Proceedings of the 2nd International Conference on Business and Policy Studies
DOI: 10.54254/2754-1169/14/20230847

Risk Analysis on Chinese Commercial Banks in the Context of FinTech Empowerment

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Abstract: In recent years, most commercial banks are facing the innovation of information technology and digital technology in the context of financial technology, showing a positive development trend. Under this positive development, how to use financial technology to identify risks and effectively improve the efficiency and quality of risk management will become the core competitiveness of commercial banks in the future.Therefore, Studying risk management in the context of China's commercial banks with FinTech capabilities is crucial.This paper collates and summarises the results of previous studies through literature research and finds that there are two types of risks that persist in most commercial banks under the technological empowerment of FinTech, namely liquidity risk and credit risk. In addition, two additional risks, namely technology risk and data risk, are innovatively proposed in the context of FinTech-enabled commercial banks. After explaining in detail the four types of risks, namely liquidity risk, credit risk, technology risk and data risk, a detailed analysis of the above two main types of risks, namely liquidity risk and credit risk, is conducted through relevant data. Based on the problems identified, the paper proposes measures for Chinese commercial banks to cope with the above four types of risks in the context of FinTech-enabled commercial banks. This paper not only completes the current research system and framework, but also aids Chinese commercial banks in raising the level of their own risk management, which would promote long-term growth of the entire financial market.

Keywords: FinTech, banking risk management, FinTech empowerment

1. Introduction

"The 14th Five-Year Plan was officially launched in March 2021, with Title 5 guiding the direction of China's digital economy. The Financial Technology Development Plan (2022-2025) were subsequently released in accordance with the aforementioned plan. This strategy paper makes clear the direction of financial technology growth in China's banking sector under the changing circumstances and sets out the goal of achieving "double growth" in comprehensive strength and core competitiveness by 2025. "This also demonstrates China's commitment to the development of financial technology. This also demonstrates China's determination in developing FinTech. FinTech is also booming in other countries, not just China. According to KPMG's 2021 FinTech Pulse report, the global FinTech industry has raised a total of US$210 billion in 2021, with the Americas receiving a record US$105 billion in FinTech investment, with venture capital accounting for US$65 billion. Many academics have begun researching the effects of FinTech on commercial banks' risk-taking in light of the industry's fast rise. Yang Huilan academics' scholarly findings indicate that [1], The effect of FinTech on risk-taking by conventional banks is inverted U-shaped, meaning early in the evolution of FinTech, FinTech companies, with their advanced technological means, enter the banking sector to expand their business and to compete with commercial banks in the three key business sectors, lowering commercial banks' deposit income and loan income, significantly reducing commercial banks' profit income, and thus increasing their risk-taking.

However, with the further development of FinTech, Chinese commercial banks are gradually paying attention to FinTech and are making arrangements for it. FinTech is beginning to empower commercial banks, i.e. commercial banks are applying technology to their development and business to innovate their traditional financial business, ultimately increasing their profit income, improving their efficiency and enhancing their risk management capabilities. Under the influence of the exemplary effect of FinTech companies, Chinese traditional commercial banks have transformed their business model from offline to a dual operation model of "offline + online", for example, through the use of FinTech innovative products and services, which have improved their operational efficiency. At the same time, FinTech also provides a new way for commercial banks to manage a wide range of customers, which also provides better services to the long-tail customers that were previously neglected and establishes a more scientific model to classify different customers, providing technical support for banks' precise services. With the rapid development of commercial banks' dual operation models and precision services, commercial banks should also keep stepping up their innovation in risk management. This is because the improvement of their own risk management capabilities is the prerequisite and basis for their efficient operation, sound and sustainable development under the new economic normal.

In terms of theory, the current search for "FinTech empowerment" on China Knowledge found 1,042 results, while the search for "risk management in Chinese commercial banks" yielded 16,821 results, and when the two are combined, only 2 results were found. This is a good indication that the study of risk management in Chinese commercial banks in the context of FinTech-enabled and commercial banks is still incomplete. This paper aims to improve the research system and research framework by implementing an accurate assessment of the comprehensive risk of commercial banks based on the context of FinTech empowerment, so as to put forward the relative opinions of commercial banks in conducting comprehensive risk management.

In practical terms, risk is inevitable in all industries, even with the empowerment of FinTech, and for the entire Chinese commercial banking industry sector, in the face of the huge demonstration effect brought about by the rapid growth of FinTech, it is necessary to use new technologies to constantly innovate and reform their traditional business. This is a new challenge to the risk management capability of commercial banks.The strategies and suggestions put out in this paper, which are supported by a wealth of theoretical research, will assist commercial banks in strengthening their own risk management while also promoting the stability and long-term growth of the financial market.

2. Literature Review

2.1. Research on FinTech

Currently, there are many academic elaborations on the connotation and definition of FinTech, but no unified consensus has been reached. Arner et al. argue that FinTech is a special fusion of financial services and information technology that uses cutting-edge technologies to solve client needs that haven't been sufficiently met by traditional financial service providers [2]. Yue and Liu point out that FinTech began as a particular technological tool, platform and ecosystem that facilitated financial services and products, and has since evolved into a series of technologies that broadly affect the financial business, including digital payments, crowdfunding, cryptocurrencies, etc [3]. Gomber et al. think of FinTech as a fusion of Internet-related technologies and a fusion of long-standing business practices in the financial services sector. They use ubiquitous communication to innovate and disrupt the financial sector, particularly through the internet and automated information processing [4]. In a study by Thakor, In order to create a new class of financial service that may address financial austerity and lower the cost of financial services through the use of lower costs, FinTech uses developing technology. This improves consumer welfare [5]. Ba Shu Song and Bai define FinTech as a high degree of integration of finance and technology, i.e. the technical means of applying emerging technologies to various financial sectors to reduce operating costs and improve service efficiency [6]. According to Cui, FinTech should include a variety of emerging technologies that can change the business model of the financial industry [7].According to Pi et al., FinTech is a kind of financial product and service that is backed by numerous emerging technologies and applied to the traditional financial industry in several new business models, which revolutionise financial products and services [8]. In a study by Deng, it is pointed out that FinTech is the application of advanced technological achievements within the field of financial services, and is a process of deep integration and continuous development of finance and technology. Its continuous improvement and deepening development form a profound impact on the entire financial system [9].

2.2. Research on Risk Management in Commercial Banks

Li offer a multi-factor credit risk model for the financial markets of the US and the UK based on multivariate credit risk and analyze the variations in the evolution of systemic risk between the US and the UK, notably in terms of banking system risk. Compared to the more practical findings reached by foreign scholars, Chinese researchers have added details to the theoretical part of the study [10]. Guo suggests that there are three main factors that influence the contagion of credit risk in commercial banks, namely owner's equity, debt structure and liquid assets. Among them, owner's equity and liquid assets determine a commercial bank's tolerance to risk [11].

3. Commercial Banking Risk Theory

The Basel Committee classifies the risks faced by commercial banks in the course of their operations into eight categories, specifically credit, market, operational, liquidity, country, reputation, legal and strategic, etc. The most important risks are those related to credit, markets, operations, and liquidity. When it comes to the level of risk management of Chinese commercial banks being affected by financial technology, based on several commercial banks that have gone bankrupt in China, such as Hainan Development Bank, there are serious deficiencies in both credit risk and liquidity risk. Therefore, this section will mainly explain and illustrate these two types of risks. In addition, in the context of the current empowerment of Chinese commercial banks by FinTech, this section also adds an explanation of technology risk and data risk, thus enriching the types of risks currently faced by Chinese commercial banks.

3.1. Liquidity Risk

Among the three core operating factors of a commercial bank, liquidity is one of the most important ones, as it is the basis for safety and security. Depending on the type of business and scope of the commercial bank's daily operations, liquidity can be divided into two categories: the liability side and the asset side.

DOI: 10.54254/2754-1169/14/20230847

Liquidity on the liability side refers to the acquisition of funds at low cost to meet the daily operational needs of commercial banks, including deposit-taking, interbank funding and other business modes to raise funds. Liquidity on the asset side refers to the ability of commercial banks to realise their assets in a timely and reasonable manner without incurring excessive losses when they realise their assets to meet their funding needs.

Commercial banks, as intermediaries in financial services, operate deposit and loan businesses. During periods of economic stability, liquidity is more relaxed and the demand for funds from participants in the economic environment is more moderate. However, when the economic cycle enters a difficult period, banks are unable to meet the funding needs of all parties and are unable to raise funds at a low cost, and their own funding operation system becomes problematic and liquidity risk eventually arises.

3.2. Credit Risk

Credit risk generally refers to the inability of a debtor to meet its obligations as contracted, thereby exposing the creditor to certain financial losses. Usually, credit risk also refers specifically to the risk of default.From a macro perspective, when the economic environment is favourable and the economy as a whole is growing, then the debtor's cash flow levels are robust and the likelihood of default is low. Conversely, if there is a macroeconomic downturn, the debtor's cash flows deteriorate and the risk of default is likely to arise. In the day-to-day business activities of commercial banks, credit risk mainly arises in the lending process. As commercial banks have distinct regional characteristics in their offline operations, branches in different regions basically only cultivate local business, and their loans are basically granted to customers in the region, which makes it difficult to achieve the purpose of diversification to reduce credit risk. Moreover, as business models become more complex, credit risk is likely to exist off-balance sheet, and a variety of new financial derivative products have emerged as a result of financial innovation, often with very complex layers. When credit defaults occur, the impact can be significant and losses can be difficult to recover. Credit risk is correlated with the general macroeconomic environment's security and stability.As a result, credit risk is one of the most significant categories of risk in commercial banks' day-to-day operations.

3.3. Technical Risk

Financial technology, mainly driven by the development of modern information technology, can effectively compress transaction costs, increase transaction efficiency and improve the quality of financial services, but it can also bring about new financial risks. As commercial banks become increasingly dependent on IT systems, the distribution and weighting of risks change significantly when using intelligence and data for risk control management, thus giving rise to technical risks. This is manifested in three main areas. First, technology risk. Financial technology is highly professional, and commercial banks lack professional technical teams, which makes them highly susceptible to technical risks in the process of data and business transaction processing. Secondly, technology is out of control. In the absence of a breakthrough in certain technical barriers, FinTech may lead to a loss of control of technology. Finally, technology risks under FinTech are sometimes difficult to judge and predict, making it more difficult for commercial banks to prevent and control risks in the context of FinTech and increasing the uncertainty of risk management.

3.4. Data Risk

FinTech has brought the financial industry increasingly closer to technology companies and industry facility operators, and the whole market is much more complex to operate than in the past. First-

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ly, in the absence of industry norms and technical standards, it is easy for transaction data to be leaked, customer information and assets to be stolen, and data to be bought and sold, which creates significant risk potential for commercial banks' information management systems. Secondly, there is no interconnection and data sharing between commercial banks, enterprises, governments and operators, and this "data silo" phenomenon makes the use of financial technology to enhance the efficiency of commercial banks' services much less effective. Finally, the current regulatory model makes it difficult to achieve comprehensive regulatory coverage of new products, technologies and services under FinTech, resulting in blurred regulatory boundaries or regulatory lag, which exacerbates the gathering and outbreak of risks in the industry.

4. Analysis of the Current State of Risk

Using the relevant risk management theories mentioned above as a theoretical basis, this section will analyse in detail the two main types of risks that currently exist in commercial banks, and thus identify the problems that exist in risk management in Chinese commercial banks today.

4.1. Commercial Bank Liquidity Analysis

The current state of deposits in commercial banks. The data from ICBC, Agricultural Bank of China, Bank of China, China Construction Bank, Bank of Communications and Postal Savings Bank of China, which are representative banks, show that the bank's long-term funding comes mainly from regular savings, which, although not showing a significant decline, are likely to increase the risk of maturity mismatch due to the nature of term deposits (see in fig 1). In addition, theoretically, the increase in incomes of the population is likely to increase the risk of maturity mismatch. In addition, theoretically, increased personal savings deposits would follow an increase in income, but the graph does not show a significant increase, probably due to the emergence of other channels for collecting deposits, such as the various investment and wealth management platforms that have been created along with the development of financial technology, thus replacing the previous role of banks in deposits, making commercial banks' funds less stable and affecting bank funds, leading to a potential liquidity risk for commercial banks. commercial banks may have potential liquidity risk.

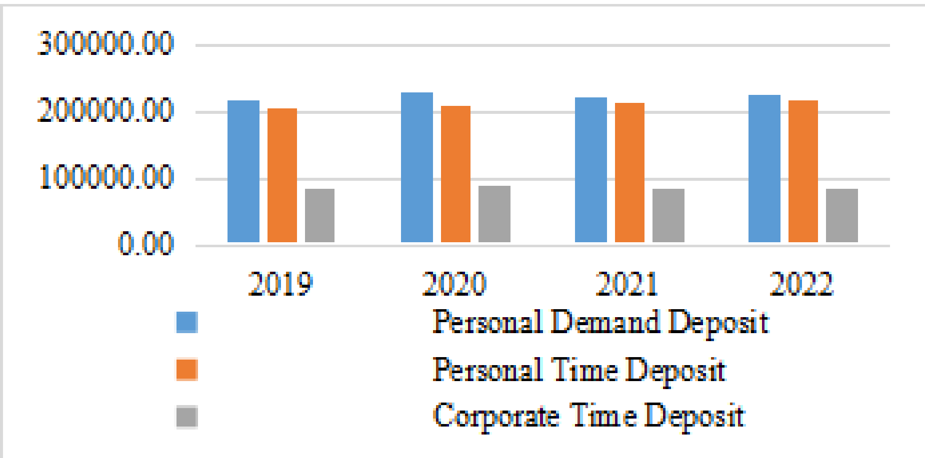

Figure 1: Personal time and demand savings deposits and corporate time savings deposits of six major banks in China.

The current state of commercial banks' assets. The liquidity of commercial banks can be affected by their lending business, which is a major component of their assets and a major profit generator. The share of short-term loans has been declining in recent years, while the share of medium- and

DOI: 10.54254/2754-1169/14/20230847

long-term loans has increased (see in fig.2). Then with the level of deposits remaining little changed, the maturity mismatch will aggravate its extent because of this situation and commercial banks will find it difficult to cope if the economic environment is sluggish and a large loan default occurs, so the extent of this maturity mismatch will exacerbate the liquidity risk that commercial banks may face.

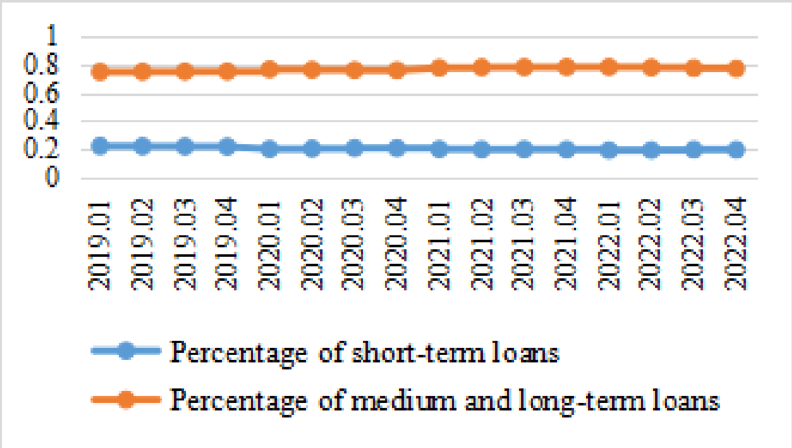

Figure 2: Share of short-term and long-term loans of the six largest banks in China.

Hidden problems in commercial banks' liquidity management.The liquidity crisis has always been a cause for alarm for commercial banks, and they are becoming aware of the importance of optimising their liquidity risk management. Even so, despite FinTech's facilitation, commercial banks continue to face numerous issues with their ongoing liquidity management.

The awareness of proactive management is weak and risk management systems are inadequate. Competition in the industry is also becoming more intense, with the threat of competition from FinTech companies increasing and large technology companies flooding into profitable segments of the financial services sector. In addition, banks have to deal with the enormous challenges posed by having large amounts of data that may be a burden to them due to poor quality or lack of protection, but which, if properly managed and utilised, can be transformed into an asset for the bank. Commercial banks have to manage risk well between the supply and demand of funds in order to maintain stable liquidity. However, most commercial banks have only managed to meet the liquidity targets required by the regulators, and their own proactive management of liquidity risk is weak and their management awareness is not strong enough.

Serious maturity mismatch. The business development of commercial banks is becoming more and more diversified, thanks to the ever-improving and sound macroeconomic environment. Although many large joint-stock commercial banks have completed the transformation of their strategic models, the majority of small and medium-sized banks still rely mostly on spreads for their revenue. In recent years, the proportion of medium and long-term loans has been rising, maturity mismatch has become more and more serious, and the share of deposits has been continuously eroded by FinTech, bank profits have been narrowing, potential capital shortage has become more and more serious, and the management of liquidity risk has become increasingly difficult.

4.2. Commercial Banking Credit Analysis

The current status of non-performing loan balances. Generally speaking, non-performing loans at the same point in time can be used to measure the quality of a commercial bank's loans. Observational analysis can be used to determine the potential credit risk profile. This section therefore delves into the credit risk of commercial banks in China based on their non-performing loan ratios.

DOI: 10.54254/2754-1169/14/20230847

The percentage of non-performing loans provides an appropriate picture of the current state of credit risk. The size of the business conducted by commercial banks has been constrained by the financial technology's quick development, and many commercial banks are increasingly inclined to invest their assets in riskier projects in order to ensure profitability. In the lending business, irregular lending and high-risk lending are frequent.

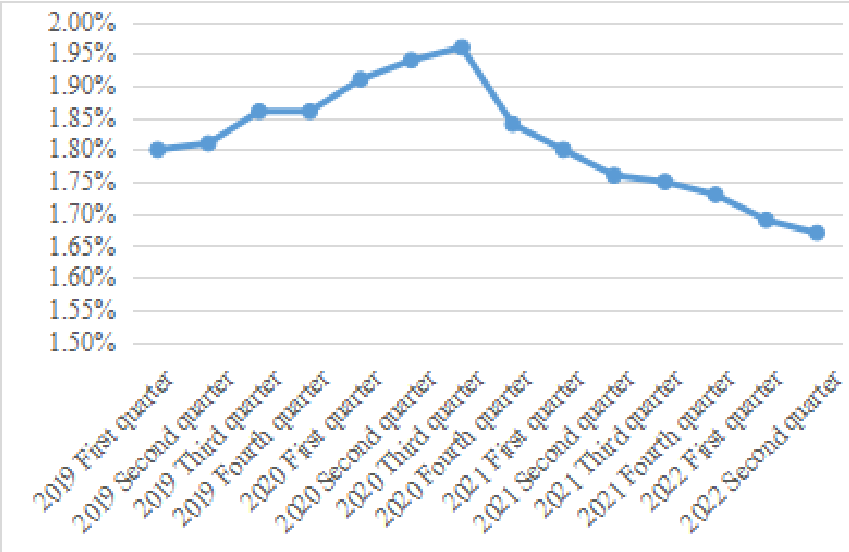

Figure 3: Non-performing loans as a percentage of China's banking sector, second quarter 2019-2022.

The non-performing loan ratio in China's banking industry shows a trend of growing and then declining, peaking at 1.96 percent in the third quarter of 2020 after the first quarter of 2019 (see in fig.3). In 2019 FinTech starts to develop significantly and the non-performing loan ratio of commercial banks continues to climb, the non-performing loan ratio of Chinese commercial banks grows tremendously between 2019 and 2020, the quality of loans takes a serious dip and the potential credit risk increases. In addition, the graph also shows that after the third quarter of 2020, the NPL ratio gradually shows a clear downward trend and the credit risk of Chinese commercial banks starts to gradually decrease, which demonstrates that despite the enormous influence of FinTech, the technology empowerment allows them to slowly have a place under the competition.

Combined with the non-performing loan ratio chart, the non-performing loan ratio of China's banking industry will grow relatively fast in 2019-2020, with its value reaching a maximum of 1.96%. Such a rapid growth rate also side-by-side reflects the possibility of an increase in bad debts and the difficulty of recovering bank loan funds, and despite the obvious downward trend in the non-performing loan ratio after 2020, credit risk still exists.

5. Suggestion

Through a thorough examination of the two primary categories of risks that Chinese commercial banks face, as well as the extra categories of risks that apply to commercial banks in the FinTech setting, a thorough comprehension of the issues that confront Chinese commercial banks' risk management has been achieved. With the high degree of technological empowerment of commercial banking by FinTech, the risk management capabilities of commercial banks are enhanced, and the willingness of commercial banks to take risks and their risk-taking behaviour are rapidly increasing. However, from a global perspective, the application of FinTech by commercial banks can still better enhance the risk management capabilities of commercial banks. In this context, commercial banks should accelerate the application of FinTech to fully explore their business development potential and continuously improve their risk management capabilities. This section will propose corresponding improvement recommendations to address the relevant issues identified, with specific measures covering the following four areas.

5.1. Suggested Countermeasures for Liquidity Risk Management of Commercial Banks

Enhance proactive management initiative and change management philosophy. Against the backdrop of slowing economic growth in China, the proportion of non-performing loans in commercial banks is on a slight upward trend and competition from peers is increasing. In an era of expanding financial technology, commercial banks must constantly raise their knowledge of proactive risk management in order to reduce the likelihood of liquidity risk, which will improve the degree of managing liquidity risk. As bank-to-bank risk linkages become stronger and the rapid growth and expansion of interbank business makes money markets more complex, the need to reduce the probability of liquidity risk contagion associated with the banking sector requires banks to form bank-to-bank liquidity management systems for more efficient risk management.

Expanding business coverage and diversifying liquidity risk. The most practical response to the effects of FinTech is for commercial banks to increase their business innovation and change the way they do business. In terms of business innovation, the biggest advantage of state-owned commercial banks (SOCBs) lies in their unique channel and brand advantages. SOCBs themselves can maintain a high proportion of demand deposits, so the cost on the liability side is relatively low. On the asset side, in addition to the traditional advantageous business of housing mortgage loans, there are also some targeted layouts so as to achieve full business coverage. For example, Construction Bank has recently launched a rental loan to actively lay out the housing rental market.

5.2. Suggested Countermeasures for Commercial Banks' Credit Risk Management

Enhance information disclosure and make interbank information more transparent. Supervision of transactions in the interbank commercial market needs to be strengthened. The problem of information asymmetry can lead to credit risk, which sets the preconditions for the contagion of credit risk among commercial banks, so, to avoid this, and to improve the transparency of information exchange between banks, transaction information disclosure can be expanded. The Chinese government could introduce policies to make the disclosure of information on market transactions more complete, clearly defining the scope of information that must be disclosed and giving instructions on the scope of information that may not be fully disclosed. The implementation of the policy should be continuously followed up and the information disclosure system should be continuously improved.

Strengthen innovation in credit risk monitoring and methodology for large commercial banks. As Zhou Xiaochuan, former Governor of the People's Bank of China, said, ICBC, Nongguan, Zhongguo, Jianjian and Jiao Tong must be systemically important banks. Therefore, it is all the more important to strengthen the monitoring of credit risk of large commercial banks, using them as a standard for the potential degree of credit risk in the banking sector. At present, most commercial banks in China use traditional methods of credit risk management, which have many potential problems, such as the lack of experience of the people involved or the subjective emotions of lenders in the economic cycle. Therefore, it is necessary to make appropriate innovations in credit risk management methods, try to combine various models, measurement methods and theories, pay more attention to the innovation of management models, establish a perfect management mechanism and choose more suitable methods to measure and control credit risk. Construct a banking

DOI: 10.54254/2754-1169/14/20230847

sector importance framework system, pay attention to systemically important banks and focus on potential systemically important banks.

5.3. Suggested Countermeasures for Technology Risk Management in Commercial Banks

Set up a dedicated department for financial technology, responsible for the application and integration of big data technology. In the era of knowledge economy, talent is the first productive force, and this is especially true for commercial banks to develop FinTech. At present, there are many problems with the human resource management of Chinese commercial banks, especially in the field of risk management, where the number of staff is generally small, old and with an outdated knowledge structure. This is not conducive to the efficient use of FinTech by commercial banks to enhance their risk management capabilities. Therefore, it is important to cultivate and attract professional composite talents with FinTech technology and financial knowledge, continuously improve risk prevention and control under FinTech, and make a good reserve of talents for risk control management.

Application interface technology is used. Under this technology, external institutions do not need to access the commercial bank's own system platform and can directly access the commercial bank's financial products, financial services and related data through the application interface, thus reducing the risk brought to the commercial bank by external institutions.

Improved risk management structure. A risk management business is set up with the head office at the centre, forming a three-tier top-down risk management model and using technology to enable risk management to cover different risk types, time zones and departments.

Improving the efficiency of business process processing. Through intelligent and digital financial technology, we can reduce the impact of human interference, improve the efficiency of business processing and improve the service experience of customers.

5.4. Suggested Countermeasures for Data Risk Management in Commercial Banks

Integrate data and establish a data framework. Standardise the standards and formats of data collection, integrate internal and external data resources, dig deeper into the correlation and intrinsic value of data, and establish a unified, comprehensive, accurate and efficient information and data platform to provide accurate and detailed data information for future data analysis and risk assessment models.

Avoiding "data silos" and achieving interconnection and data sharing. Establish cooperation with the government, enterprises and financial technology companies to build an information sharing platform to improve the efficiency of data use and real-time monitoring, as well as the identification, detection, analysis and early warning of potential risks in business.

Use FinTech tools to improve data regulation. On the one hand, regulatory authorities should use big data, artificial intelligence and cloud computing to avoid the problems of blurred regulatory boundaries and regulatory lag. Using the processing mechanism of artificial intelligence and the effective capture and analysis of data, it can be embedded into the supervisory system of the regulator for risk identification and early warning of possible systemic risks. Digital supervisory systems can also be established to effectively identify the risks that exist in commercial banks and other regulatory targets. On the other hand, the regulation of the FinTech industry should be continuously improved. Regulatory authorities should develop industry codes and technical standards for FinTech to prevent unscrupulous elements from taking advantage of legal gaps and technical loopholes to engage in risky activities.

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6. Conclusion

This paper analyses four types of risks, namely liquidity risk, credit risk, technology risk and data risk, and identifies the problems that exist in the control of the four types of risks in the context of FinTech-enabled Chinese commercial banks.

For liquidity risk, there are two main problems: firstly, the awareness of active management is weak and the risk management system is not perfect, and secondly, the maturity mismatch is serious. For credit risk. The proportion of non-performing loans is growing too fast, making it more likely that bad debts will increase, making it more difficult for banks to recover loan funds and increasing the credit risk of commercial banks. For technical risk. The lack of a professional technical team makes it highly susceptible to technical risks in the processing of data and business transactions. Without a breakthrough in technical barriers, FinTech may lead to a loss of control of technology, and technical risks under FinTech are sometimes difficult to judge, increasing the uncertainty of risk management. For data risk. Leakage of transaction data, theft of customer information and assets, and data trading are prone to occur, creating significant risk potential in commercial banks' information management systems. In addition, the phenomenon of "data silos" does not allow FinTech to better empower commercial banks, and the regulatory boundary is blurred or lags behind, exacerbating the gathering and outbreak of risks in the industry.

Based on the problems identified above, this paper also proposes corresponding measures to address them. With regard to liquidity risk, it is important to increase proactive management, change management concepts and expand business coverage to diversify liquidity risk. For credit risk, strengthen information disclosure, make inter-bank information more transparent and enhance the innovation of credit risk monitoring and methods for large commercial banks. For technology risk, set up a dedicated FinTech department responsible for the application and integration of big data technologies, adopt application interface technologies and improve risk management structures. For data risk, consolidate data and establish a data framework to avoid "data silos", achieve interoperability, data sharing and improve data supervision using FinTech tools.

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