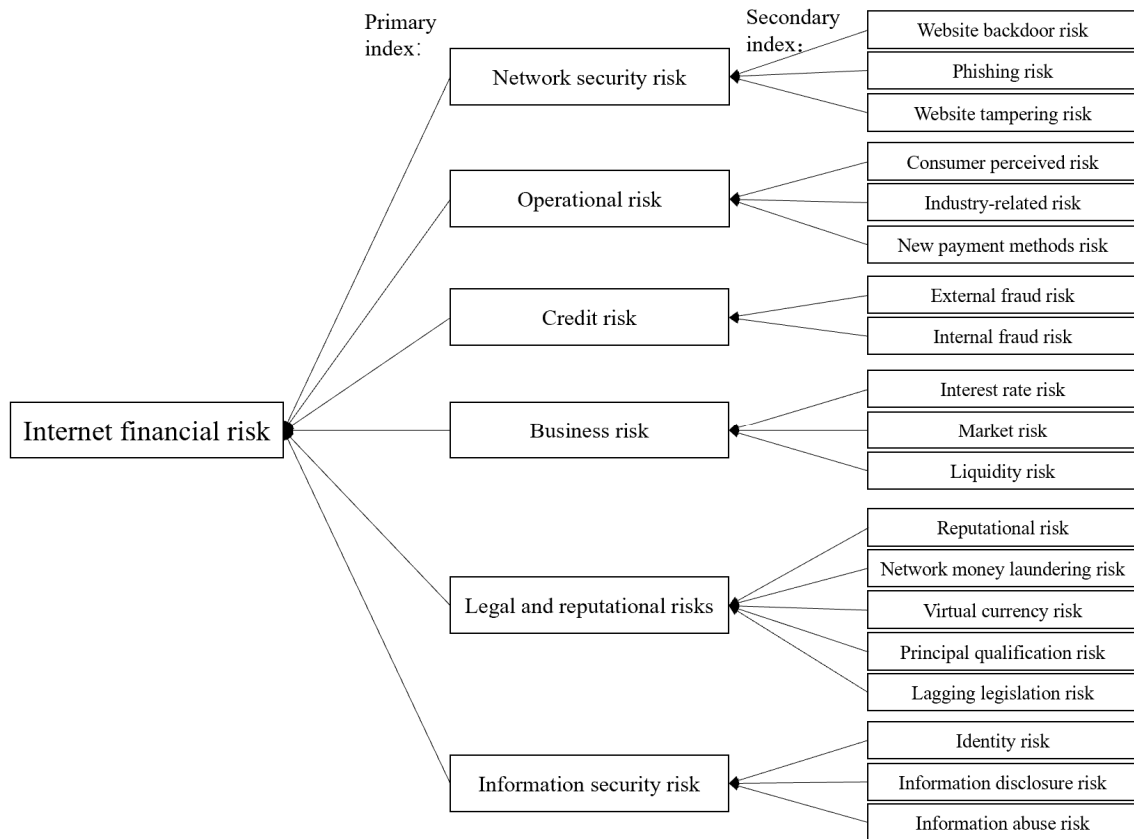


Figure 1. Internet finance risk evaluation index system

In this paper, the 1-9 scale method is used to compare and score the importance of each level and the importance of each level's internal indicators, and construct an analysis matrix. By using the Delphi method, according to the systematic procedure, the prediction opinions of the expert panel members are consulted by back-to-back communication, that is, the team members are not allowed to discuss with each other or have horizontal contact with each other, but can only have relations with the investigators. After repeated consultation, induction and modification, the opinions of the experts on the questions raised in the questionnaire are summarized into basically the same opinions of the experts. As a result of prediction, 9 financial professionals and practitioners of Internet financial institutions were invited to

consult the forecast opinions of the expert panel members through back-to-back communication, that is, team members should not discuss with each other or have horizontal contact with each other, but can only have relations with the investigators. Through multiple rounds of surveys, experts' views on the questions raised in the questionnaire were investigated. After repeated consultation, induction, modification, and finally summarized into the basic consensus of experts. Based on this, the judgment matrix of first-level indicators is established and its weight is calculated. Combined with the weight of first-level indicators, the combined weight of Internet financial risk assessment system is calculated, as shown in Table 1.

Table 1. Internet Finance Risk i]Index Portfolio Weight

| Primary index | Weighted | Secondary index | Weighted | Resultant weight | sort |
|------------------------------|----------|-------------------------------|----------|------------------|------|
| Network security risk | 0.328 | Website backdoor risk | 0.117 | 0.038 | 9 |
| | | Phishing risk | 0.614 | 0.201 | 1 |
| | | Website tampering risk | 0.269 | 0.088 | 4 |
| Operational risk | 0.069 | Consumer perceived risk | 0.143 | 0.010 | 15 |
| | | Inter-industry risk | 0.143 | 0.010 | 15 |
| | | New payment methods risk | 0.714 | 0.049 | 8 |
| Credit risk | 0.150 | External fraud risk | 0.333 | 0.050 | 7 |
| | | Internal fraud risk | 0.667 | 0.100 | 3 |
| Business risk | 0.113 | Interest rate risk | 0.268 | 0.030 | 10 |
| | | Market risk | 0.615 | 0.069 | 6 |
| | | Liquidity risk | 0.117 | 0.013 | 14 |
| | | Reputational risk | 0.308 | 0.017 | 13 |
| Legal and reputational risks | 0.054 | Network money laundering risk | 0.145 | 0.008 | 17 |
| | | Virtual currency risk | 0.089 | 0.005 | 18 |
| | | Principal qualification risk | 0.383 | 0.021 | 12 |
| | | Risk of lagging legislation | 0.075 | 0.004 | 19 |
| | | Identity risk | 0.280 | 0.080 | 5 |
| Information security risk | 0.286 | Information disclosure risk | 0.627 | 0.179 | 2 |
| | | Information abuse risk | 0.093 | 0.027 | 11 |

Source: This study collated

On the basis of the single factor fuzzy evaluation results, combined with the weights of all levels of indicators, the fuzzy comprehensive evaluation method is used to carry out multi-level fuzzy comprehensive evaluation, and the Internet financial risk is graded according to the principle of maximum membership degree. The membership degree of risk index is obtained by expert voting, and the corresponding matrix is established through analysis and calculation. Results The main factor fuzzy matrix C of six types of indicators was obtained, which was sequentially sorted as C1, C2, C3, C4, C5, C6. By combining the main factor fuzzy matrix C with the first-level index weight W, the membership vector E of the fuzzy comprehensive evaluation of Internet financial risk could be calculated:

$$E = W * C$$

$$= (0.328, 0.069, 0.150, 0.113, 0.054, 0.286)$$

$$* \begin{bmatrix} 0.111 & 0.415 & 0.269 & 0.205 & 0 \\ 0.174 & 0.238 & 0.461 & 0.127 & 0 \\ 0.185 & 0.371 & 0.223 & 0.111 & 0.111 \\ 0.081 & 0.316 & 0.304 & 0.299 & 0 \\ 0.032 & 0.319 & 0.453 & 0.153 & 0.043 \\ 0.183 & 0.723 & 0.052 & 0.041 & 0 \end{bmatrix}$$

$$=(0.139 \quad 0.468 \quad 0.227 \quad 0.146 \quad 0.019)$$

According to the principle of maximum membership, the level of evaluation set corresponding to the maximum vector E is the current risk level of Internet finance. As can be seen from the above results, the maximum value of the evaluation result is the second value 0.468, that is, the membership degree of the risk level of Internet finance to the evaluation level of "higher" is 0.468. According to the principle of maximum membership, it can be determined that the risk level of Internet finance is "high". In addition, from the weight value of indicators at all levels, it can be seen that the main risk faced by Internet finance is the risk of network security, followed by the risk of information security, credit risk and business risk. This conclusion also confirms the subjective judgment of experts.

3. Result Analysis and Evaluation

The network security risk weight is 0.328, which shows that the network environment has a great impact on Internet finance. If you want to better develop Internet finance, you must do a good job in preventing network security risks. The proportion of information security risk is 0.286, indicating that people attach great importance to their own information and do not want their information to be abused and misused. Information security risk is an important source of Internet financial risk. Risk indicators between 0.1 and 0.2 are credit risk and business risk. All financial activities are ultimately an evaluation of credit. As Internet finance, it also faces huge credit risks. Internet finance itself is the product of the integration and innovation of network technology and financial business. For the prevention of these financial business risks, we can learn from the measures of traditional financial business in risk prevention. These two types of risks are relatively common, for Internet financial institutions, but also easy to quantify, although the influence is also very large, but relatively easy to control, need to pay attention to. Finally, operational risks and legal risks are also important, but they take a relatively small proportion in the model of this paper. However, continuous management is still needed in the risk management process of Internet finance.

As can be seen from the results of multi-level fuzzy

comprehensive evaluation, on the one hand, the membership degree of the overall risk level of China's Internet finance is 0.139 for the evaluation grade "high", 0.468 for the evaluation grade "high", and 0.227 for the evaluation grade "medium". According to the principle of maximum membership degree, the overall risk level of Internet finance is determined to be "high". On the other hand, the proportion of Internet financial risks belonging to "high", "high" and "medium" risk levels is 83.5%, and the proportion belonging to "low" and "low" risk levels is only 16.5%. The overall risk level of Internet finance is at a medium-high level, and the high overall level of Internet finance is unfavorable to the further development of finance. Therefore, relevant measures should be taken to prevent risks, in order to have an overall grasp of the risks and prevent the further spread of risks.

4. Internet Financial Risk Prevention Suggestions

(1) Strictly control technology selection standards to ensure network system security

First of all, control the choice of computer hardware system, establish a fast and stable system trading platform, and improve the operating environment of Internet financial services. Secondly, formulate corresponding technical standards and norms to enhance the defense and anti-attack capability of network systems. Finally, the development of Internet financial information technology with independent intellectual property rights to reduce the risk of technology selection.

(2) Improve the social credit system and set up consumer protection agencies

The comprehensive development of Internet finance and the construction of a social credit system can promote each other and make progress together. Establish a consumer protection agency, actively guide Internet financial investors or consumers to correctly use existing Internet platforms, strengthen consumer guidance, and improve their awareness of risk prevention and corresponding awareness of rights protection.

(3) Strengthen enterprise internal control and improve risk management system

The internal control of Internet financial institutions plays a very important role in maintaining the normal operation of institutions. We should strengthen the internal control of institutions and improve the risk management system from the following aspects: standardize the internal operation process of Internet financial enterprises; We will improve the risk management system for Internet finance

(4) Accelerate the construction of a legal system to clarify the supervision mechanism

Legislation and supervision are related to the macro operating environment of Internet finance operation, and are also the aspects with the highest potential risks. Properly dealing with these two aspects can greatly improve the operational efficiency of Internet finance. The survival and development of any enterprise cannot be separated from the restriction and guarantee of national laws and regulations, and Internet financial enterprises are no exception.

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