Early Warning Analysis of Distributed Internet Financial Risks Based on Big Data

Peng Yin

Jinling Institute of Technology, Nanjing 211169, China

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Abstract: Against the background of national policies supporting Internet innovation, the rapid development of Internet finance requires the establishment of an Internet financial risk warning system for risk prevention. This article starts from big data, according to the characteristics of Internet financial data, follows the data-centric system design principle, divides the system level according to the data processing method, and builds an Internet financial risk early warning system based on big data analysis. By using big data management tools and analysis methods, potential financial risks in Internet finance can be discovered in advance, thereby providing risk management basis for Internet companies, which is conducive to ensuring the healthy and sustainable development of Internet finance companies.

1. Introduction

In recent years, the quiet rise of the new economic model of the Internet credit industry has brought convenience to people's lives, while also greatly impacting the business model of the traditional commercial banking industry. In order to comply with the trend of the times, traditional commercial banks have gradually started Internet credit business to meet the changes of the times. However, as we all know, China's current credit system is not perfect. Especially in the Internet credit industry, it is more difficult for traditional commercial banks to obtain and supervise the credit information of lenders [1]. Therefore, when developing Internet credit business, they will also face greater challenges. Risk challenge. At the time of the big data era, how to use big data to form effective risk early warning and prevention and control during the development of Internet credit business is a major issue that traditional commercial banks are facing and must address. Based on this, the article focuses on Internet finance and corporate financing costs and risks based on big data, and analyses the value and significance of big data technology in the internet financial market for corporate financing bottlenecks. Since the current financing of enterprises comes from debt-based debt financing, the corporate financing costs and risks mentioned in the article are also subject to discussion and analysis of debt financing in the form of loans.

2. Characteristics of Internet Finance

Internet finance is a combination of the Internet and the traditional financial industry. With the use of Internet information technologies, such as cloud computing, the Internet of Things, social networks, and third-party payment platforms, new changes have occurred in the way assets are allocated in the traditional financial sector. The emergence and development of Internet finance has not only greatly improved the efficiency of the allocation of financial resources and reduced the cost of financial transactions, but has also broken the restrictions of the traditional financial industry to a certain extent, allowing more people to have the opportunity to participate Into financial activities. The characteristics of Internet finance are mainly as follows: 1. Innovation. The development of Internet finance relies on modern Internet information technologies such as big data and cloud computing. It is very different from traditional financial models in terms of information processing methods and processing efficiency. Has opened a new stage in the development of the financial industry. With the support of the Internet, the financial industry has greatly improved both in the efficiency of transaction activities and the level of financial services. 2. Inclusiveness, the

Internet has shortened the distance between people, and the combination of the Internet and the financial industry has also lowered the entry threshold for financial activities, making financial activities gradually move from "elite" to "popular", and small businesses And the proportion of ordinary people participating in financing and investment activities has increased significantly. 3. De-intermediation. During the development of Internet finance, many Internet financial platforms have gradually emerged. With these platforms, suppliers and demanders of funds can directly trade without the need for traditional financial intermediaries and transaction media. The two are P2P and crowdfunding financing models. This transaction mode has opened a new resource allocation method for the financial industry, and promoted the development of Internet finance towards disintermediation [2].

3. Risk Analysis of Online Lending Platform

3.1. Information Asymmetry Risk

For the lending platform, if the basic information of the borrower is not enough, and the correctness of the existing information is not verified, it is easy to make unscientific decision-making judgments. At this time, the investor's money is lent to the borrower. If the person is overdue or defaults, the lending platform will face liability for compensation, and the incomplete information will increase the difficulty of recovering funds. For borrowers, many platforms rarely expose sensitive information such as bad debt ratios and overdue ratios, non-performing loan ratios, and even many reports of zero bad debts, but in the case of P2P's own operating costs of up to 20% It is extremely difficult to keep the bad debt ratio low, even lower than that of banks with strict risk control. Therefore, such reports contain a lot of untrue and misleading information, which is also very unfavourable for investors to analyse data and make investment decisions [3].

3.2. Legal and regulatory risks

As an emerging industry, Internet finance lending has not yet established a relatively comprehensive and comprehensive regulatory system for it, and it lacks accurate and effective regulations and penalties for specific borrowings and breaches. In addition, the entry threshold of the online lending industry is relatively low. Many companies with insufficient capabilities or even illegal operations have touched the edge of the law. The use of capital leverage to obtain funds exceeding the company's own management strength has greatly harmed the stability of the industry.

3.3. Platform Management Risk

As the major online lending platforms have not been established for a long time, the company lacks a more comprehensive and systematic credit rating system and risk monitoring system for the issuance and recovery of each loan. At present, there is no third-party authoritative system to fully and comprehensively determine the risk of online lending the index factor for risk control, so that the same limit on risk control. This makes different platforms' approaches to risk early-warning and management models quite different, leading to a series of problems such as confusion in the industry's risk control system and lack of effectiveness.

4. Data and Characteristics in Internet Finance

Like Internet e-commerce, Internet finance, as a form of financial informatization, cannot be separated from companies, customers, and related financial services or products that participate in Internet financial activities. Compared with traditional financial activities, Internet financial activities are easier to collect, organize, and store user information, user transaction data, service or product information, and even store users' use of the Internet platform, operation behaviour, and communication during the transaction process., Messages, and more. From the perspective of the composition of Internet financial data, it mainly includes: user data, transaction data, user operations and behaviour data, financial service or product supply, and text data (including: email, instant chat, and messages, etc.).
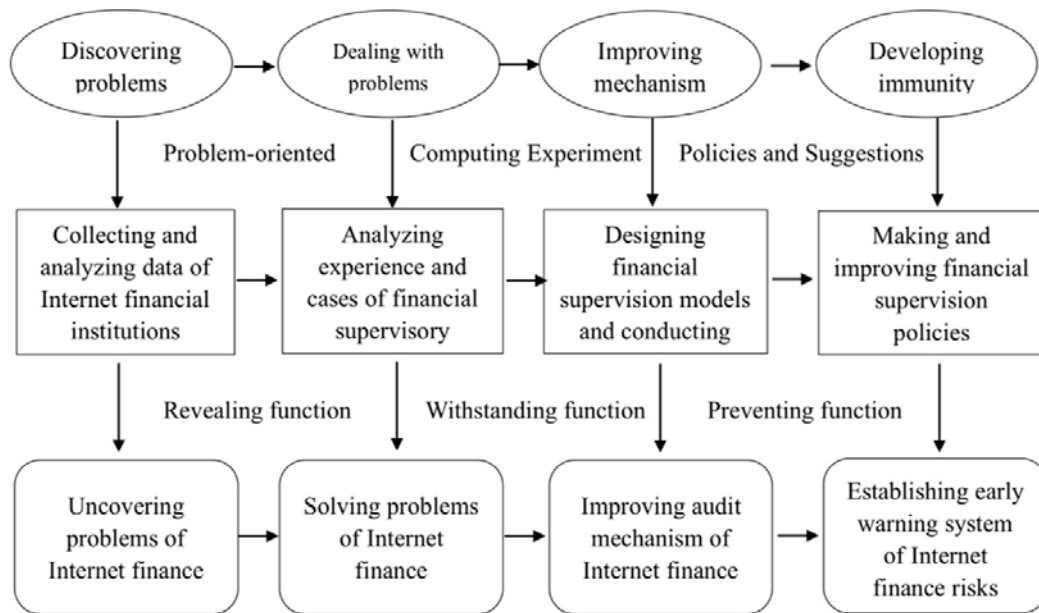
Figure 1. Internet financial data.

4.1. User data

The development of Internet financial services depends on the participation of users. In order to ensure the financial security of users in the transaction process and the smooth progress of daily financial activities, financial companies' management of user information is very strict. Under normal circumstances, the user's basic information will be collected and stored in the enterprise information system. As a service object of Internet finance, users are an indispensable component. The size of users directly reflects the size of the enterprise and indirectly reflects the development prospects of the enterprise.

4.2. Transaction data

Internet finance is the development of traditional finance towards electronic information. The main activity of Internet finance is inseparable from user transactions. Internet financial companies provide Internet platform media and related financial services for user transactions. In order to ensure transaction security, improve the service quality of the enterprise, and facilitate traceability and evidence collection, the system will record the user's transaction process through the Internet platform. The long-term accumulated transaction data can not only be used to analyse the user's trading preferences, but also to detect the user's abnormal transaction behaviour, providing a basis for preventing transaction risks.

4.3. User operation behaviour data

Internet financial platforms are not only media for Internet transactions, but also carry the role of transmitting information and promoting financial services. Unlike traditional finance, internet financial platforms cannot perceive the customer's feelings through face-to-face conversations, and discover abnormal behaviours of customers. Therefore, in order to improve the service quality of the Internet financial platform and understand the customer's operation behaviour habits, the customer's operation behaviour is usually recorded.

4.4. Other data

In addition, there are many external factors that will affect the normal operation of Internet finance, such as the state's macroeconomic operation, price levels, import and export, and industry development conditions, etc., will affect Internet finance. In order to ensure the normal operation of Internet financial enterprises, relevant and comprehensive data should be sorted out and collected.

5. Internet financial evaluation method based on information entropy

The information entropy model was established by Shannon Ennon in 1948 when he founded information theory. It is an indicator for measuring the uncertainty of information sources. The information entropy model is mainly applicable to the risks caused by imperfect data and subjective assumptions of the distribution, which meets the status quo and basically meets the requirements of internal management. A discrete source of information can be expressed as:

$$\begin{bmatrix} x_1 & x_2 & \cdots & x_n \\ p_1 & p_2 & \cdots & p_n \end{bmatrix} \tag{1}$$

That is, the probability that the random variable x takes value x_i is p_i, i=1，2，3….n, where $p\left(x=x_i/x=x_j\right)=0, i \neq j$

$$\sum_{i=1}^{n} p_i = 1 \tag{2}$$

Then define the entropy:

$$H(x) = H(p_1, p_2, p_3 \cdots p_n) = -k \sum_{i=1}^{n} (p_i * \log p_i) \tag{3}$$

K can be a certain constant, often taking 1. In the calculation of entropy, generally taking 2 or 10 as the logarithm, and its unit is bit. The quantity H in equation (3) is called information entropy, which describes the uncertainty of the information source. For continuous information sources, the distribution function of x is described by probability density p (x) [4].

$$H(x)=H(P(x))= -\int_R p(x) \ln p(x) dx = -E[\ln P(x)] \tag{4}$$

That is, the mathematical expectation of the logarithm of the distribution density p (x) is defined as entropy.

For the estimation of sample probability density of the maximum entropy method, a simple method of sample information can be used to calculate the moments of the sample. The following uses random variables to explain this method in detail:

$$H(x)= -\int_R p(x) \ln p(x) dx = \max \tag{5}$$

The constraints are:

$$\int_R p(x) dx = 1 \tag{6}$$

$$\int_R x^i p(x) dx = m_i, i = 1, 2, 3 \cdots m \tag{7}$$

In the formula, m is the stage of the moment used, and m_i is the i-th order origin moment. In the following, the entropy is maximized by adjusting p (x), and the LaGrange multiplier method is used to solve this problem. Let $\bar{H}$ be a LaGrange function, and the LaGrange multiplier λ_0, $\lambda_1 \cdots \cdots \lambda_m$,, ...

$$\bar{H} = H_{(X)} + (\lambda_0 + 1)\left[\int_R p(x)dx - 1\right] + \sum_{i=1}^{m} \lambda_i \left[\int_R x^i p(x)dx - m_i\right] \tag{8}$$

$$\frac{d\bar{H}}{dp(x)} = -\int_R \big[\ln p(x)+1\big]dx + (\lambda_0+1)\int_R dx + \sum_{i=1}^{m}\lambda_i\left(\int_R x^i dx\right)+0 \tag{9}$$

6. Internet financial risk control methods in the context of financial big data

6.1. Establish and Improve Internet Financial Risk Control System

Credit risk is one of the main types of risks in the Internet finance industry, and it poses a huge obstacle to the sustainable development of the Internet finance industry. Therefore, we must strengthen the regulation and control of this type of risk. First, build a sound internal risk control system and strengthen the assessment and management of user risks. Secondly, Internet financial companies should respond to the customer's loan situation, prior to the loan, arrange and review customer information, fully implement the pre-established risk control procedures, and pay sufficient attention to the safety of loan repayment funds on time to prevent problems due to customers' own credit, Cause damage to the good image of the company in the society, unable to protect the legitimate rights and interests of creditors. Finally, Internet financial companies must rely on various legal channels to comprehensively collect real customer information, appropriately raise the threshold for loans, combine the actual needs of loan customers with their own conditions, and set reasonable loan quotas in order to control Internet financial risks. In a reasonable range that the company can afford [5].

6.2. Big data affects investment risks of corporate investors (creditors)
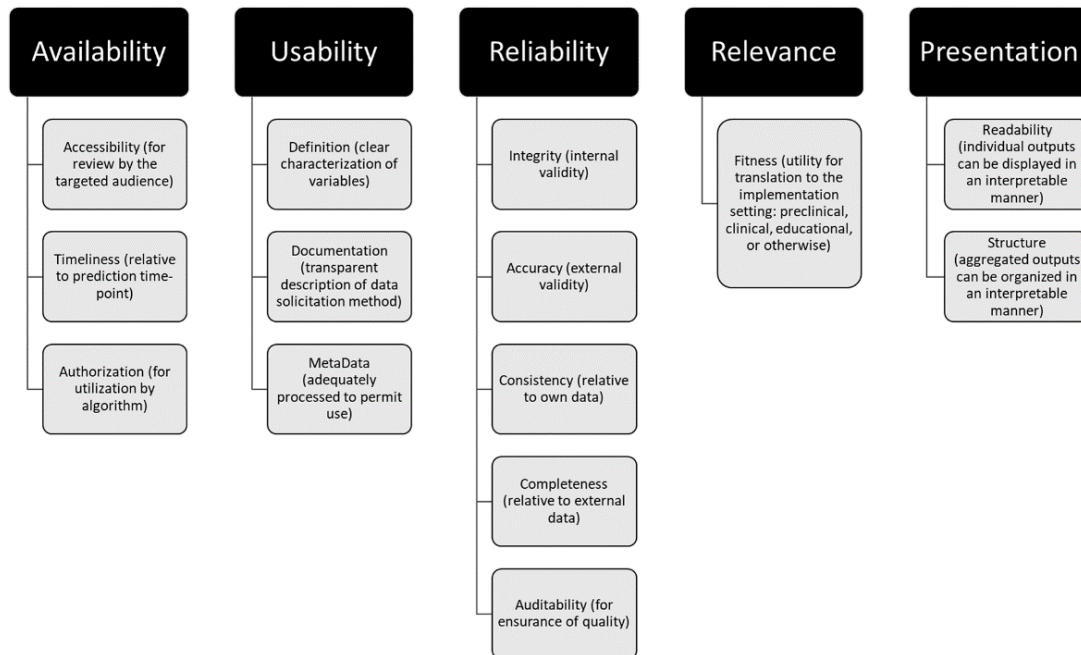

Figure 2. Credit rating under big data technology.

The level of corporate debt financing risk is subject to its creditors' "repayment of principal and interest on time" interest requirements. In order to effectively protect their own interests, creditors must clearly understand and master the basic operation and financial status of the enterprise before and during the loan period. However, as an external affiliate of a company, creditors' access to information, authenticity, and accuracy are all restricted to a large extent, and the uncertainty of investing in the company becomes higher. Therefore, higher loan interest rates, various These mortgage clauses and restrictions followed, which ultimately directly increased the financing cost of the enterprise and increased the financing risk. Therefore, credit issues, the measurement of creditors' interests and risks, are the necessary considerations for corporate financing. Because of its enough information volume and advanced information technology conditions, big data can enable creditors to achieve high accuracy and efficiency of corporate credit ratings, and clear credit

barriers to corporate financing (Figure 2) [6]. Creditors have fully cooperated with relevant network platforms to collect data on the transaction records, payment records and other credit records of enterprises on Internet e-commerce, taxation, search engines, cloud computing and other platforms to a great extent. After advanced information technology data mining, Calculate and analyse, complete credit ratings with high authenticity and accuracy, greatly reduce creditors' information acquisition and identification costs in terms of manpower, time, etc. For companies with good development potential, it directly verifies their credit risk and default to the extent that it avoids corporate moral hazard and adverse selection, it certainly improves the availability of its financial resources.

6.3. Close monitoring of Internet financial payment trends

Regulators need to give full play to their own roles, pay more attention to Internet financial payment innovations and risk situations, strengthen analysis of big data on Internet financial payment platforms, and take the latest situation to formulate targeted regulatory measures. This requires regulators to continuously improve their ability to analyse data on Internet financial company payment platforms, especially to build a large database of their payment data, so that they can understand the latest data and formulate scientific and effective policies. To improve water aversion to risk.

7. Summary

The development of Internet finance has played a key role in China's economic development. In the actual development process, Internet finance needs to prevent and control development risks. Through the construction of a risk early warning system, through the improvement of relevant laws and the construction of a credit information system, Internet financial risks can be effectively prevented and controlled to ensure the healthy development of the financial industry.

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