Research on the Application of Big Data in Financial Investment Risk Management and Control

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Abstract. This paper explores how big data technology can be used for investment risk control in the financial industry. Through theoretical analysis, this paper expounds the application form and application effect of big data in financial investment risk control. Through the application analysis of risk control in banking and insurance industries in the financial field, this paper expounds the advantages of big data risk control, and expounds the data analysis process of big data risk control for reference.

Keywords: Financial investment · risk management and control · big data analysis

1 Introduction

Based on big data mining and analysis, this paper expounds the role of big data in financial investment risk from three perspectives: corporate governance, supply chain finance, and investors. From the perspective of enterprise risk management and control, the paper analyzes the application of big data in investment decision-making and auditing; from the perspective of bank risk management and control, the paper analyzes the application of big data in risk management and control, supply chain, etc.; from the perspective of insurance business, the paper explains the application of big data in the insurance industry as well as the application of risk management and control. Based on big data, the full text expounds the management of investment risk control in three aspects of the financial industry.

2 Overview of Big Data Mining and Analysis

Finance is the core of economy, and the core issue of financial research is financial risk management. The rapid development of modern science and technology in the financial field promotes the comprehensive data sources in financial activities, and makes the information of both parties more symmetrical. Trading based on artificial intelligence and big data is conducive to the construction of financial market robustness, improving the efficiency of price discovery in financial market and promoting the liquidity of financial

market. Based on the possession of big data, regulators can use scientific decision-making methods to analyze and warn the systemic risks of financial transactions and prevent the occurrence of events such as " black swan" and "grey rhino" [1].

2.1 Big Data Improves the Coverage of Financial Risk Management

Big data has the characteristics of "3V", namely volume, velocity and type (Variety). For the financial industry, big data also has the fourth V characteristic, namely Value. The financial industry is one of the industries most closely integrated with big data [2]. The era of big data in China financial industry is approaching. The data level of many domestic financial institutions has reached more than 100TB. In the financial field, big data includes unstructured data such as text, graphics, images, audio, and video, as well as personal information data. Structured data such as enterprise customer information data and transaction information data. The financial industry can complete customer portraits based on these data, classify customers, and then effectively carry out precision marketing, complete personalized recommendations, customer life cycle management, and so on. In the era when data is king, big data has become the core asset of finance. Traditional financial risk management relies on experience or low-frequency data, and the analysis results do not have real-time accuracy [3]. With big data technology, a full range of data information can be obtained, and modern mathematical analysis such as Bayes, logistic regression, SVM, deep neural network, etc. Methods and information analysis technology, comprehensively build a framework for financial risk analysis, and provide scientific decision-making for preventing systemic financial risks.

Big data technology has promoted the development of all aspects of our lives. The country provides great convenience for market development, promotes the renewal of traditional operation and management models, and increases corporate profits.At the same time, the development and use of big data technology has brought many new experiences to consumers. For example, big data technology has promoted the improvement of product quality and better service to consumers. On the contrary, using big data technology to analyze data can enable the company to better understand the market situation and predict market changes, so that the company can better respond to market changes and ensure the company's development.

2.2 The Importance of Big Data Technology in Financial Investment

Today's economic environment is unpredictable, and economic integration has exposed SMEs to macroeconomic instability, making the problems faced by financial investors increasingly complex. According to relevant research data, the Internet, telecommunications and financial industries are the industries that use big data technology most widely [4]. Specifically, the use of big data technology in the financial industry to predict and analyze financial investment risks and help companies develop scientific response methods can improve their ability to respond to risks from the source.

From the perspective of corporate governance, many companies lack experience in investment risk management and control, and cannot respond to financial investment risks in a timely manner. Especially for small and micro enterprises, there is no comprehensive accounting and auditing system, and the company's management may make

investment decisions without considering the company's financial status or even under irrational circumstances. In this case, the establishment of a sound accounting and auditing system, especially the application of big data, can conduct unified management of data, integrate the large amount of resources required, and provide the necessary prerequisites for the better development of financial audit work. Using big data technology to collect, filter, use, and accumulate data required for financial audits, and find out audit trails after comprehensive analysis of various data can greatly shorten the time for manual data processing, which is largely avoided Reduce the low-level human error, thereby reducing the impact of human factors on the audit work, and spend the time saved in other important links such as on-site evidence collection of financial audits, and improve the efficiency of financial auditing; the use of big data technology can make full use of Multiple types of data, comparing data from multiple dimensions, discovering and checking possible doubts, effectively avoiding failure to discover problems in time, and better playing the role of financial audit in preventing and deflating financial risks.

From the perspective of supply chain finance, many companies now rely on each other in their operations. In order to use funds efficiently, the leverage ratio in the financial statements is too high and the turnover of accounts receivable and payable is too slow, causing huge financial risks. Big data technology can promote information sharing, reduce risks between each other and help each participant increase economic benefits. There are still many companies facing a lot of information brought about by modern business model reforms. By applying big data technology to analyze the collected data information, companies can more accurately predict the risks they may face, thereby achieving high-quality management.

From the perspective of investors, the Internet and big data have had an impact on the financial industry from the macro and micro levels. In particular, they have had a certain impact on financial risk management. Focusing on data sources and data mining has become the use of real-time big data to improve risks. The key to management. The essence of big data is a lot of noise. Applying the method of probability statistics to financial investment is to find the weak signal from the massive data, that is, to find the real signal from the large amount of noise. Using this method, big data analysis and machine deep learning can be used to explore many causal laws in the market transaction process, which can help investors choose a portfolio of investment strategies and risk control tools that are more suitable for them.

Therefore, it is necessary to apply big data technology to financial investment.

3 Big Data Application in Financial Investment Risk Management and Control

3.1 Comprehensive Management and Control System for Big Data Risks

The comprehensive risk management reference system of big data mainly includes five aspects. The first is the management of market law risk. The management of market risk covers 14 small contents. The second is liquidity risk control, which covers 6 small contents. Content, then operational risk management, which includes 6 small contents, and then credit risk management, which includes 6 small contents. After the group, there
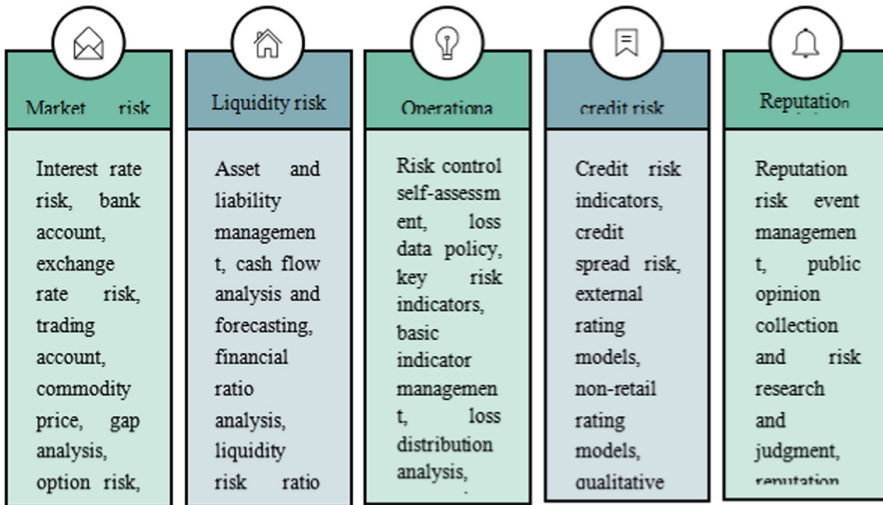
Market risk	Liquidity risk	Operationa	credit risk	Reputation
Interest rate risk, bank account, exchange rate risk, trading account, commodity price, gap analysis, option risk,	Asset and liability managemen t, cash flow analysis and forecasting, financial ratio analysis, liquidity risk ratio	Risk control self-assessm ent, loss data policy, key risk indicators, basic indicator managemen t, loss distribution analysis,	Credit risk indicators, credit spread risk, external rating models, non-retail rating models, qualitative	Reputation risk event managemen t, public opinion collection and risk research and judgment, renutation

Fig. 1. Comprehensive risk management application system (Source: Author's own figure).
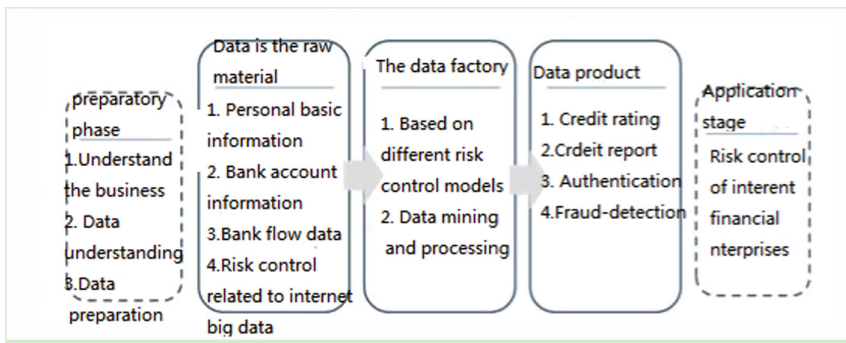
Fig. 2. Big data analysis and processing process (Source: Author's own figure).

is residual risk management, which includes 6 small contents. The specific content is shown in Fig. 1.

In the process of big data risk control, the data analysis and mining process in the financial industry, preparation stage → data raw material → data factory → data product → application stage, as the whole process of big data analysis and processing, see Fig. 2 for details Show.

3.2   Risk Management and Control of Big Data in Enterprises

3.2.1   Investment Decision

Corporate development requires corporate leaders to make investment decisions from a macro perspective, use big data, focus on changes in the market competition environment, analyze, sort and collect market data, summarize the laws of market development and
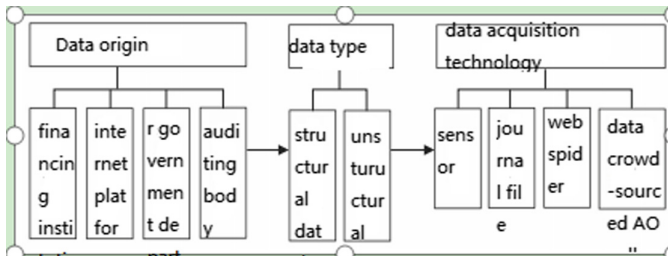
Fig. 3. Financial audit data collection process (Source: Author's own figure).

change, and enhance their own anti-risk capabilities. So as to better avoid potential market risks in the market and reduce the error rate of investment decision-making.

3.2.2 Audit

The core of the audit work is to discover the risk points from the complicated structure and unstructured data and then find out the major mistakes. With the rapid development of artificial intelligence (AI), big data and other technologies, this process is undergoing a profound change, and it is showing characteristics different from any previous audit reforms [5]. The core organization of big data audit is the data processing center, which collects, organizes, and analyzes data 24 h a day, and feeds back the results, as shown in Fig. 3.

3.3 Risk Management and Control of Big Data in Banks

a) Application of Big Data in Banks
   The application of big data in banks can be roughly divided into four parts. If it is represented by four quadrants, as shown in Fig. 4, the first part is the portrait of the customer, which includes the portrait of the individual customer and the portrait of the corporate customer; Most of them are precision marketing, which includes cross-marketing, personalized recommendations, and customer lifecycle management; the third most is risk control, loan risk assessment for small and medium-sized enterprises, real-time fraudulent transaction analysis, and analysis of anti-money laundering services; The fourth major part is cloud supply optimization, which includes market and channel analysis, product optimization analysis, and real-time public opinion analysis.

b) Risk control
   I mentioned the system content of comprehensive risk management and control in the previous article. For risk management and control in banks, the key content includes the management and control of loan risks and fraudulent transactions, as well as the loss of customers.

   • Risk assessment of SME loans. According to the relevant information about the company's production, distribution, sales, finance, etc., banks can analyze loan risks through big data mining technology, quantify the company's credit limit, and execute SME loans more effectively.

Fig. 4. Bank big data application (Source: Author's own figure).

- Customer loss. For example, if a credit card customer swipes 8 times a month, the average amount of one swipe is 800 yuan, the average number of customer service calls is 4 times a year, and there is no complaint. The result of the analysis is that the customer is very satisfied and the risk of customer churn is also very low. However, if you check the customer's weibo, you will find that the payroll and credit card are not in the same bank, repayment is inconvenient, and the customer service phone number is not linked multiple times. Weibo has a higher risk of overturning several times.

- Real-time fraudulent transaction identification and anti-money laundering analysis. Banks can combine basic cardholder information, basic card information, transaction history, customer past behavior patterns, ongoing behavior patterns (such as transfers) with smart rules engines (such as transfers or transfers in less frequent countries/regions) Combine. For only users) online transactions in unfamiliar locations) real-time transaction fraud prevention analysis. For example, IBM financial crime management solutions can help banks use big data to effectively prevent and manage financial crimes, while JPMorgan Chase Bank uses big data technology to steal customer accounts or use automated teller machine (ATM) systems to track criminals who intrude.

c) Interaction between banks and multi-enterprise-supply chain finance

Through the introduction of advanced experience in foreign supply chain finance, combined with the actual situation of the Chinese market, we will actively transform and innovate.

First of all, a mature product system has been formed. According to the different transaction links of corporate financing, three major product systems have been formed: receivable, payment, and collateral. In addition, the flexible combination of banking products has also formed various supply chain solutions.

Second, a number of key industries have been developed. The automobile industry is the earliest and most mature industry developed in supply chain finance.

Through in-depth analysis of the operating characteristics of related industries, practical solutions were designed, and the major core enterprises were used as the starting point to expand in batches, which further strengthened the cooperation between the bank and various industries.

Third, a supporting credit system has been established. Many banks have summarized the unique credit characteristics of supply chain finance based on previous practices, and have separately introduced related credit systems that cooperate with supply chain finance in addition to general customer credit policies. The establishment of this credit system provides active support for the further development of supply chain finance.

Finally, a three-dimensional customer channel was established. In addition to the traditional model of offline acceptance business, commercial banks have built up the function of supply chain finance in the online banking channel to support online processing and inquiries in some business links of customers. Some commercial banks have developed a comprehensive supply chain financial service platform on their own or in cooperation with third-party institutions, integrating the business links of customers involved in supply chain finance, the business links of third-party cooperative institutions, and the banks back-office processing procedures, realizing the line of the entire business chain Automated processing [6].

3.4   Risk Management and Control of Big Data in Insurance Business

a) Big Data Application in the Insurance Industry
Due to the characteristics of the insurance industry, the characteristics of the traditional insurance industry mainly require the quality of the agent insurer and the relationship between the agents. This is also the most critical factor in the development of the insurance industry. However, the emergence of big data has promoted the development of the insurance industry., The application characteristics of big data can be divided into three aspects. The first is refined marketing, which includes customer segmentation, potential customer mining, customer churn prediction, customer relationship precision marketing, etc.; second is fraud analysis, It can also be called risk management and control. In the previous article, it is learned that comprehensive risk management and control covers a wider range. In this content, insurance fraud and abuse analysis, auto insurance fraud analysis, etc. are included; finally, refined operation. This includes product optimization, operation analysis, and agent selection (Fig. 5). According to market analysis, there are still related customers. For example, in Taobao, refund customers purchase freight insurance. According to Taobao big data statistical analysis, more than 50% of Taobao customers have made freight insurance claims. Taobao freight insurance brings only about 5% of profits to insurance companies, and many insurance companies are still willing to provide this kind of service to Taobao, which shows that although this kind of service brings low profit margins to insurance companies, but it is also profitable. Therefore, many insurance companies are willing to provide this service [7]. For the insurance industry, the application of big data can not only create progress for the industry, but also bring profit to the industry.
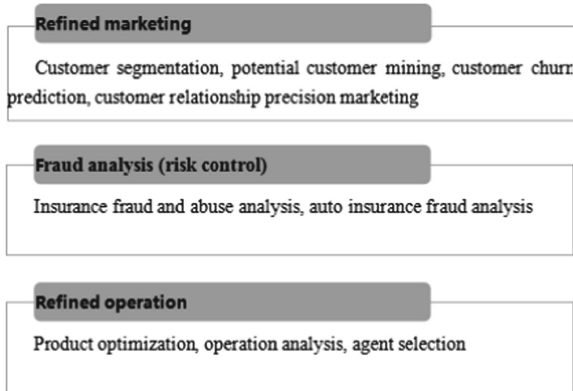
Fig. 5. Big data applications in the insurance industry (Source: Author's own figure).

b) Risk control

According to internal and external transaction rules, historical data can conduct real-time or semi-real-time prediction and analysis of fraud and other illegal activities, such as medical insurance fraud and abuse analysis, auto insurance fraud analysis, etc.

- Fraud and abuse of medical insurance. Medical insurance fraud and abuse can usually be divided into illegal fraud to obtain insurance money, that is, insurance fraud. The other is repeated processing, over-declaration of claims within the insurance coverage, etc., that is, medical insurance abuse. Insurance companies use historical data to find the most important factors affecting insurance fraud and the value range of these factors, build predictive models, and use automatic scoring functions to quickly classify claims based on the likelihood of fraud.
- Car insurance fraud. Insurance companies can use past fraud events to build predictive models and handle billing applications at different levels, which can lead to car insurance fraud problems, such as fraud detection in car insurance claims applications and fraud in salespeople and auto repair shops Detection [8].

4   Conclusion

In short, the application of big data is more extensive, based on the crawler technology in big data, it is applied to the financial industry, which can effectively lower the risk, reduce the loss risk of customers, analyze and control the credit risk of customers, reduce the fraud of insurance business reimbursement, so as to improve the business ability of the financial industry, reduce the loss of the financial industry, and promote the development of market economy.

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