

The measurement and statistical research of Internet financial flow risk based on AHP

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Abstract: With the rise of a new round of industrial and technological revolution, "Internet + finance" has been taking on a new development pattern, which is manifested in the financial field of Internet finance. As a new financial model, Internet finance has the characteristics of directness and virtuality. However, while it brings convenience, it also brings inevitable risks and challenges. This paper adopts the analytic hierarchy process mode to analyze and measure the risk of Internet financial flows, and puts forward some suggestions and measures on this basis. The innovation of this paper is that the hypothesis is verified by model analysis.

1. Introduction

In 2012, the concept of Internet finance was proposed for the first time at the annual meeting of 40 people in finance. The Internet finance model gradually penetrated into the public life and served the real economy. With its own characteristics of openness, sharing, equality and freedom, the Internet has shown strong support for the development of today's world.

1.1 Internet finance

The financial industry shows a new development trend. On the one hand, Internet enterprises are gradually involved in the financial field and constantly infiltrate into the traditional financial business forms. On the other hand, the traditional financial industry is gradually being internet-oriented. At the same time, financial business constantly updates financial products with the help of the Internet. The new mode generated by the combination of these three factors is Internet finance. All financial business forms with Internet spirit are collectively referred to as Internet finance. According to the guiding opinions on promoting the healthy development of the Internet financial to the definition of the concept of the Internet financial, it can be seen that the Internet financial absolute is not a simple Internet technology, but based on the function of the Internet itself, supported by the new communication technology of a new financial business model, is one of the network financial business model.

Compared with traditional finance, its most essential characteristic is its disintermediation. Its three pillars are online payment, information processing and resource allocation. Internet finance has the following characteristics: one is the disintermediation of the transaction process. In the transaction process of Internet finance, both the supplier and the seller can avoid traditional financial institutions to conduct direct transactions, and the funds can reach the demander directly from the supplier. Second, the symmetry of transaction information. Internet finance realizes the information matching between supply and demand with the help of advanced Internet technology, which can reduce the asymmetry of transaction information. The third is the minimization of cost and universality. Internet financial transaction simplifies the process of financial transaction, improves the efficiency of resource allocation, minimizes the cost of financial transaction and provides convenience for both parties. Fourthly, the virtuality of network economy. The virtuality of network economy makes the operation activities of Internet finance break the restriction of traditional finance outlets and make it have obvious regional openness.

1.2 Risks of Internet finance

As an innovation of traditional finance, Internet finance is not a simple superposition of

traditional finance and Internet. In addition to traditional financial risks, Internet finance also has network security technology risks, which are mainly manifested in system security vulnerabilities, network tampering and other risks.

Traditional market risk refers to the unexpected loss of main body value caused by the random changes of exchange rate and interest rate, commodity price and stock price, etc., which mainly includes equity risk, interest rate risk, exchange rate risk and commodity risk. However, Internet financial market risk refers to the potential risk that both parties of Internet financial transactions suffer losses due to changes in interest rates and other factors during the transaction process.

Table 1 Evaluation criteria and evaluation scores of risk degree

The results of	T evaluation standard	Score
A slight	Does not affect normal business activities, almost no loss	1
Low	Do not affect normal operation activity basically, produce a few loss	2
Medium	Do not affect normal operation activity basically, produce bigger loss	3
High	Affect normal business activities, resulting in a small loss	4
Serious	Destroy capital chain, even the enterprise goes bankrupt	5

Different from traditional risks, platform risks are new types of risks generated by various platforms under the Internet financial model, including Internet financial fraud risk, Internet financial crime risk, Internet system security risk, etc.

Table 2 Statistics of security vulnerabilities over a certain period of time in 2017

Year	Information security vulnerability	High risk vulnerabilities	Proportion of high-risk vulnerabilities
9	356	189	53.10%
10	568	435	76.60%
11	789	567	71.90%
12	1078	790	73.20%

2. Research on financial risk statistics and measurement based on AHP

2.1 Analytic hierarchy process

Analytic hierarchy process, also known as AHP method, is a systematic and hierarchical analysis method that decomposes the elements related to decision-making into three levels, namely, mouth mark, criterion and scheme. Analytic hierarchy process was first proposed by Thomas sethi, an American operational research scientist, in the mid-1970s. This method has been widely used in many fields such as behavioral science, education, medical treatment, environmental assessment, transportation and economic planning management.

The concrete operation steps of the analytical method are as follows: First, the hierarchical structure model is established; The second step is to construct the judgment matrix of all factors in each level; The third step is single hierarchical sorting and consistency test; The fourth step is to sort the hierarchy.

2.2 Establishment of Internet financial risk assessment index system

First, the hierarchical structure model is established. According to the previous risk analysis, the Internet financial risk evaluation index system can be obtained. Secondly, the judgment matrix is constructed. For each factor at the same level, pairwise comparison is carried out for the factors at the above level. The relative importance is determined according to the evaluation scale, and a pairwise comparison judgment matrix is constructed. The specific scaling methods are shown in the table.

Table 3. Specific scaling method

Scale	Meaning (Ci over Cj)
1	As important
3	A little important
5	Important
7	Obviously important
9	Absolutely vital
2,4,6,8	It's somewhere in between
The derivative of each of these Numbers	Reverse comparison of indicators

Determining the risk weight of each index is mainly subject to the subjective judgment by professionals in relevant fields based on experience, so as to reduce the unreasonable weight determination caused by insufficient personal decision-making and judgment ability. This paper assumes that the experts agree on the importance degree, so the expert group is requested to carry out weight assessment, and the judgment matrix is constructed as follows:

Can be simply expressed as:

$$A = \begin{bmatrix} 1 & 2 & 1/4 & 6 & 1 & 5 \\ 1/4 & 1 & 3 & 12/ & 3 & 1 \\ 1/6 & 1/3 & 1 & 1/6 & 1 & 3 \\ 1 & 4 & 4 & 6 & 2 & 3 \\ 1 & 2 & 1/4 & 4 & 4 & 1 \\ 1/5 & 1/3 & 3 & 1/6 & 1 & 6 \end{bmatrix}$$

Similarly, the second-order matrix is expressed as:

$$B_1 = \begin{bmatrix} 1 & 3 & 5 \\ 1 & 1/2 & 4 \\ 2/3 & 3 & 1 \end{bmatrix}, B_2 = \begin{bmatrix} 1 & 5 \\ 1/4 & 3 \end{bmatrix}$$

Consistency testing. Calculate the eigenvectors of the matrix:

A, Normalized each column vector of A to: $\varpi = \frac{a_q}{\sum_{i=1}^n a_{ij}}$,

B, Sum over the rows: $\varpi_i = \sum_{i=1}^n \varpi_{ij}$;

C, The normalized, $\varpi_i = \frac{\varpi}{\sum_{i=1}^n \varpi_i}$, $W = (w_1, w_2)^T$, $i = 1, 2$

When the test passes, the eigenvector can be used as the weight vector, otherwise the matrix must be rebuilt or modified.

Consistency test formula: $CR = \frac{CI}{RI}$, When $CR < 0.1$, the consistency test of the judgment matrix is considered to be passed.

Among them, $CI = \frac{(\lambda - n)}{(n - 1)}$, λ_{\max} is the maximum characteristic root; RI is a random consistency index, and the values are shown in the table below:

Table 4 Values of RI

n	1	2	3	4	5	6	7	8	9
RI	0.1	0.2	0.38	0.7	0.9	1.2	1.5	1.67	2.11

It can be seen from the weight values of various indicators that information asymmetry, vague or lack of supporting regulations and operational risks have the most important impact on the overall risk of Internet finance. The second is the risk of information abuse, network system security, high policy uncertainty and breach of contract, etc., and the risk of illegal fund-raising and network fraud account for the smallest proportion of the overall risk. In terms of first-level indicators, the proportion of credit information risk and legal risk is the largest, followed by operational risk and technical risk, and finally moral risk and capital risk. Based on the online characteristics and innovation of Internet finance, targeted credit investigation system, legal policy and regulatory system are indispensable, which is also one of the reasons for the high weight of credit information risk and legal risk, as well as the amplification of several other risks.

3. Suggestions on measures

3.1 Strengthen the "risk-based" supervision measures of Internet finance.

From the perspective of the government, it is necessary to clarify the subject and thinking of supervision and actively encourage external supervision. On the one hand, the specific arrangement of rules should be clarified in the next step; on the other hand, the supervision mode should be innovated to encourage external supervision through paid measures, so as to form a top-down supervision system in the industry, with the main regulatory body stipulated by law and external supervision as the auxiliary. At the same time, we should improve laws and regulations, crack down on crimes in accordance with the law, protect the legitimate rights and interests of participants, and provide legal protection for the healthy development of Internet finance.

3.2 Establish industry associations, strengthen self-discipline and establish risk management system.

Give full play to the role of the self-discipline organization, correctly handle the relationship with government regulators and the Internet financial enterprises, earnestly implement the regulatory guidance, to speed up the construction of Internet financial risk management system, improve the Internet financial consumers' rights and interests protection mechanism, for the Internet financial enterprise, the consumer provides the omni-directional high-quality service.

3.3 Strengthen enterprise risk internal control and customer account management.

We will increase investment in scientific and technological research and development, and develop core technologies to achieve technological innovation and development. We will strengthen the management of enterprise branches and front-line personnel, improve the quality of employees, and provide intellectual support to Internet financial enterprises. On the other hand, the admittance standard of practitioners should be improved, and the cultivation of professional knowledge and ability and the improvement of comprehensive quality of practitioners should be strengthened.

3.4 Improve the construction of administrative control system and reduce the administrative intervention in liquidity risk.

At the same time, we should protect the interests of depositors. At the same time, direct intervention should be avoided and quantitative management indicators should be avoided. In case of liquidity risk management problems, commercial Banks should be mainly rescued by themselves, and regulatory authorities should have perfect disposal procedures. In the process of market economy development, administrative departments have a certain impact on the normal market operation mechanism, and administrative management means are easy to fail. Therefore, for the liquidity risk of Internet finance, self-adjustment and solution should be advocated to maintain the

normal operation of the market by operating in accordance with the rules and regulations of the financial market.

3.5 Highlight the market-oriented role of liquidity risk management.

Banks need to position themselves accurately, change their thinking of operation and management, make full use of their strengths while avoiding weaknesses, speed up the transformation, improve their internal governance structure, and improve the system related to liquidity risk. On the one hand, we should strengthen asset and liability management, optimize the structural adjustment of asset and liability, and shift to a diversified asset allocation mode. On the other hand, we should maintain dynamic balance, reduce liquidity risks and increase the proportion of core liabilities.

3.6 Accelerate the development of private financial institutions.

The financial institutions should encourage private capital investment and support the development of small loan companies, financing guarantee company, set up by the folk capital to launch at their own risk of private Banks, consumer finance companies and financial leasing companies, etc., will under private finance into the formal financial system, carries on the strict financial supervision, to set up the exit mechanism of private financial institutions, improve the operating efficiency of private financial institutions, to promote the development of the constantly normalized.

References

- [1] Jin, Song, Miao, et al. Algorithm Research of Moving Vehicle Detection and Vehicle Flow Statistical Based on Machine Vision [J]. International Proceedings of Computer Science & Information Tech, 2012.
- [2] Li Y , Wang T , Song X , et al. Optimal resource allocation for anti-terrorism in protecting overpass bridge based on AHP risk assessment model[J]. Ksce Journal of Civil Engineering, 2016, 20(1):309-322.
- [3] Cui G H, Li X S. Research on the Evaluation Model of Development Strength in Regional Logistics Based on the AHP and Factor Analysis in China[C]// International Conference on Information Management. 2011.
- [4] Guochao L , Guangjie L I , Lina Y . Risk assessments of debris flow based on improved analytic hierarchy process and efficacy coefficient method[J]. Global Geology, 2012, 15(3):231-236.
- [5] Yang L , Song M . Research of Corporate Credit for Anhui Province's Listed Companies Based on Computer Technology[M]// Advancing Computing, Communication, Control and Management. Springer Berlin Heidelberg, 2010.
- [6] Li D, Liu X, Duan L, et al. Forecasting Mathematical Model of Regional Debris Flow Based on AHP[J]. Journal of Tianjin University, 2017, 50(9):900-906.