Exploration and Innovation of Commercial Bank Risk Management from the Perspective of Big Data

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Abstract: Under the impact of the informatization wave, the rapid development of the Internet has had a huge impact on the entire society and has also brought profound changes to the financial market. With the current transformation of economic growth and the acceleration of the structural adjustment process, China has entered a new normal of new and old kinetic energy conversion. In the increasingly severe new situation, the original risk management technology can no longer achieve the expected results. It can be seen that the application of big data technology is necessary and innovative, which can bring better development for commercial banks. From the perspective of big data, this article explores and optimizes the risk management of traditional commercial banks by optimizing and innovating the feasibility of the application of big data technology, and puts forward relevant suggestions.

Keywords: Big data; Commercial bank; Risk management; Innovation

1. Introduction

In the context of the new era, China's commercial banks will encounter various risks such as credit risk, business risk and marketing risk, and the number of risks will greatly increase. At the same time, due to the continuous deepening of the vertical development of customer groups, the advanced development and sharing of informatized big data technology and the reduction of required costs will accelerate the process of changing and innovating the original financial structure. There is no doubt that the development of information technology such as big data and cloud computing will bring more risks and challenges to China's commercial banking industry while bringing opportunities. Commercial banks have data collection capabilities and risk analysis capabilities in risk management, which not only determines the risk management setup mode but also greatly enhances their risk management capabilities. It can be seen that the optimization of commercial bank risk management from the perspective of big data is an inevitable trend for the development of commercial banks in China.

2. Literature review

[4]established a capital and risk correlation model under capital adequacy, and confirmed that the important role of capital adequacy supervision for bank management can effectively reduce the risk of bankruptcy. [5] analyzed the impact of the four regulatory tools on the capital adequacy ratio, leverage ratio, liquidity, and loan provision ratio of the Chinese banking industry in the context of the implementation of Basel III, and derived its Relevant conclusions with positive impact at the level of bank supervision. [6] researched the relationship between different regulatory intensities and bank risk-taking at different levels, and argued that higher-intensity risk supervision has stronger risk suppression effects. [7] believe that large-scale banks equipped with more advanced network systems have higher risk management levels. Under this situation, with the development of Internet technology, the financial business coverage in the financial market has been continuously promoted, and the differences have become more apparent. [2] believes that the current environment is facing more severe risk challenges, and it is no longer possible to rely on the monitoring and management of financial institutions. Keeping pace with the times, the application of big data is imminent. [1] believes that the current development of big data technology and Internet finance has become the main driving force for the formation of a global financial ecosystem. With the emerging pressure of competition in China, China undoubtedly needs to add big data financial strategies to the plan and accelerate its progress.[3] believe that under the influence of the international crisis, follow the general secretary JinpingXi's report at the 19th National Congress of the Communist Party of China to propose "sound financial supervision system and keep the bottom line of systemic financial risks" socialism with Chinese characteristics in the new era Fundamental requirements of ideology in the financial field, in addition to proactively implementing a systematic financial risk and risk control system, the improvement of me-

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chanisms, and the use of scientific and technological means are also very important. [8] believes that the traditional financial supervision model can no longer meet the requirements. The advent of the information age, especially the application of big data, will reshape the financial management system and propose new application ideas.

At present, the application of big data has become an inevitable trend. In the information age, the application of big data in the banking industry and various corporate risks has become a hot spot in the financial market. Better use of big data can not only effectively improve banks The efficiency of industry management will bring more sustainable development to the banking industry, and it will also bring positive impacts on market forecasting and other aspects, injecting new vitality into the entire market. Therefore, this article is of great significance to the innovation exploration of commercial bank risk management under the impact of big data technology.

3. Background of the Era of Big Data

Big Data is a term for the IT industry. The research organization Gartner gave the definition that Big Data is a stronger decision-making, insight and process optimization ability under the new processing model to adapt to mass, high growth rate and diversity. Information assets. [20] The main characteristics of big data are volume (Volume), various types (Variety), fast acquisition and processing (Velocity) and authenticity (Veracity). [11] The above five characteristics are also called the 5V characteristics of big data. Generally speaking, the scale of big data is so huge that we cannot rely on traditional related management software to acquire, store, integrate, and analyze data in a short period of time. Let us discuss from three perspectives:

3.1. Type perspective

From this perspective, big data can be divided into structured, semi-structured, and unstructured data. At present, big data is mainly composed of unstructured data, such as audio, video, and images.

3.2. Technical perspective

From this perspective, the core content of big data is to efficiently process information and extract valuable parts from it. This function is mainly completed through distribution, data cleaning, cloud computing technology, and intelligent algorithms. [9] Big data is closely related to cloud computing and other related calculations. It can perform data mining based on massive data.

3.3. Application Perspective

From this point of view, the ultimate goal that needs to be achieved by applying big data technology is to achieve effective analysis of huge amounts of data, and

to provide constructive guidance and decision-making for management based on the analysis. [10] The analysis process mainly requires the use of high-tech methods such as data mining technology and intelligent analysis technology, and has high application requirements for these technical methods. At present, the Los Angeles Police Department and the University of California use big data to predict crime; MIT uses mobile phone positioning data and traffic data to establish urban planning; Macy's SAS-based system has over 73 million Cargo prices are adjusted in real time; in addition, Google Flu Trends uses search keywords with a large data base to predict the spread of bird flu.

4. The Status of Commercial Banks

4.1. Challenges

According to relevant data from the China Banking Regulatory Commission, the non-performing loan ratio of commercial banks has increased significantly in recent years, and huge challenges have been encountered in risk management, and asset pressure has continued to rise. Since 2016, the non-performing loan balance of commercial banks has reached 787.5 billion yuan, and the non-performing loan ratio has reached 1.24%. By the end of 2018, the non-loan balance of commercial banks in China had exceeded 2 trillion yuan, and the level of non-performing loan ratio reached 1.89%. As shown in Figure 1.

On the other hand, from the perspective of different scales, commercial banks with larger scales generally face more severe risk management. The balance of non-performing loans of large commercial banks is generally higher than that of banks of other sizes, as shown in Figure 2. It can be seen that more and more large commercial banks are facing greater challenges under the new background and need to process more data. The optimization of risk management is imminent, and the emergence of big data undoubtedly brings hope.

4.2. Difficulties and shortcomings under the current regulatory system

In the context of financial business crossover and high risk correlation, the influence of business is bound to be greater, and it is necessary for commercial banks to combine risk prevention and control at the macro and micro levels. However, in China's macro-prudential supervision, the focus is on preventing risks from a single industry and a single institution, and there is a lack of regulatory design, coordination and coordination of cross-border financial services. On the other hand, there is also a single and lagging regulatory approach. [12] Due to the temporary, ex post facto, and regional characteristics of supervision, commercial banks cannot effectively predict and control the chain transmission of risks. [13] The lack

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of supervision can be summarized into the following five points: first, the lack of consistency in regulatory regulations; second, the lack of uniformity of the regulatory system; third, insufficient effectiveness of regulatory coordination; fourth, insufficient standardization of information disclosure; fifth, risk isolation With insufficient warning. Since the emergence of commercial banks, their returns and risks have followed them, and they have developed with commercial banks. The ultimate goal of commercial banks is high returns, but high risks are also inevitable while pursuing high returns. [14] The exis-

tence of high risks undoubtedly poses a threat to the profitability and even survival of commercial banks. It is worth mentioning that, unlike ordinary enterprises, commercial banks issue loans through the deposits they absorb. Deposits are their main working capital, and the proportion of funds held by them is relatively low. [15] This feature directly leads to its own risks, and it is also a risk representative for institutions in the financial market. The evaluation of bank operating risks can be carried out from the following three levels: risk level, risk migration and risk compensation.
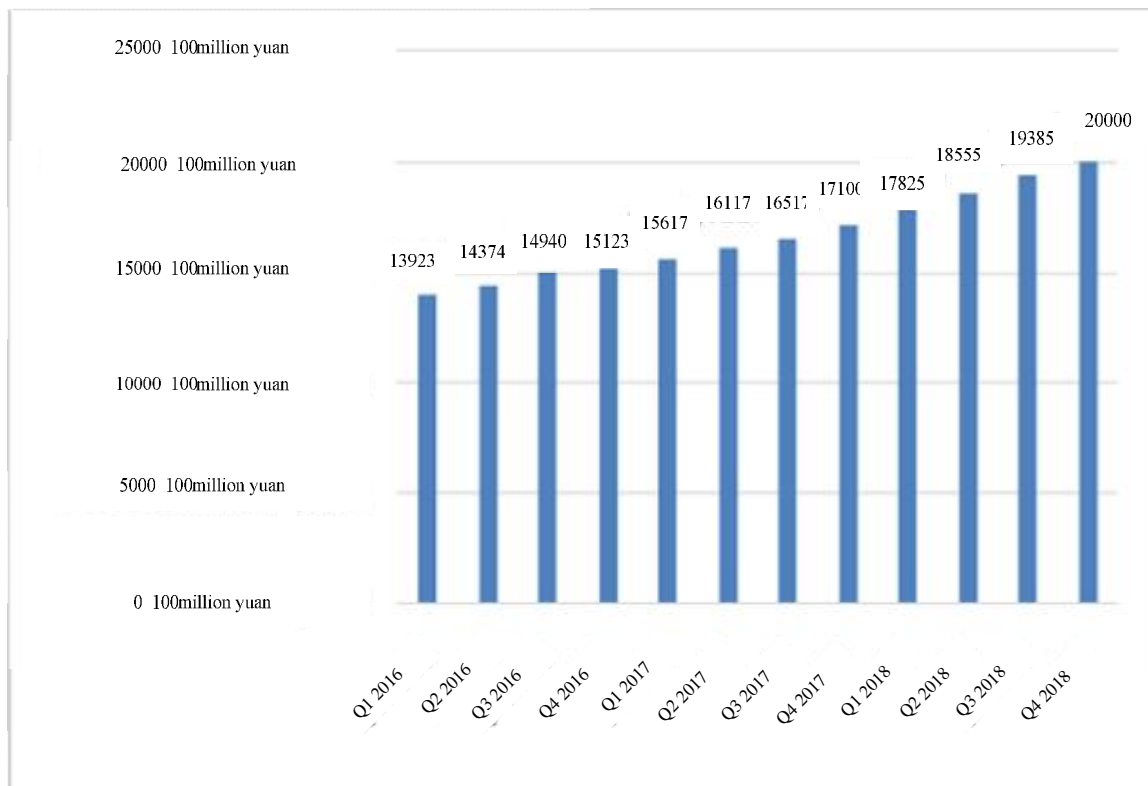

Figure 1. Non-performing loan balances of commercial banks from 2016 to 2018.

In order to be able to more accurately analyze the risk management of commercial banks, looking at relevant institutions at home and abroad, they have mentioned the important connotation of internal control. Internal control is the foundation of commercial bank risk management. According to the relevant concepts of the Committee of Sponsoring Organization of the Tread way Commission (COSO), the Basel Committee, and the original CBRC, the United States Anti-Fake Financial Reporting Committee, internal control has high requirements for the operating environment and requires careful attention. Full control and analysis. Under the new normal economy, the operating performance and risk management of commercial banks have improved from their original levels. In 2012, an economic downturn occurred, and the bad assets of commercial banks broke out, gradually exposing many

shortcomings in commercial banks' risk management. . In the management of loans, there is a widespread phenomenon of credit investigations by commercial banks that are inadequate and in-depth; the survey methods and methods are relatively simple in the industry's inaccurate judgments and non-objective, which further causes the industry's production capacity to lag, and access to customer ratings Waiting for a series of questions. In order to make the customer's conditions reach the level of access, unrealistic overestimation of the credit rating results, making some production operations do not meet the standards, financial conditions are not good, and customers with excessive financing have the opportunity to enter. [16]There are situations in which the system cannot be accurate and prudently calculated due to inadequacy of capabilities and technologies, resulting in re-

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sults that deviate from the actual needs of customers. In the process of loan management, the issue of loan inconsistency with the customer's planned payment time often occurs. Analyzing the reasons behind the phenomenon, it can be roughly known that the approvals of commercial banks, pledges, and guarantor's solvency are all insufficient Where can be improved. [17] In post-loan management, due to the lack of advanced supervision technology, it is impossible to accurately monitor and control the flow of funds, and the frequency of loan fund misappropriation incidents has increased significantly. In addition, commercial banks do not have adequate supervision over the core information related to the settlement of customer accounts and cannot effectively control funds. [18] Commercial banks have not been able to make effective and timely predictions and warnings in terms of customer risk monitoring, laying a hidden danger for the authenticity of assets reflected by customers.
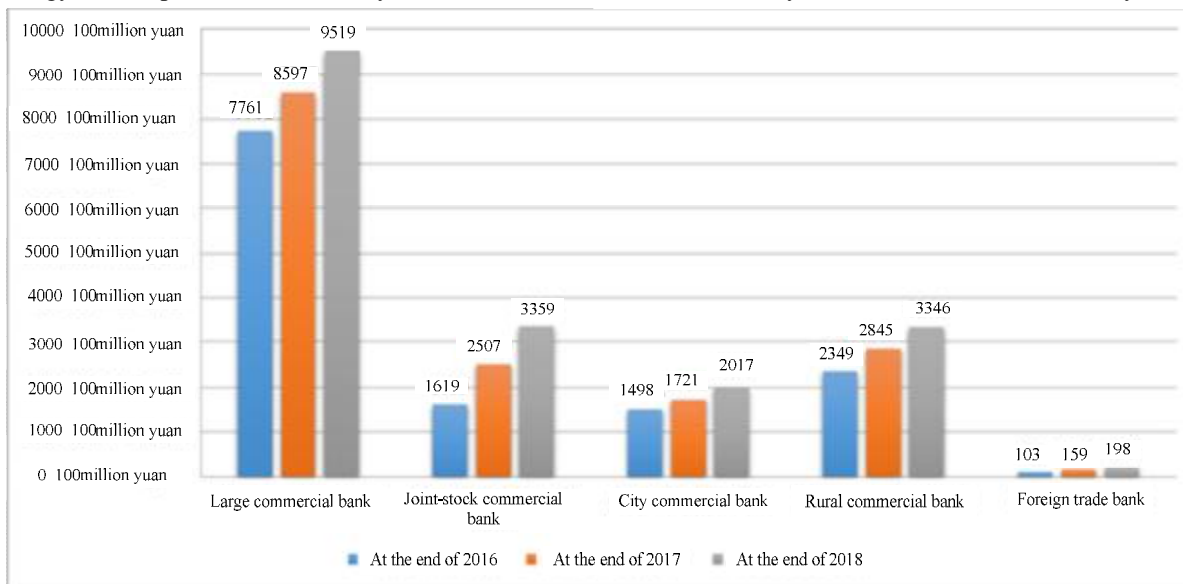

Figure 2. Non-performing loan balances of different types of banks from 2016 to 2018.

After the above analysis, it can be known that there are many problems in the risk management of commercial banks to be resolved. Subjective inaction is necessarily one of the reasons. On the other hand, methods and concepts need to be considered. Among them, technical means should be more conspicuous at present. The immaturity of commercial banks in technology has become a further improvement of risk management. Maximum limit.

5. Feasibility Analysis of big Data

5.1. Applicability of big data in commercial bank risk management

The customer data stored by commercial banks in the continuous development has become very large. In traditional risk management, subject to traditional information technology, only a small amount of structured data is effectively used, and the rest of the data is abandoned, and a large amount of data cannot realize its value. [21] The emergence of big data technology will undoubtedly bring good news to commercial banks, and has great significance in the development of risk management technology. Different characteristics of traditional risk management and risk management using big data technologies are shown in Table 1.

Table 1. Comparison of characteristics of risk management.

	Traditional technology	Big data technology
Data collection	Collected through branches or directly from individual customers	Receivedata in real-time and dynamic, realizing full supervision and control
Risk Identification	Data collation using traditional tools is often insufficient to effectively identify early warning risks	Relying on quantitative technical means to test the integration and refined analysis of data
Data management	Due to insufficient electronicization of traditional methods, management is chaotic	Usingbig data technology, management can be systematized, refined, and the use and distribution of redundant configurations can be intelligentized. Electronicization has greatly improved the quality of management
service system	The service process standard in the traditional way	Relying on big data technology, the precision of the service system

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lacks uniformity and professionalism	is improved, the degree is highly unified, the specialization is strong, and the rapid connection is achieved

By establishing a risk data collection platform, the application of big data analysis technology can not only effectively integrate the data of commercial banks, but also make effective predictions and judgments in data analysis, so as to analyze the probability of risk occurrence and take targeted measures accordingly. Precaution. In addition, big data analysis technology can also provide security for loans. [19] For example, a commercial bank can form a data sharing platform, realize the integration of data in various parts, and mobilize the enthusiasm of members to manage the premise. On the one hand, the risk management function should be clearly defined, and at the same time, the invisible barriers between systems should be broken, so that departments can Realize unimpeded communication and integrate customer information to build a huge real-time database for risk management based on this, so as to predict and manage risks, and realize the connection of different business chains, post chains, and product chains, and conduct in-depth inspection of hidden risks Guarantee

It can effectively grasp the real-time dynamics of customers. The use of cloud computing has improved the performance of the data platform, more effectively identified the relevant information data of commercial banks, and ensured that the business data of commercial banks were secure to the maximum extent.

5.2. SWOT analysis of risk management of commercial banks from the perspective of big data

In the face of the impact of the informatization wave, the report of the 19th National Congress of the Communist Party of China proposes to further promote the deep integration of the Internet, big data, artificial intelligence and the real economy, strengthen applied basic research, and build a digital China and a smart society. On March 16, 2018, the CBRC issued the "Guidelines for Data Governance of Banking Financial Institutions (Draft for Solicitation of Comments)" to strengthen the data governance mechanism. In the context of big data, we are experiencing a digital information revolution. In the face of the new situation, commercial banks are undoubtedly one of the subjects that have been greatly affected. Big data technology has affected all aspects of commercial banks. In the following, the SWOT model is used to analyze and analyze the advantages (Strengths), Weaknesses, Opportunities, and Threats of commercial banks using big data technology.

5.2.1. S-Advantage analysis

First of all, due to its nature, banks have a huge business volume at all times, and these data can be used as strategic resources. Secondly, the bank absorbs a large number

of new blood every year, has a large number of high-quality human resources, and has outstanding talent advantages. Fundamentally, big data technology is still manipulated and used by people. Banking employees are basically bachelor degree or above, have the ability to use big data technology, and can make the most of the advantages of big data technology. Finally, commercial banks have sufficient capital. Overall, the risks are within the controllable range. On the basis of this, they meet the basic conditions for the use of big data technologies. Commercial banks play a central role in the financial system, and future development prospects are promising.

5.2.2. W-disadvantage analysis

First, the system is not innovative enough. Traditional commercial banks' data collection is mainly provided by institutions and customers. Relying on manual collection can easily lead to problems of dispersion, duplication, and lack of accuracy, reducing the accuracy of the collected data.

Secondly, the level of intelligence is not enough. Due to the related limitations of talents and technical factors, commercial banks are lacking in data processing capabilities such as integrating data and deep mining data, which has a negative impact on data identification and identification. Finally, the quality of talents is still lacking, and the talent team's ability has not yet fully met the requirements of high-level big data technology. The problem of aging employees of commercial banks cannot be ignored and lack of comprehensive talents. In the information age, commercial banks are facing severe challenges.

5.2.3. O-opportunity analysis

First, reduce the degree of information asymmetry. Because some members in economic activities have information that other members do not have, the resulting information asymmetry puts the party with more information in an advantageous position, while the party lacking information is in a disadvantaged position. Symmetry has always been a problem that people continue to pay attention to and solve. The emergence of big data technology has undoubtedly brought about a wonderful turn for the better. Multi-party capabilities such as data sharing and real-time collection and monitoring have largely diminished the asymmetry of information and made members equal. Secondly, the risk identification ability of commercial banks can be improved, and the use of a larger and more accurate database and the use of distributed and cloud computing can better identify risks. Finally, big data broadens and opens up new business and

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marketing channels, effectively eliminating hidden risks for commercial banks.

5.2.4. T-threat analysis

First of all, big data brings fiercer competition to the banking industry. Under the new situation, the object of competition with commercial banks is no longer just interbanks. The newly joined Internet companies will undoubtedly put more pressure on the entire traditional banking industry and change the original banking structure. For example, the emergence of P2P platforms, Yu'ebao, Alipay, etc. In this environment, China Construction Bank's choice to cooperate with Alibaba may well be a new way of survival forced by the situation. Secondly, big data increases information risks. While big data brings benefits to banks, its superior information sharing makes it more convenient for the industry and customers and banks. At the same time, its sharing also greatly increases private information. The possibility of leakage requires commercial banks to further improve their information management capabilities and create a good and secure information environment for customers. Finally, under the background of big data, there is undoubtedly higher requirements for practitioners. The demand and training of commercial banks for talents will be inseparable from big data technology. A large number of high-quality comprehensive talents are needed to realize their own transformation.

6. Innovative Exploration with big data as the Core of Technology

6.1. Customer relationship management based on big data technology

In the traditional model, customers are not closely connected with various banks. Banks cannot fully understand the interests of customers, nor can they monopolize customer transactions. There are a large number of competitors in the market, which has aggravated the phenomenon of bank disintermediation. But for the long-term development of commercial banks, to minimize the probability of potential dangers, commercial banks must fully understand customer preferences. To achieve this, commercial banks should focus more on external sources such as social networks, customer phone-related records, customer emails, and so on. The use of big data technology for customer sentiment analysis, preference analysis to strengthen customer awareness, bring market forecasting possibilities, and undoubtedly weaken the risk.

6.2. Customer sentiment analysis

Social media serves as a new type of communication link between commercial banks and customers. Commercial banks can understand customer preferences based on customer reviews of brands, number of shares, and number of likes, so as to predict and analyze customers and find the most influential ones. Customers, use it as an entry point to attract more customers and convert potential customers. Using this channel to conduct customer sentiment analysis based on big data, it is convenient for banks to understand their true thoughts, so as to improve products and services according to their wishes. In contrast, traditional questionnaire surveys seem inconsequential.

6.3. Big data transaction identification

Commercial banks can use big data technology to identify various types of transactions, and conduct a comprehensive analysis of important data through a series of advanced analysis methods to determine whether there is fraud in a transaction. Based on the results of the analysis and management cases, further investigations may be conducted on transactions that may have risk factors. In addition, it is also possible to visualize financial crimes and fraud cases through big data collection and systematic processing of historical data to find out the rules. Greatly reduce the risks in commercial bank transactions, and maximize transaction benefits.

7. Conclusion

In the new era, traditional risk management methods of commercial banks have been unable to cope with the new competitive situation. For commercial banks, the most essential purpose is to maximize the benefits, and if they want to maximize the benefits, they must have a strong customer relationship. Under such circumstances, big data technology and its algorithms have emerged as the times require. The use of big data can quickly and effectively strengthen customer relationships, improve the ability to predict market risks, and apply the accuracy of ratings and the real-time nature of anti-fraud. In order to reduce the risk probability encountered in the management of commercial banks, commercial banks have achieved more long-term development. Fintech has undoubtedly become a new focus of the banking industry. For banks to get better returns and more sustainable development, the mastery of big data technology is the key, and big data is ultimately used by people. The absorption becomes very important. In addition, the influx of emerging Internet financial technologies, such as online banking, has also put pressure on traditional commercial banks. In the increasingly fierce competition, it can be said that the skilled person wins the world. The technology here undoubtedly includes big data technology. Therefore, in the new era, the transformation of commercial banks is inevitable, but the employees inside the commercial banks are the resistance to change, because their careers have been threatened by big data technologies, and many manual management can be used for big data. Technology. On the other hand, even if commercial

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banks now recognize the importance of big data, the serious shortage of big data talents is the most disturbing problem. For the training of talents, universities have a lack of big data technology. Although they try to fill this gap, in fact, they cannot match the speed of talent training with the actual needs of society. In view of this, commercial banks should fully tap the internal potential and introduce external talents to improve their employees' big data analysis capabilities. In addition, while attracting and training talents, we also need to retain talents. However, judging from the situation in recent years, the salary and welfare benefits of the commercial banking industry are no longer comparable to high-tech companies, which should also cause warnings in the commercial banking industry. Under the new era, college students only need to focus on the cultivation of high-tech technology, big data technology and other skills, and continuously improve themselves to be able to stand on the world, not to suffer the crisis of being replaced, and to become the master rather than the dominator. In the future, it is foreseeable that the use of big data technology in the entire financial industry will be deeper, with more channels and wider coverage. In order to optimize the risk management of commercial banks, there is no doubt that a new generation of talents combined with big data analysis technology is required to inject new vitality into commercial banks to lead them towards a better future.

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