

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY
ECONOMICS AND MANAGEMENT FACULTY**

Public management and administration Department

QUALIFICATION WORK

Education Degree – Master

**on: Implementation of modern management technologies of a financial
institution**

Completed: student of
073 «Management» (EP «Administrative Management»)
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Sumy - 2025

SUMY NATIONAL AGRARIAN UNIVERSITY

Faculty Economics and Management
Department Public management and administration
Education degree «Master»
Field of Study 073 «Management» (EP «Administrative Management»)

Approved:

Head of
Department

«_____» _____ 2025 y.

TASK on qualification work for student

Mu Jinhao

1. Theme of Research on E-commerce Development of Enterprises under Qualification the Background of Internet+ work: _____

Supervisor Olena Bieliaieva, Candidate of Public Administration
approved by the university from _____

2. Deadline for student completed project (work) March 2025

3. Background to the project (work):

educational methodical manuals, monographs, textbooks on the subject of research, scientific publications, and economic and financial statements for the period of 2021-2023

4. Contents of settlement and explanatory notes (the list of issues to develop):

1. Definition of Basic Concepts and Theoretical Basis

2. Analysis of the External Environment for the Development of Financial Technology

3. Measures to ensure the implementation of financial technology strategies

4. Develop measures to ensure the implementation of digital transformation strategies

5. Summarize and analyze the results

5. Date of assignment:

March 2025

CALENDAR PLAN

№	Title the stages of the degree project (work)	Date of performance project stages	Note
1	Definition and approval of the thesis, preparation of the plan - schedule of work	<i>December, 2023</i>	done
2	Selection and analysis of literary sources, the preparation of the first theoretical chapter	<i>December, 2023</i>	done
3	Preparation and presentation of the draft of the first chapter of the thesis	<i>February, 2023</i>	done
4	Collection and processing of factual material, synthesis analysis of application issues in the enterprise	<i>March, 2024</i>	done
5	Making the theoretical part of the thesis, summarizing the analytical part	<i>April, 2024</i>	done
6	Design options improve the research problem	<i>May, 2024</i>	done
7	Completion of the project part of the thesis, design chapters	<i>May, 2024</i>	done
8	Previous work and its defense review	<i>February, 2025</i>	done
9	Checking the authenticity of the thesis	<i>February, 2025</i>	done
10	The deadline for students to complete the thesis	<i>February, 2025</i>	done
11	Defense of the thesis	<i>March 2025</i>	done

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The thesis allowed for defense.

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ABSTRACT

Mu Jinhao. Implementation of Modern Management Technologies in Financial Institutions.

Master's Thesis in the specialty 073 "Management," EP "Administrative Management," Sumy National Agrarian University, Sumy - 2025. - Manuscript.

In the context of rapid technological advancement, this thesis explores financial technology's (FinTech) role in enhancing commercial banks' efficiency and profitability. The study focuses on transforming the banking sector by applying cutting-edge technologies such as artificial intelligence, big data, blockchain, and cloud computing. It examines the impact of FinTech on banks' operational and financial performance, with a special emphasis on China Merchants Bank as a case study.

The findings highlight the importance of continuous innovation in financial technology and the strategic adoption of digital tools to ensure sustainable growth in the banking industry. The study underscores banks' need to embrace these changes to enhance operational efficiency and secure long-term profitability.

Keywords: financial technology, digital transformation, banking sector, FinTech, profitability, risk management, asset-liability management, customer service, competitiveness.

АНОТАЦІЯ

Му Джінхао. Впровадження сучасних технологій управління у фінансових установах.

Магістерська робота за спеціальністю 073 «Менеджмент», ОП «Адміністративний менеджмент», Сумський національний аграрний університет, м. Суми – 2025. – Рукопис.

У контексті швидкого технологічного прогресу досліджується роль фінансових технологій (FinTech) у підвищенні ефективності та прибутковості комерційних банків. Дослідження зосереджено на трансформації банківського сектора шляхом застосування передових технологій, таких як штучний інтелект, блокчейн і хмарні обчислення. У ньому розглядається вплив FinTech на операційну та фінансову ефективність банків, з особливим наголосом на прикладі China Merchants Bank.

Результати підкреслюють важливість постійних інновацій у фінансових технологіях і стратегічного впровадження цифрових інструментів для забезпечення сталого зростання банківської галузі. Дослідження підкреслює необхідність для банків прийняти ці зміни для підвищення операційної ефективності та забезпечення довгострокової прибутковості.

Ключові слова: фінансові технології, цифрова трансформація, банківський сектор, FinTech, прибутковість, управління ризиками, управління активами-пасивами, обслуговування клієнтів, конкурентоспроможність.

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INTRODUCTION

Actuality of theme. In the context of rapid digital transformation and financial innovation, modern management technologies in financial institutions have become a critical factor in enhancing operational efficiency and market competitiveness. Financial technology (FinTech), driven by advancements in artificial intelligence, big data, blockchain, and cloud computing, has fundamentally reshaped traditional financial services. These technologies optimize risk management and customer service and introduce new challenges such as market competition, regulatory compliance, and technological spillover effects. For commercial banks, integrating FinTech into their core operations is no longer optional but a strategic necessity to maintain profitability and adapt to evolving consumer demands.

The competitiveness of financial institutions today hinges on their ability to leverage technological innovations to reduce costs, improve service quality, and expand market reach. However, the rapid growth of FinTech companies and online platforms has intensified competition, leading to customer diversion and margin compression for traditional banks. For instance, the rise of digital lending platforms and mobile payment systems has disrupted traditional deposit and loan businesses, forcing banks to rethink their strategies. Against this backdrop, understanding how FinTech impacts commercial banks' profitability and identifying effective management optimization paths are urgent priorities for academia and industry.

Relationship with academic programs, plans, and themes. This research aligns with the educational focus of Sumy National Agrarian University's Public Management and Administration Department, which emphasizes the integration of innovative management technologies into institutional frameworks. The study

addresses the gap in the existing literature by combining theoretical analysis with empirical case studies to explore the dual effects of FinTech – technological spillover and competitive crowding-out – on commercial banks.

The thesis aims to systematically analyze the implementation mechanisms of modern management technologies in financial institutions, evaluate their impact on profitability, and propose actionable strategies for efficiency optimization.

Key objectives of the study include:

- Clarifying the conceptual framework of FinTech and its core components (e.g., big data finance, AI-driven risk management, blockchain applications).
- Examining the operational and financial performance of China Merchants Bank as a representative case of digital transformation in China’s banking sector.
- Investigating the direct and indirect mechanisms FinTech influences profitability, including asset-liability management, risk control, and intermediary business innovation.
- Identifying challenges in digital transformation, such as slowed investment growth, talent shortages, and infrastructure limitations.
- Proposing countermeasures to enhance collaboration with FinTech firms, optimize service models, and strengthen risk prevention systems.

The object of the study is the organizational and economic dynamics of modern management technologies in financial institutions, focusing on China Merchants Bank’s digital transformation.

The subject of the study encompasses theoretical principles, methodological approaches, and practical insights into improving management efficiency through FinTech adoption.

Research methods include:

- Case analysis: In-depth evaluation of China Merchants Bank's FinTech initiatives and financial performance from 2021 to 2023.
- Statistical and comparative analysis: Examination of key metrics such as return on equity, capital adequacy ratios, and intermediary business income.
- Factor synthesis: Assessment of technological spillover effects, competitive pressures, and regulatory impacts.
- Empirical modeling: Analysis of the correlation between FinTech investment and profitability using annual reports and industry data.

The information base comprises academic publications, annual reports of China Merchants Bank and peer institutions, regulatory policies, and global research on FinTech trends.

The scientific novelty lies in the following:

- Systematically mapping the dual impact mechanisms of FinTech (spillover vs. crowding-out effects) on commercial banks.
- Demonstrating how asset-liability management and risk control mediate enhancing profitability through FinTech adoption.
- Highlighting the underutilized potential of intermediary business innovation in driving non-interest income.

Practical significance is reflected in actionable recommendations for banks to balance technological innovation with risk management, foster cross-industry collaborations, and optimize digital infrastructure. The findings are validated by applying to China Merchants Bank's strategic reforms, offering replicable insights for other financial institutions.

Personal achievements include the integration of theoretical frameworks with real-world case data, contributing to the discourse on FinTech's role in sustainable

banking practices. Key proposals, such as strengthening talent cultivation and leveraging cloud computing for operational agility, are derived from independent analysis.

List of publications:

1. Mu Jinhao. Active participation in VII International Scientific and Practical Conference “Scientific Research: Modern Challenges and Future Prospects.” Proceedings of VII International Scientific and Practical Conference Munich, Germany 17-19 February 2025. SCI-CONF Publishing, Munich, Germany. 2025. 24 p. (0.8 ECTS credits). Available at: sci-conf.com.ua.

2. Mu Jinhao. Active participation in VI International Scientific and Practical Conference “Science in the Modern World: Innovations and Challenges.” Proceedings of VI International Scientific and Practical Conference Toronto, Canada 20-22 February 2025. SCI-CONF Publishing, Toronto, Canada. 2025. 24 p. (0.8 ECTS credits). Available at: sci-conf.com.ua.

The structure of the work includes an introduction, three chapters, conclusions, and a list of references from 43 sources. The total text of the work is 65 pages; the main text covers 59 pages, eight figures, and three tables.

CHAPTER 1

RELATED CONCEPTS AND THEORETICAL FOUNDATIONS

Fintech refers to innovatively improving financial services and management methods by combining advanced scientific and technological means, such as artificial intelligence, big data analysis, blockchain, cloud computing, etc., with financial business. It covers all aspects of the financial field, including payment, lending, investment, insurance, etc. The emergence of financial technology has wholly changed the traditional financial industry's operation mode and ecological pattern. It mainly includes four core parts: big data finance, artificial intelligence finance, blockchain finance, and quantitative finance. As one of the new driving forces for the transformation and development of the banking industry, the application of financial technology is mainly reflected in risk management, data analysis, and online transactions. Through data analysis, the operating risks of commercial banks can be more accurately predicted, thereby improving risk management capabilities [35]. At the same time, the rational use of technologies such as big data and cloud computing to conduct refined analysis and record customer needs and transaction behaviors will help commercial banks launch more targeted products and services for different customer groups, thereby enhancing customer loyalty and attracting new customers. Online transactions are mainly reflected in the launch and update of APPs. By making full use of financial technology, optimizing the APP customer experience, and designing a more convenient and user-friendly APP interface, commercial banks can better meet customer needs and provide high-quality products and services. Financial technology's primary goal is to improve financial services' efficiency, reduce costs, enhance convenience, and make financial services more inclusive.

Through technological innovation and application, financial technology provides more convenient financial services, such as mobile payment, P2P lending, competent investment advisors, etc., bringing users a more convenient and personalized financial experience. In addition to improving user experience, financial technology also plays a vital role in risk management and anti-fraud. With the help of big data analysis and artificial intelligence technology, financial institutions can more accurately assess risks and monitor transaction activities in real-time to prevent fraud and protect users' funds. In addition, financial technology has also promoted the digital transformation and innovative development of the financial industry. The transparency and security of financial transactions have been improved through blockchain technology, while cloud computing technology allows financial institutions to deploy and manage information technology resources more flexibly [24]. In general, the development of financial technology has promoted the upgrading and transformation of the financial industry and brought new impetus and opportunities for global economic development. However, it is accompanied by continued attention and challenges to data privacy and network security issues. Therefore, the development of financial technology needs to strike a balance between technological innovation and risk management to achieve sustainable development of financial services and maximize social value [4].

The performance evaluation of commercial banks is a comprehensive and scientific process of evaluating their overall operating conditions, which is crucial to improving the management level of banks and promoting sustainable development. This not only helps to enhance the core competitiveness of banks and occupy financial market share but also has guiding significance for the bank's business decision-making and strategic planning. Commercial banks are different from

traditional manufacturing enterprises. Their main business objects are money rather than goods or services. Therefore, the performance evaluation of banks needs to consider their particularity, especially in risk management. Compared with other enterprises, commercial banks pursue profits and bear more social responsibilities, including maintaining the security and stability of the national financial system [6].

The performance evaluation of commercial banks covers many aspects, including financial and non-financial indicators. Financial indicators such as balance sheets, income statements, and cash flow statements can objectively reflect the economic benefits of banks. In contrast, non-financial indicators such as customer satisfaction, non-performing asset ratio, and risk control indicators focus more on the bank's risk management and customer service level. Good commercial bank performance is reflected in a single indicator and considers multiple factors. It demonstrates the bank's operating benefits regarding profitability, asset operation level, etc., and reflects operators' contributions and achievements in the management process [16]. At the same time, the performance evaluation of commercial banks is also subject to supervision and evaluation from managers such as the central bank, the Finance Bureau, and the China Banking Regulatory Commission.

The extended tail theory is a concept proposed by Chris Anderson in 2014 to describe a phenomenon in the market and economy in the digital age. The theory believes that the development of digital technology has made the products or services on the market no longer limited to a few popular commodities but present a long tail containing many long-tail products or services. In the traditional market model, the products with the most significant sales volume usually account for only a tiny part of the total market sales volume. These products are called head products, while others constitute the long tail [18]. In the digital age, due to the development of the Internet

and e-commerce, consumers can more easily obtain various long-tail products or services, so the market share of the long-tail part is gradually increasing. The core idea of the extended tail theory is that the sales volume of a single product or service of the long tail may be low, but because the long tail contains many different types, the overall sales volume may exceed that of the head product. This is because the needs of consumers are diverse, and long-tail products or services can meet those specific and personalized needs that are ignored in the traditional market. The extended tail theory profoundly impacts the market and the economy [21]. First, it has changed the conventional market structure and provided more opportunities for small businesses and individual creators to enter the market by selling their products or services through the Internet and e-commerce platforms. Secondly, increasing long tail products or services provides consumers with more abundant and diverse choices, meets personalized needs, and promotes market diversification and differentiation. However, the extended tail theory also faces some challenges. The sale of long-tail products or services usually requires lower costs, but it also means fierce competition and limited profit margins. In addition, the fragmentation and information overload of the long-tail market may also cause consumers to face difficulties in the selection process. The extended tail theory has laid a more solid theoretical foundation for the widespread dissemination of financial technology, and it especially highlights the key position of ordinary customers and small and medium-sized enterprises often ignored by traditional commercial banks in the market [11]. These groups frequently encounter difficulties in financial services, such as financing difficulties caused by scattered funds, high transaction costs, and potential risk issues. These obstacles make obtaining sufficient financial support from traditional banking channels challenging. However, the long-term effect of financial technology has opened up

new opportunities for these groups, helping them to integrate more smoothly into the modern financial system and enjoy more efficient and convenient financial services. However, with the development of financial technology, the vast potential in the long-tail market has been tapped. With the continuous emergence of new financial models, the scope of financial services has been redefined, optimizing the existing market structure. The deep integration of technology companies and non-bank financial institutions has brought targeted financial products and services to customers, accurately met the diverse needs of the public, and effectively supplemented the service gaps of banks in this field. The rise of this cooperation model has further prompted customer groups to flow from traditional commercial banks to more diversified service providers. In this process, financial technology companies actively analyze public needs with advanced technologies such as big data and the Internet and quickly obtain key information such as customer creditworthiness to analyze customers' credit status. This change significantly reduced labor costs and improved information processing efficiency, effectively reducing the information asymmetry problem between banks and customers. These advantages not only discovered customer groups that were difficult to find in traditional banking but also promoted the expansion of the long-tail market. Applying the long-tail theory not only provided new ideas and directions for the innovative development of financial technology but also further promoted the popularization and inclusive development of financial services and positively contributed to the continued prosperity of the social economy [29].

The crowding-out effect refers to an economic phenomenon in which when the government increases spending or raises taxes, it decreases spending or income in the private sector. British economist John Maynard Keynes first proposed this concept in

the 1930s, and it has been widely used in analyzing macroeconomics and fiscal policy. The crowding-out effect usually occurs when the government stimulates the economy by increasing public spending. In this case, government spending will increase, such as infrastructure construction, social welfare projects, or purchasing goods and services. Such measures are intended to stimulate economic growth and promote employment and consumption. However, increased government spending often requires increased taxes or borrowing, which may hurt the private sector. When the government raises funds through taxes, companies and individuals must pay more taxes, reducing the funds they can use for investment and consumption. This may cause the private sector to reduce investment, production, and consumption, offsetting the stimulus effect of increased government spending or even exceeding the stimulus effect of government spending, restricting overall economic activities. According to previous research, in the digital transformation process of commercial banks, financial technology may have a crowding-out effect on their performance. First, with the popularization of digital transformation, FinTech may lead to the loss of long-tail customers of commercial banks because banks tend to allocate resources to high-end customers. Second, the disruptive innovation theory of FinTech means that it may gradually occupy the so-called "low-end market" and then use low-cost business models to enter the mainstream market, intensifying competition in the external market. Therefore, the rapid development of FinTech has increased competition between technology companies inside and outside commercial banks. Commercial banks need to face the external impact of digital transformation and increase the scale and efficiency of FinTech investment. For domestic and commercial banks, large state-owned banks have advantages such as large scale, rich assets, many employees, and complete policies and systems to resist losses caused by

crowding-out effects. In contrast, small and medium-sized commercial banks may be more affected by crowding-out effects [42].

The technology spillover effect refers to the fact that the application and development of technology not only affects the field where the technology is directly used but also positively impacts other related fields, even fields that are not directly involved, thereby bringing additional economic and social benefits. This effect usually occurs in the process of technological innovation and technology application and is of great significance in promoting economic growth, improving productivity, and improving the quality of life. The technology spillover effect can promote the development and upgrading of industries. When technology is applied successfully in a particular field, the technology, experience, and methods it brings are often spread and promoted to related industries, thereby promoting the upgrading and transformation of the entire industrial chain. The technology spillover effect also helps to promote technological innovation and knowledge sharing. When a technology breakthroughs in a particular field, the relevant research and development results and lessons learned are often widely shared and disseminated, stimulating more innovative activities. This sharing and exchanging of knowledge promotes the rapid development of technology, the optimization of industrial structure, and sustained economic growth. The technology spillover effect is essential in promoting economic innovation and development and improving overall benefits. Through the dissemination and promotion of technology, it is possible to achieve a broader application of technology, promote upgrading industrial structure, improve labor productivity, and promote sustainable economic development. Therefore, the government, enterprises, and society should actively support and encourage

technological innovation and knowledge sharing to promote the play of technology spillover effects and achieve long-term economic growth and social progress.

In the digital transformation of commercial banks, the technology spillover effect positively impacts the development of Internet finance. Specifically, this effect promotes the growth of commercial banks in the following aspects:

First, service efficiency and product diversification have been significantly improved by actively learning from the advanced experience of Internet finance and intensely studying its unique business model and advanced technology. This cross-border learning and experience sharing optimizes commercial banks' business processes, strengthens their risk control capabilities, and significantly enhances their market competitiveness [11].

Second, the vigorous development of Internet finance has intensified the financial industry's competitive situation and promoted the interest rate marketization process.

In the face of this change, commercial banks' traditional interest rate spread income has been impacted. Therefore, commercial banks have to accelerate the pace of digital transformation to adapt to the challenges brought about by industry changes. In responding to changes, banks should take the initiative to cooperate with financial technology companies. By establishing cooperative relationships with these technology-leading companies, the process of digital transformation can be accelerated. This cooperation not only helps to improve the technical level of commercial banks but also helps to expand their business scope and enhance their market influence.

The technological spillover effect of financial technology is significantly reflected in the deepening of commercial banks' application of financial technology.

In contrast, the competitive effect is mainly reflected in the external market competition caused by financial technology companies with the help of digital technology. On the one hand, the update and progress of financial technology have injected strong technical support into the digital transformation of commercial banks, enabling them to change their original operating model. By applying financial technology, banks have not only successfully reduced operating costs but also reduced their risks. On the other hand, Internet financial companies have continuously developed new business forms with financial technology, diverting the customer base of traditional banks, which has led to a decline in bank performance. This competitive effect not only intensifies the competitive situation in the financial market but also prompts commercial banks to accelerate innovation to meet the challenges of financial technology companies [37].

The crowding-out effect on asset business The progress of financial technology has led to the continuous expansion of the number and scale of online loan platforms. These platforms have supplemented the loan services of commercial banks to a certain extent but have also hurt the traditional loan business of banks. Based on the core concept of platform economy, borrowers and loan providers can now use online platforms for financing, significantly weakening commercial banks' function as traditional intermediaries. Online lending platforms rely on Internet technology to innovatively create a new type of credit method, thanks to the rapid development of digital technologies such as big data. These technological breakthroughs allow financial technology companies to develop, enabling them to occupy the market share of traditional commercial banks with the help of digital technology [16]. Online lending platforms are more convenient and faster than bank credit, and the business process is simple. In addition, financial technology companies also use technologies

such as big data to effectively eliminate the hidden dangers of information asymmetry between enterprises and customers and effectively manage the loan process. In addition, online lending has a lower marginal cost and can conveniently conduct business transactions anywhere and anytime. This has led to more and more loan providers and borrowers choosing online transaction platforms. Due to the extended tail theory, online lending platforms have become a good choice to meet the needs of the general public, small and micro enterprises, and other groups that traditional banks neglect. In the conventional bank credit management system, banks usually prioritize high-income customers, making it difficult for low-income customers and small businesses to obtain low-cost credit services. Banks set up a series of conditions when lending, including requiring customers to go through a complex credit investigation process. At the same time, banks' screening standards for loan customers are also stringent due to the consideration of credit risk in the loan process. For low- and middle-income groups, their conditions often become obstacles in the loan process. Online lending platforms have shown a high degree of flexibility, significantly eliminating these existing problems and effectively meeting the needs of small loan customers. These platforms have attracted a wider range of customers by providing more convenient and personalized services, thus supplementing the shortcomings of traditional banking business. The emergence of online lending platforms has injected new vitality into the financial market and promoted the innovative development of financial services [29].

Crowding-out effect on liability business Liability business is the foundation of commercial banking. My country's financial industry was not fully mature in the early years, and there were few types of financial products. Although there were other financial service options, many people preferred to deposit their funds in bank

deposits. Over time, the income of commercial banks, which mainly relies on earning interest rate spreads, has become a primary source of income. Against this background, many financial technology companies have provided better financial services through cooperative research and development. Many new financial products have been created. These products have attracted many customers with their high liquidity and high returns. At the same time, they have also prompted commercial bank depositors to seek new investment options and seize the original customers of commercial banks. However, these funds will eventually flow back to the banking system through the interbank market. In this process, small deposits that banks could repay at low cost gradually turned into large deposits that require high interest. This transformation has not only significantly increased banks' financing costs but also posed new challenges to their profitability and risk management capabilities. Therefore, commercial banks need to pay close attention to market dynamics and constantly adjust and optimize their business structure to meet the challenges brought about by this change. It has had a considerable impact on the deposit business of commercial banks. To retain customers, banks must increase deposit fees, resulting in more interest payments, further increasing financial costs and reducing bank profits. For example, Yu'eobao in Alipay and Lingqiantong in WeChat are strictly substitutes for bank deposits. They do not require fees or minimum amounts, allow transactions and fund recovery at any time and place, and provide conveniences such as transfers, bill payments, product purchases, and taxi payments to meet people's needs in business and financial management. Internet financial products have occupied a part of the customer base, reducing banks' profits. Therefore, the substitution effect of the liability business for the banking business has further intensified. At the same time, as people's financial concepts have gradually strengthened, they have reduced their

dependence on bank deposits, further reducing the proportion of liability business in commercial banking business [17].

The technical spillover effect of artificial intelligence uses advanced algorithms and data analysis technologies to provide banks with more accurate risk assessment and credit management methods. In the traditional model, banks rely more on manual experience and limited data analysis in loan approval, risk prevention, and control. The emergence of artificial intelligence can efficiently process massive data, deeply explore potential laws, and provide banks with a more accurate and comprehensive risk assessment basis. This transformation significantly enhanced the bank's risk management capabilities and enabled it to occupy a favorable position in the fierce market competition. At the same time, artificial intelligence has also shown great potential in customer service. With the help of advanced technologies such as intelligent voice response and natural language processing, artificial intelligence has brought customers a more convenient and efficient service experience. Whether it is to query account information, handle transfer and remittance business, or make investment and financial planning, customers can quickly complete the relevant operations through the intelligent customer service system without having to wait for a long time for the intervention of manual customer service. This effectively improves the bank's service efficiency and significantly enhances customer satisfaction and loyalty. In addition, artificial intelligence has also promoted the automation and intelligence of banking business processes. Traditional banking business processes often involve a large number of tedious manual operations. At the same time, artificial intelligence has simplified these processes through technical means such as automated processing and intelligent decision-making, significantly improving work efficiency. Taking the account opening process as an example,

artificial intelligence uses advanced technologies such as face recognition and identity verification to achieve rapid entry and verification of customer information, thereby significantly shortening the account opening time. These changes have improved the bank's operational efficiency and brought customers a more convenient and efficient service experience[43].

Big data's emergence has reshaped how data is processed and analyzed, giving rise to a wide range of technology spillover effects. This effect is not only limited to the technology industry but also profoundly impacts the banking industry. Big data technology has significantly improved commercial banks' decision-making accuracy and efficiency. Through in-depth mining and detailed analysis of massive data, banks can more accurately analyze customer preferences through information such as customer browsing records so that banks can provide customers with more targeted and distinctive financial products, more accurately understand market trends, optimize product design and marketing layout, and thus optimize resource allocation and upgrade risk management. The spillover effect of big data technology has also significantly improved innovation capabilities [15].

The big data platform allows commercial banks to integrate knowledge and technology with other fields. This cross-border integration promotes the accelerated incubation and application of new technologies and the continuous optimization and upgrading of industrial structures. In addition, in handling credit business, commercial banks can use big data technology to deeply analyze various information about borrowers and use advanced model technology to accurately assess the default risk of borrowers and generate credit reports. This move not only significantly alleviated the problem of information asymmetry between banks and customers but

also successfully achieved the dual goals of risk prediction and control, thereby ensuring the stable operation and efficient management of the credit business.

The technical spillover effect of cloud computing Cloud computing technology has significantly improved the efficiency of commercial banks' IT operations. Banks have reduced their dependence on traditional hardware facilities by transferring data storage and computing tasks to the cloud, thereby reducing IT costs. This technical spillover effect optimizes the bank's business processes and improves service quality and customer experience, giving banks a favorable position in the fierce market competition. At the same time, cloud computing technology has significantly enhanced the data analysis capabilities of commercial banks.

Banks can more efficiently collect, integrate, and analyze various types of data, including customer behavior, market trends, etc., and then dig out more valuable information. This technical spillover effect enables banks to more accurately grasp market dynamics, optimize product design, and improve risk prevention and control capabilities, providing strong support for the stable development of banks. Cloud computing technology has also promoted the cross-border integration of commercial banks and other industries. With the help of cloud platforms, banks can cooperate sincerely with financial technology companies, e-commerce platforms, etc., to jointly develop more innovative financial products and services. This broadens the business scope of banks and promotes the innovation and development of the entire financial industry [22].

CHAPTER 2

CHINA MERCHANTS BANK CASE STUDY

2.1 Current status of financial technology development in China

Merchants Bank

China Merchants Bank was founded in 1987. It is very different from commercial banks in other countries. Legal persons fully own China Merchants Bank. China Merchants Bank transformed its retail business in 1999, rapidly expanded in scale, and successfully went public three years later. Since its establishment, China Merchants Bank has vigorously developed the retail industry nationwide. Under the goal of deepening reform and building a light bank, China Merchants Bank took the lead in China in proposing using financial technology and information technology to promote the transformation and development of commercial banks and achieved remarkable results.

This article selects China Merchants Bank as a case for analysis. The main reasons are: First, China Merchants Bank's financial technology application level is in a leading position in my country's banking industry. It began to transform its retail business in 2004 and took the lead in launching the second round of changes in 2014. With "light bank" as the strategic transformation goal, it began to explore digital transformation [15].

Therefore, China Merchants Bank is representative. Second, taking China Merchants Bank as an example, it can better promote China Merchants Bank to make changes in innovation and reform, product innovation, and service model, thereby improving its profitability, better coping with the impact of Internet finance, and

promoting China Merchants Bank to make changes and innovations in operation and management model, business development model, product service model, talent management model, and risk control model.

Third, studying the application level of financial technology in China Merchants Bank can have specific guiding significance for other banks to carry out digital transformation and can be inspired by it so that different banks can make more rational decisions according to their business and organizational structure.

Against the background of the rapid development of global Internet technology with the rapid growth of financial technology, the business model of my country's commercial banks has also undergone tremendous changes. Their market share and profits are continuously devoured. Domestic commercial banks have begun to actively develop financial technology and carry out technological transformation to better cope with this situation and gain a better position in the subsequent market competition [21].

When making in-depth layouts for the innovative application of financial technology in its products, businesses, and services, commercial banks not only clarify their strategic position and readjust their organizational structure but also pay more and more attention to the endogenous creation generated by the increasing investment. In the field of financial technology, the R&D investment of commercial banks is reflected in three dimensions: R&D expenses, the proportion of scientific and technological talents, and the number of patent applications. The entire banking industry is constantly increasing its investment in financial technology, especially after 2016, when the investment and growth rate of funds in science and technology in the banking industry have shown a rapid upward trend. China Merchants Bank has increased its investment in financial technology from all aspects to achieve its

strategic development goals, which is enough to prove its emphasis on financial technology. First of all, regarding human resources, China Merchants Bank actively promotes allocating human resources to build a talent structure that meets the requirements of financial technology banks and adopts a strategy of internal training and external introduction. On the one hand, a set of systematic systems for internal training of scientific and technological talents is established, data analysis and R&D teams are strengthened, a smooth and echelon-reasonable talent structure is established, and all employees' understanding of financial technology is continuously enhanced, thereby improving their business level [23]. On the other hand, actively introduce external talents, especially those who cannot be cultivated in a short period, high-level, rare, and multi-field talents, to lay a solid foundation for the talent pool of financial technology. Figure 2.1 shows the number of financial technology talents and the changes in the number of employees in China Merchants Bank from 2018 to 2024

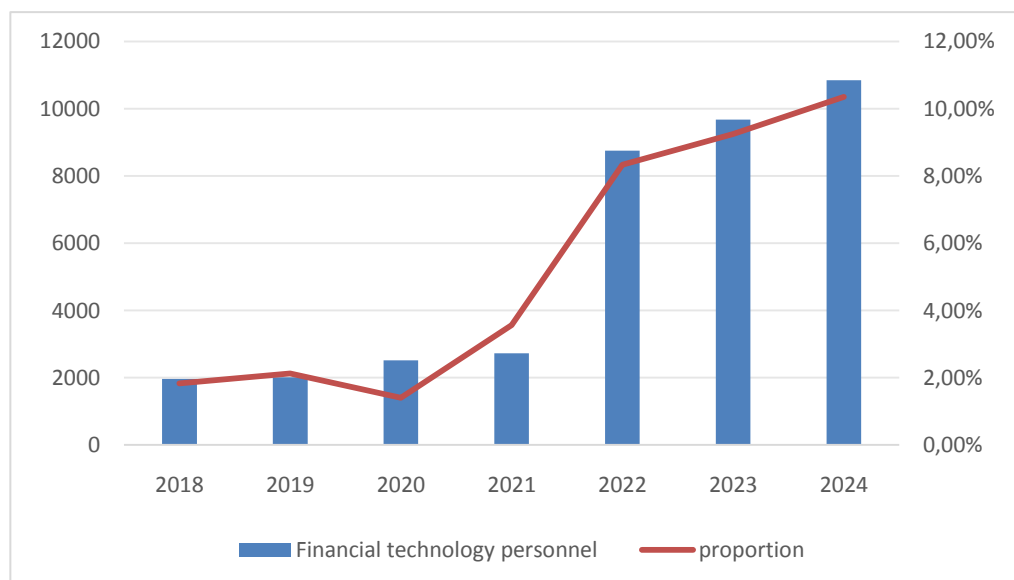


Figure 2.1-Financial technology personnel and their proportion in China Merchants Bank (Unit: person)

Source: [4]

The number of financial technology personnel has been steadily increasing. By the end of 2024, their number had reached 10,846, accounting for almost 8% of the company. It became the first joint-stock bank with more than 10,000 technology employees, with an increase of 7.9% compared with the end of last year, more than 7 times that of 2018.

Secondly, in terms of investment in financial technology, China Merchants Bank has set up a special fund since 2017. As of 2022, 3,242 projects have been approved and 2,450 have been launched. In addition to allocating 5 billion yuan a year for financial technology innovation, China Merchants Bank also uses 1% of its profits for investment, which shows its investment in financial technology[31]. This is also reflected in the annual report of China Merchants Bank. Before 2017, this fund was called "R&D expenses", and in recent years it has been called "information technology investment". Table 3-1 and Figure 3.2 show that China Merchants Bank's investment in financial technology in 2022 reached 11.47 billion yuan, accounting for 4.5% of the company's operating income. China Merchants Bank's investment in financial technology is on the rise, and it is in a leading position among banks of the same type.

Table 2.1- Financial technology investment of joint-stock banks in 2022

Bank Name	Technology Investment (100 million yuan)
China Merchants Bank	141.68
CITIC Bank	87.49
Industrial Bank	82.51
Shanghai Pudong Development Bank	70.07

Source: [6]

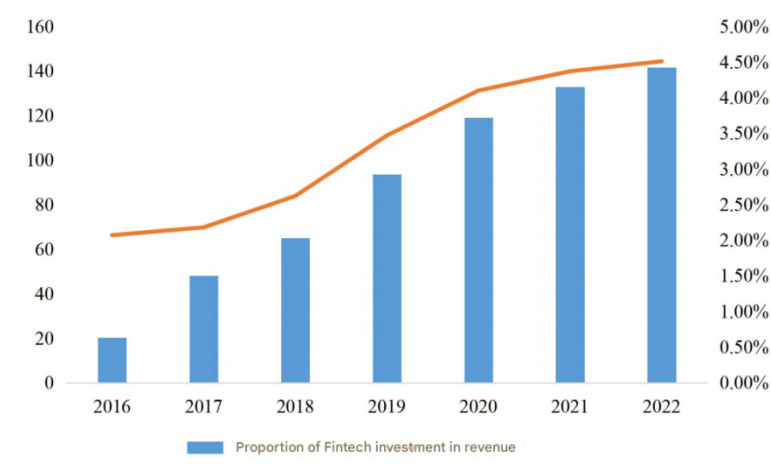


Figure 2.2 Investment in financial technology and its proportion of revenue of China Merchants Bank from 2016 to 2022 (Unit: 100 million yuan)

Source: [4]

The digital level of banks continues to improve. As China Merchants Bank realizes that its own system can no longer keep up with the development of technology, it has changed its organizational structure to adapt to the rapid development of financial technology. In the process of implementing digital transformation, we need to break the past concepts and build a supporting institutional framework. In the past, my country's commercial banks were mainly product-centric, and the technology department was responsible for providing support for basic business. However, due to the cumbersome loan approval process within the bank, it often resulted in low loan approval efficiency. In the Internet environment, because the information on the Internet changes rapidly, there must be greater flexibility while ensuring stability. China Merchants Bank is well aware of the importance of organizational structure change. By comparing with similar large domestic companies, in order to adapt to the needs of digital transformation, the organizational structure, decision-making process and cooperation mechanism have undergone comprehensive and in-depth changes. In terms of organizational structure,

in order to better use financial technology to optimize the business and make the organizational structure more flexible, China Merchants Bank readjusted its original organizational structure in 2019 to better meet customer needs and better guarantee customers' quality services. First, a financial technology affairs management center was established to unify and coordinate the bank's financial technology work. Second, the architecture of the information system was refined so that each information system could be directly connected to each business system, thus forming the information system architecture of China Merchants Bank. At the same time, in order to respond to relevant customer needs in a timely manner, financial technology was actively applied to the bank's business development process [40]. The efficiency of the bank's overall collaboration was improved through the integrated development of technology and business. China Merchants Bank is committed to creating a relaxed and pleasant working atmosphere and a free and open communication environment to provide employees with a comfortable soil for innovation. The bank has built a technological innovation and incubation service platform based on digital technology, providing solid support for technology research and development. In addition, the "Eggshell Platform" launched by China Merchants Bank has reshaped the decision-making process so that the voice of every employee can be heard. On this platform, opinions and suggestions are no longer limited by hierarchical relationships, and ideas for product improvement can be quickly adopted and put into practice. At the same time, China Merchants Bank has also carefully built a fund manager growth and cultivation platform for the public, aiming to discover and cultivate potential and capable fund managers[41]. This platform not only provides opportunities for incubation and locking in excellent fund managers, but also provides investors with more high-quality investment options. In order to achieve more efficient

transformation and development, China Merchants Bank not only actively promotes digital technology research and development and innovation internally, but also establishes close cooperative relations with financial technology companies. By working with external partners, the bank continues to expand its business areas and enhance its competitiveness in the financial industry. For example, China Merchants Bank and Tencent have established a strategic partnership, jointly developed electronic anti-counterfeiting technology, and found loopholes in it. China Merchants Bank and Huawei have carried out in-depth cooperation in many fields. Huawei provides "Hui Yan 11" big data services to China Merchants Bank, and has established a self-developed "distributed database" in three fields, including "distributed database", "Kunpeng computing" and "big data storage". China Merchants Bank has introduced foreign technology and capital, integrated network thinking with traditional business models, and has a lot of room for development in the field of financial technology.

In recent years, "digitalization" has become the theme of an era and a consensus for an enterprise to transform and upgrade. The scenarios covered by digitalization cover all aspects of enterprise operations. The business scenarios of different industries are very different. Therefore, the digitalization needs and processes of enterprises are also different. In digital transformation, a major problem that digital technology companies cannot avoid is how to fully use their advantages, grasp the digital essence of various industries, and help enterprises reduce costs and increase efficiency. In the process of digital transformation in my country, financial technology companies, mainly based on banks, have unique ways of solving this problem. For example, China Merchants Bank's "CMB Cloud Innovation" is a typical example [22]. It introduces financial technology into the digital scenarios of

enterprises, helping enterprises to promote "cost reduction and efficiency improvement" starting from cash management scenarios, and deeply explores and utilizes the data value in enterprises' internal capital flow scenarios, providing new ideas for industrial interconnection and digital services. Domestically, the banking industry has played an important role in investment and innovative applications in financial technology. In recent years, some commercial banks with strong technical capabilities have established financial technology subsidiaries as carriers for their financial technology output. As one of a bank's earliest financial technology subsidiaries in China, CMB Cloud Creation's main business is to provide financial technology services to the financial industry in the CMB system. In March 2020, CMB Cloud Creation began a new development. On the one hand, it became a financial technology service platform for CMB's public. It is responsible for exporting the financial technology accumulated by CMB for more than 30 years to the financial industry and the business community; at the same time, CMB Cloud Creation is also the carrier of CMB's enterprise digital business. It takes the Internet as the core of the industry, makes full use of its accumulated experience in financing enterprises, and applies financial technology to various business environments. From providing support for the internal system of CMB to developing customers in the market, CMB Cloud Creation's digital service path in the enterprise is obvious. CMB has paid great attention to the transformation of financial technology [25]. In 2017, it proposed building a "financial technology bank" and was the first commercial bank to launch this strategy. Digital products such as the Treasury Management Cloud CBS in 2007 have existed in the corporate fund management market for a long time and have always been regarded as the representative of CMB's corporate digital services. As a technology company, CMB Cloud believes that the best entry point for

technology-based enterprises is to digitize the company's cash flow. CMB Cloud has rich experience in financial management and has become a promoter of the company's digital transformation with its own experience. CMB Cloud uses "capital flow" as a front and "drawing silk" to help Chinese companies steadily move towards digital transformation. CMB Cloud provides a comprehensive financial management service system for enterprises through the digital product "Group Enterprise Treasury GET," including unified account management, centralized settlement management, fund planning management, risk management, etc., to help enterprises improve the effectiveness of capital operation, reduce investment costs, and prevent and control related risks. If onlineization and digitalization are used to collect the company's cash flow data, then intelligence is used to explore and release the value of the company's cash flow data. CMB Cloud provides strong support for creating enterprises' financial value in this field. CMB Cloud provides comprehensive digital services for enterprises and organizations regarding fund settlement, fund operation, investment and financing management, risk management, and management cockpit. The digital services for the enterprise's cash flow scenarios have technical and financial characteristics. Its financial characteristics determine its complexity and strong professionalism, which brings great challenges to pure technology companies. CMB Cloud has done well in both aspects. First, CMB Cloud has an in-depth understanding of corporate cash flow management needs from the banks' perspective and provides them with more abundant financial services [32]. CMB Cloud uses the "bank-enterprise direct connection" method and connects with over 180 banks. In addition, in terms of team structure, the core personnel of CMB Cloud come from major technology companies, international consulting companies, banks, and other

industries, forming a digital technology company oriented to financial services in the two fields of technology and finance.

2.2 Current Profitability of China Merchants Bank

China Merchants Bank has comprehensively improved its risk management system using financial technology, enhanced its risk management capabilities, and promoted the overall improvement of its capital and asset quality. By using technical means, China Merchants Bank has effectively reduced its non-performing loan ratio and promoted the improvement of the bank's overall profitability.

One of the main measures of China Merchants Bank's operating conditions is the scale of its deposits and loans. Since the interest rate spread between deposits and loans accounts for a considerable proportion of the bank's main business, it is also an important way for the bank to make profits. By sorting out China Merchants Bank's credit situation in recent years and analyzing its deposit and loan business, as shown in Figure 2.3, it can be seen that China Merchants Bank's loan scale has increased year by year. After actively adopting the fintech banking strategy in 2017, the growth rate of loan scale has also accelerated significantly. However, due to the impact of external factors, the growth rate declined in 2020. Despite this, China Merchants Bank's loan scale has increased significantly compared to when it did not implement the fintech strategy [31].

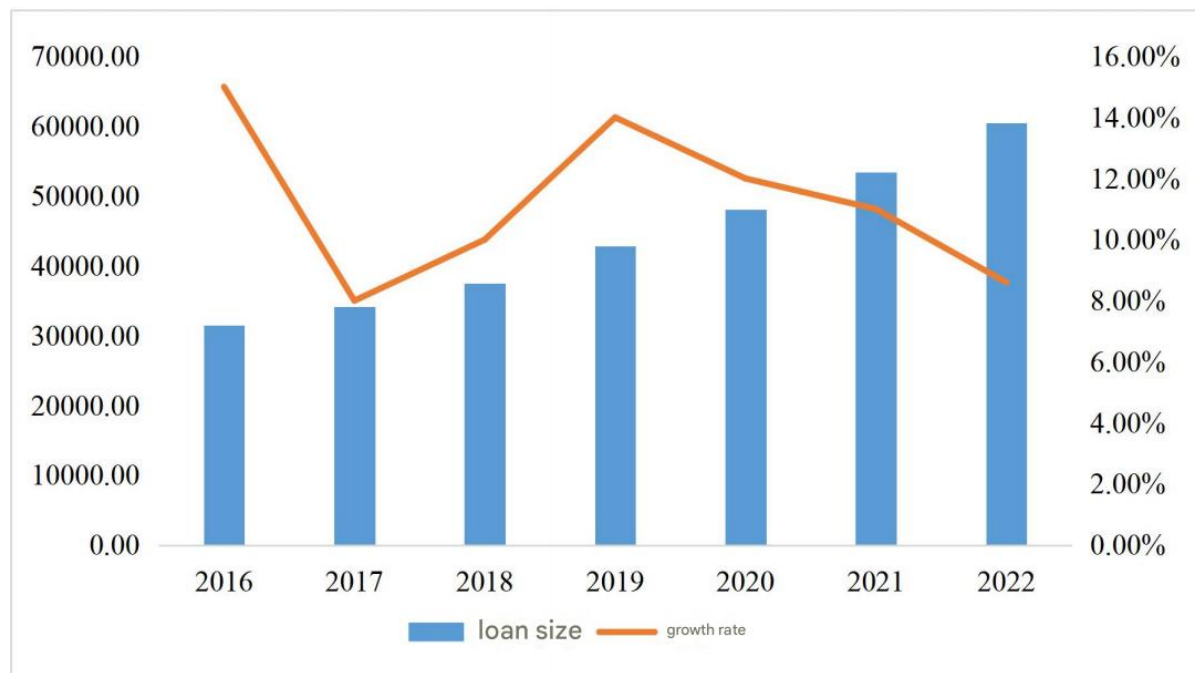


Figure 2.3-Changes in the loan scale and growth rate of China Merchants Bank
(Unit: 100 million yuan; %)

Source:[4]

Return on equity measures the efficiency of a company's assets in generating net income, that is, the net income that can be generated by a unit of assets, and is a standard for measuring a company's profitability. The higher the value of this index, the better the company's capital utilization, indicating that the company has obtained higher returns on the use of assets, and vice versa. As can be seen from Figure 3.4, since 2016, China Merchants Bank's return on equity has been growing steadily. Although it declined in 2020, it can be seen that in 2021, China Merchants Bank has gradually overcome external influences, and the return on assets has shown an upward trend. The return on equity has a great impact on the change ratio of China Merchants Bank's return on total assets. If China Merchants Bank wants to improve its profit level, it must increase the bank's return on equity.

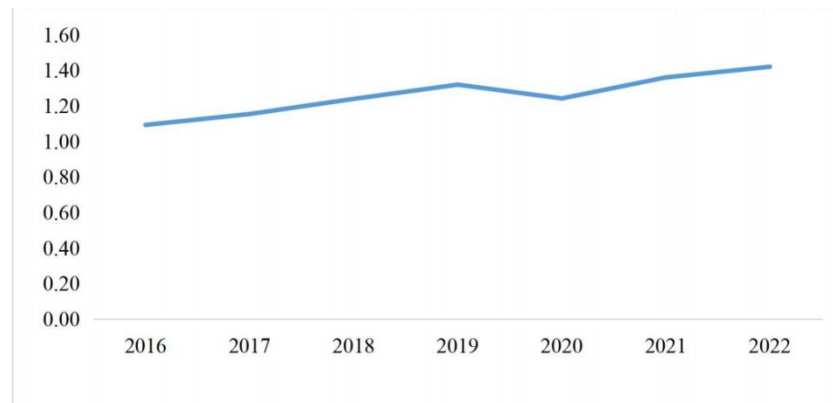


Figure 2.4-Trend of Return on Equity of China Merchants Bank (Unit: %)

Source:[4]

China Merchants Bank is gradually shifting to a light-asset operation model. At the same time, its capital adequacy ratio has also shown a significant growth trend. As shown in Figure 3.5, China Merchants Bank's capital adequacy ratio reached 15.48% in 2017, a significant increase from 13.33% in 2016, showing the rapid increase in its capital strength. After 2017, China Merchants Bank has maintained a capital ratio of more than 15%, and even reached 17.77% in 2022, showing a sustained and stable capital management capability. Its Tier 1 capital adequacy ratio has also been significantly improved to 15.75%, which is the best in recent years. This shows that China Merchants Bank's internal capital strength has shown a good development trend.

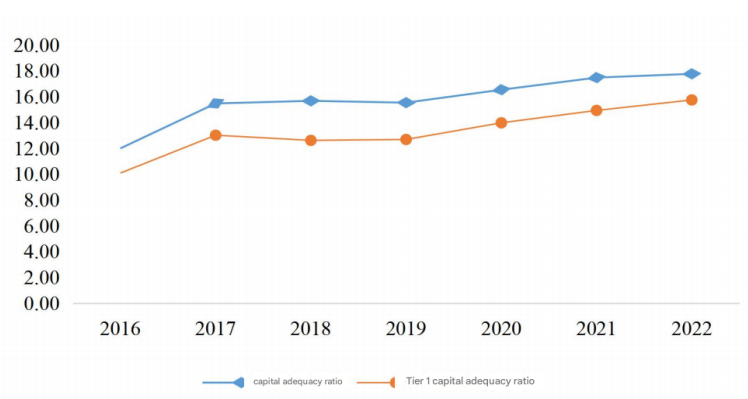


Figure 2.5 Capital adequacy ratio of China Merchants Bank from 2016 to 2022

Source:[4]

- Current status of liability business

Credit cards are an important means for China Merchants Bank to increase its profits. China Merchants Bank has introduced technology in credit card products, further expanded its brand influence, and thus increased the scale of the bank's asset-liability business.

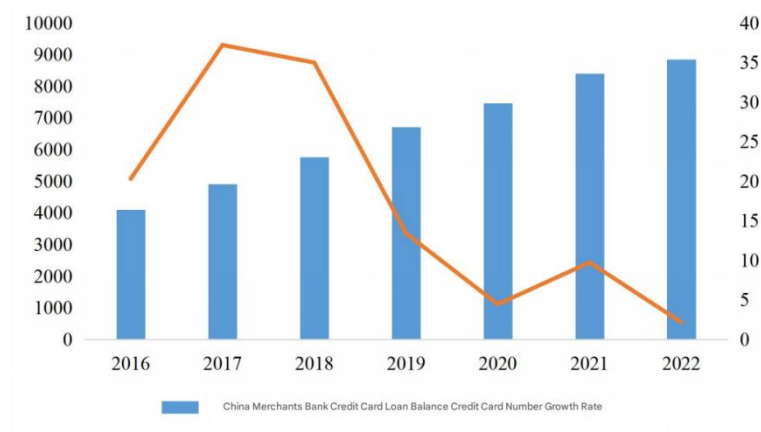


Figure 2.6 Credit card business of China Merchants Bank from 2016 to 2022
(Unit: 100 million yuan; %)

Source:[4]

As shown in Figure 2.6, the balance of credit card loans of China Merchants Bank has increased year by year, with an increase of 475.2 billion yuan compared with the same period in 2016, which has played a great role in promoting the development of China Merchants Bank's credit business. Although the number of credit cards of China Merchants Bank is increasing, the growth rate has declined significantly after 2018, which shows that although this innovative cross-field cooperation method has achieved obvious results, its endurance is limited. China Merchants Bank needs to continue to innovate in credit card products to ensure its stable development. Due to the influence of the external environment, the growth rate of China Merchants Bank's card issuance amount has declined significantly in recent

years, which requires China Merchants Bank to pay attention to it and reflect on its future development direction.

Deposit and loan business scale. In traditional commercial banks, deposit and loan business is the largest source of profit, among which the interest rate spread between deposits and loans is the main source of bank profits. China Merchants Bank has continuously improved its ability to acquire customers through innovative products and services, which has enabled it to expand its assets and liabilities in the process of conducting intermediary business, and at the same time promoted the rapid development of deposit and loan business. As can be seen from Figure 3.7, China Merchants Bank has maintained stable growth in both deposits and loans, and the deposit-loan ratio has been shrinking. In terms of growth rate, China Merchants Bank's deposit business has been growing faster and faster since 2018, and has maintained a good development momentum. In the past three years, although the growth rate of loans has declined due to the influence of the external environment, it has generally maintained a stable development trend [17].

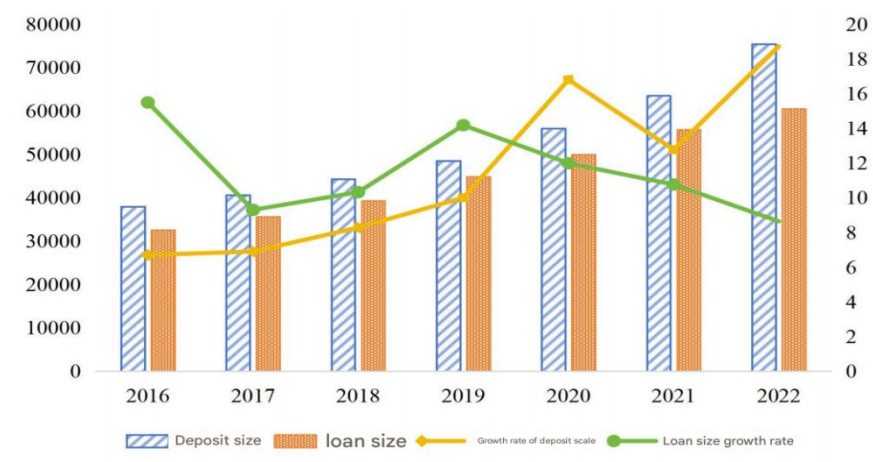


Figure 2.7 Deposit and loan business scale of China Merchants Bank from 2016 to 2022 (Unit: 100 million yuan; %)

Source:[4]

- Current status of intermediary business

From the perspective of commercial bank operating income, the interest rate spread between deposits and loans, fees and commissions are all considered as bank operating income, while the net income from renewal fees and commissions is also called intermediary business income. It has the advantages of low capital occupancy rate and relative stability, and is the manifestation of the bank's core competitiveness and innovative development.

Income structure. Generally speaking, banks with a higher type and proportion of intermediary business have higher equity returns and market value. By actively applying financial technology, China Merchants Bank has achieved income diversification. At the same time, its non-interest income has also gradually increased. As can be seen from Figure 3.8, the proportion of China Merchants Bank's net interest income has been declining overall, but it began to recover in 2022. The decline has been slow in the past three years, and the corresponding non-interest income ratio has increased slightly. However, China Merchants Bank's proportion in non-interest income has increased by 1.1 percentage points compared with 2016.

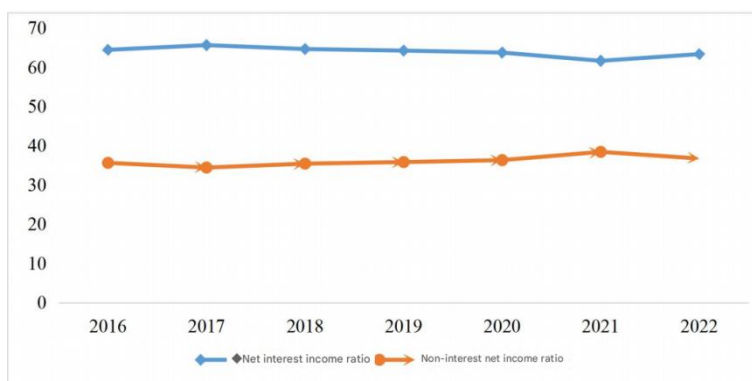


Figure 2.8 Changes in China Merchants Bank's income structure (Unit: %)

Source:[4]

In the overall trend, the proportion of non-interest income has been increasing in recent years, and only declined in 2022, indicating that its development in

non-interest income is constantly improving, but there is still a lot of room for development.

Fee and commission income.

Since China Merchants Bank implemented the light reform strategy in 2014, the growth rate of its intermediate business income has shown a significant growth trend. In particular, in 2021, China Merchants Bank's wealth management products grew rapidly. As shown in Figure 2.9, China Merchants Bank's contribution to intermediary business revenue reached RMB 35.841 billion, a significant increase of 29% over 2020. The "Big Wealth Management System" established by China Merchants Bank to adapt to digital transformation is based on technology and linked by digital operations. It has achieved an organic integration of investment and financing, and is an important measure for China Merchants Bank to improve its income level.

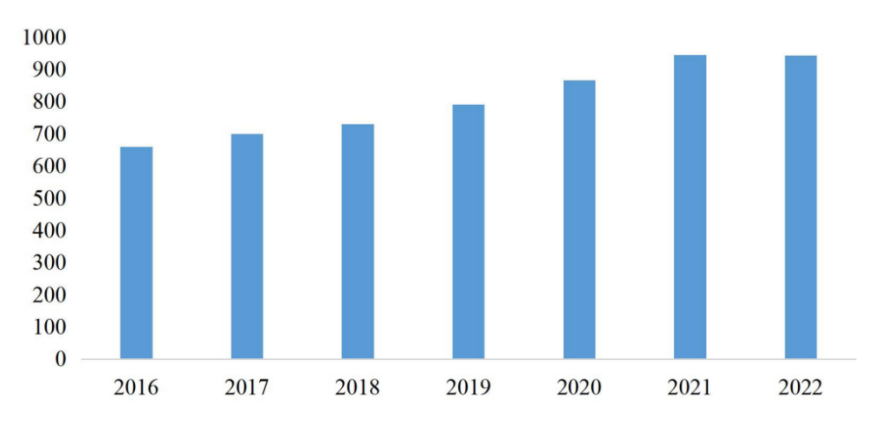


Figure 2.9 Changes in China Merchants Bank's Fee and Commission Income
(Unit: RMB 100 million)

Source:[4]

Proportion of various fees and commissions.

Financial technology developed rapidly from 2013 to 2015. China Merchants Bank's bank card business and settlement business were greatly affected and declined

to varying degrees. At the same time, due to the explosive development of financial technology, its agency business also showed a downward trend in 2015. As shown in Figure 3.10, from 2014 to 2022, China Merchants Bank still has great development potential in intermediary business. In the past two years, affected by the macroeconomic environment, the development of bank cards and settlement business has shown a downward trend. In the past two years, China Merchants Bank has provided customers with better services through a series of wealth management product reforms, which is mainly due to the increase in China Merchants Bank's commission and custody business. To this end, China Merchants Bank should give full play to the role of financial technology, strengthen support for intermediary business, form its own unique advantages, and promote its development.

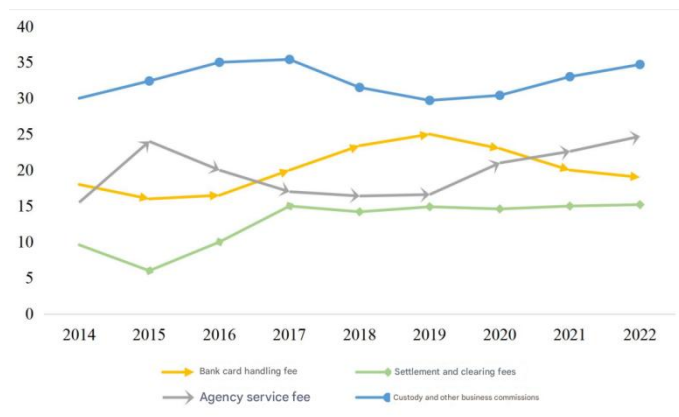


Figure 2.10 Trend of changes in the proportion of various fees and commission income of China Merchants Bank (Unit: %)

Source:[4]

2.3 The impact mechanism of financial technology on the profitability of commercial banks

The direct impact mechanism of financial technology on the profitability of commercial banks. Before the emergence of financial technology, in order to gain more customers, banks usually had to open up new markets through newly opened physical outlets, which led to an increase in personnel, venue, equipment and other costs. The development and application of financial technology has enabled commercial banks to break free from the constraints of space and time.

They can provide customers with 24-hour services online, thereby reducing the cost of setting up outlets and subsequent operating costs, and can save users' costs by simplifying procedures. Therefore, due to the limitations of scale, commercial banks must actively use financial technology to break through their limitations and achieve the goal of reducing costs and increasing efficiency. Commercial banks can use innovative means to effectively integrate limited financial resources and further optimize their business structure, thereby continuously improving the development level of banks (Hu Wentao et al., 2019).

At the same time, the use of information technology such as big data can enable financial technology to provide a strong driving force for the digital transformation of commercial banks. This transformation makes products and services more online and networked, significantly reducing dependence on manual labor, thereby improving the development level of banks (Li Yunda et al., 2020). In addition, the advanced technology of financial technology companies has played a demonstration and leading role for commercial banks, encouraging banks to learn and draw on the models and products of financial technology companies, transform their

service concepts, and thus improve the overall development level of banks. Commercial banks and financial technology companies can establish cooperative relationships and share huge customer resources. At the same time, commercial banks can provide payment and clearing services to financial technology companies to achieve complementary advantages and jointly improve their profitability (Shen Yue and Guo Pin, 2016). Based on the above analysis, this paper proposes hypothesis H1a. H1a: The application of financial technology can improve the development level of commercial banks.

- The impact of financial technology on bank profitability

The vigorous development of commercial banks in the field of financial technology is, on the one hand, to improve their own financial products and service levels, and on the other hand, to attract more new customers, thereby reducing customer churn. As a financial intermediary, commercial banks use big data, cloud computing and other technical methods to analyze customers' relevant data. On the one hand, they can alleviate the problem of information asymmetry, and on the other hand, they can more accurately understand and meet customers' investment preferences. While reducing risks, they can also increase the number of customers for corresponding businesses and enhance the bank's ability to obtain profits (Yu Fengqin and Yu Qianhui, 2021)[16]. Financial technology can improve the payment system of commercial banks. Financial technology makes payment and settlement services more convenient than traditional commercial banks. Due to institutional barriers, interest rate constraints and other factors, the traditional commercial banking system has the problem of inefficient use of funds. Financial technology breaks through the limitations of time and space, accelerates the circulation of funds, and enables both supply and demand sides to obtain the maximum benefits. With the

application of financial technology in the payment field, new payment channels and transaction methods are becoming increasingly diversified, which can effectively expand the service channels of commercial banks and enhance their profitability (Liu Mengfei and Wang Qi, 2021). Commercial banks use financial technology to simplify complicated business procedures and processes, improve operating efficiency, save more costs through systematic and digital operations, develop more application scenarios, and continuously expand the scale of deposits and loans and business scope, thereby increasing the profit space of commercial banks (Guo Lihong, Zhu Keda, 2021). Based on the above analysis, this paper proposes hypothesis H1b.

H1b: The application of financial technology can improve the profitability of commercial banks.

Based on the above analysis, hypothesis H1 is proposed: There is a linear positive correlation between financial technology and the profitability of commercial banks.

- Indirect impact mechanism of financial technology on the profitability of commercial banks

From the perspective of technological spillover effects, the development and application of financial technology has had a significant impact on the liability business of commercial banks. On the one hand, it has promoted the online process of liability business, increased the coverage of liability business, and opened up a wider range of acquisition channels for deposit liabilities. This enables commercial banks to use convenient payment methods to effectively absorb a large amount of idle funds, thereby enhancing their storage capacity (Qiu Han et al., 2018)[19]. On the other hand, financial technology has also had a positive impact on the asset business of commercial banks. It has promoted the onlineization of asset business and provided

huge development space for small and micro loans and consumer loan businesses. In addition, financial technology can also tap potential customers and reduce the problem of information asymmetry, thereby meeting the loan needs of a large number of long-tail customers, and the bank's asset-liability management capabilities as a transmission mechanism can improve the profitability of banks (Yu Fengqin et al., 2021).

The profitability of commercial banks can be reflected by the level of their asset-liability management. In order to maximize profits, commercial banks will reasonably allocate their debts and assets. Generally speaking, the asset-liability management capabilities of commercial banks are proportional to their profitability. From the perspective of technological innovation, if commercial banks can effectively integrate financial technology into their daily operations, they can conduct in-depth analysis in more dimensions and use the most accurate models to evaluate the risks and returns of their assets and liabilities. This can not only overcome the limitations of the single-factor model, but also improve the profitability of my country's commercial banks. Based on this impact mechanism, hypothesis H2 is proposed. H2: The application of financial technology can significantly improve the asset-liability management capabilities of commercial banks and further promote the improvement of their profitability [15].

From the perspective of commercial banks, the application of financial technology plays a key role in enhancing risk management, and thus can improve their profitability (Chen Yun et al., 2021). Through an empirical analysis of the dynamic relationship between the profitability and risk management level of commercial banks, the results show that the profitability of commercial banks is affected by various risk management indicators including non-performing loan ratio

and liquidity ratio. Through quantitative analysis, it can be concluded that on the basis of applying financial technology to improve the risk management level, the profitability of commercial banks is expected to be improved (Zhang Qiwen, 2012). The progress of financial technology provides banks with a variety of management methods and tools, enabling banks to comprehensively monitor the entire life cycle of the business. This monitoring not only enhances the effectiveness of internal supervision of banks, but also reduces management costs. In addition, financial technology also helps banks obtain more objective and accurate user data, alleviates the problem of information asymmetry, and improves the risk management level of banks. (Du Chaoyun, 2023) Through the intermediary effect model test, it is concluded that the risk management ability of commercial banks shows a significant positive intermediary effect in the path of financial technology development affecting profitability[27]. Commercial banks can make timely adjustments to their strategies by using financial technology, which greatly improves their risk management level, thereby ensuring that their profitability can be steadily improved. Based on this mechanism of action, hypothesis H3 is proposed. H3: The application of financial technology can significantly improve the risk management ability of commercial banks and further promote the improvement of their profitability.

Intermediary mechanism of bank intermediary business income Commercial banks use digital technology to optimize payment platforms, thereby providing users with more efficient and convenient payment and settlement services. Secondly, this convenience also enhances users' dependence and loyalty to commercial banks, thereby promoting their profitability growth (Li Xiangqian, He Zhuoyi, 2021) It is proposed that the development of financial technology can change the existing business structure of commercial banks, enrich the bank's income sources and

business models, and has a significant positive effect on increasing the bank's intermediary business income. Fintech has promoted product and business innovation of commercial banks, improved customer stickiness and retention rate, and further expanded off-balance sheet business and increased intermediary business income. Carrying out intermediary business can help commercial banks expand their business scope and thus improve their profitability. Fintech can provide technical support for commercial banks to develop intermediary business, which is conducive to increasing intermediary business income, and the increase in intermediary business income will have a positive impact on bank profitability (Yu Fengqin, Yu Qianhui, 2021). Commercial banks use financial technology to continuously optimize traditional products and business services, and in the process of integrating and developing with financial technology companies, they reduce the information asymmetry between banks and customers and between different banks, thereby promoting the steady growth of intermediary business income[22].

At the same time, with the help of advanced big data technology and algorithms, an efficient data analysis platform has been built. Through in-depth mining of standardized data, banks can more accurately grasp customer needs and provide customers with more personalized precision marketing services, thereby promoting the improvement of bank profitability. Based on this impact mechanism, hypothesis H4 is proposed. H4: Fintech has promoted the increase of commercial banks' intermediary business income, thereby promoting the improvement of their profitability.

CHAPTER 3

SUGGESTED MANAGEMENT EFFICIENCY OPTIMIZATION PATH

3.1 Problems in the digital transformation of retail business of Pufa Bank

The growth rate of financial technology investment has slowed down. Digital transformation requires huge investment costs, including technology platform construction, talent training, etc., which will put certain pressure on the financial situation of commercial banks. Commercial banks need to invest a lot of money in digital transformation, which may face major problems for some banks. Although Pufa has continuously strengthened its investment in financial technology, information technology and other aspects in recent years, the growth rate has continued to shrink, from 38.71% in 2020 to 4.49% in 2022, and the decline in two years has reached 34.22 percentage points. The growth rate has slowed down rapidly, and the investment has been severely reduced, which is at a relatively low level among national joint-stock commercial banks. At the same time, the growth rate of scientific and technological personnel has dropped from 50.31% in 2020 to 0.33% in 2022, a decrease of nearly 50%, and the number of scientific and technological personnel has increased less [17].

Lack of business talents for digital transformation. For retail business to achieve digital transformation, it is necessary to have a good talent guarantee, especially the construction of the marketing team is crucial. The human resources management department of Shanghai Pudong Development Bank has also formulated many measures on how to carry out talent research and development and training, but

talent training, especially the training of professional talents, is a systematic project and will not be effective in the short term. At present, the job competence of new employees of Shanghai Pudong Development Bank is insufficient, and the ability and quality of account managers are also far from the development of retail business. Among the existing marketing personnel, the proportion of personnel who are familiar with market requirements and product attributes is not high, and the number of account managers with outstanding business capabilities is not large. Due to the lack of reserve forces in the team, the last elimination mechanism is not well implemented, and there are still great problems in talent training.

Weak digital infrastructure. Data connection is the technical route of digital transformation. Perfect data flow is the blood of bank operations and the key to banks building core competitiveness in digital transformation. Integrate the data retained in various links of the bank's daily operations through technical platforms and data platforms to promote the rapid flow of business data in the operating links, reduce the cost of data use, and enhance the innovation and development mode of various bank businesses [27].

At present, there is an outsourcing phenomenon in the core technology of Shanghai Pudong Development Bank. The underlying technical capabilities cannot be bought, the technical platform itself cannot evolve and iterate, and the team is relatively closed. In the long-term iteration process of digital transformation, business-related needs are constantly changing, emerging technologies are constantly being introduced, and the smooth expansion and smooth evolution of digital systems are more important. The closed group of systems or platforms will hinder digital transformation. A technical platform with heavy policies and rigidity is difficult to respond to customer needs agilely and quickly in the digital economy era.

3.2 Challenges faced by the digital transformation of Pudong Development Bank's retail business

The market competition environment is becoming increasingly complex.

With the rapid development of the Internet and mobile technology, new competitors such as Internet banks and payment institutions continue to emerge, posing a threat to market share and customer loss to traditional commercial banks. The transaction scale of China's Internet banks has reached 35.8 trillion yuan in 2019, a year-on-year increase of 21.7%. These new competitors are deeply loved by many young customers with their convenient, efficient and innovative features, including some core customers of traditional commercial banks. This has forced traditional commercial banks to face the competitive pressure of powerful opponents and try to find strategies to maintain their leading position in digital transformation[29].

Diverse consumer demands. With the rise of financial technology, consumers' expectations and demands for financial services have changed, and traditional retail business models are facing the challenge of innovation and change. Consumers pay more attention to personalized, convenient and efficient financial service experience. Traditional bank counter services and traditional financial products can no longer fully meet their needs. Therefore, commercial banks need to focus on digital transformation, create smart retail, and introduce information technology to innovate business models and provide more convenient, customized and efficient banking services to attract and retain customers.

According to survey data, more than 60% of consumers said that they hope banks can provide more personalized, convenient and efficient financial services. Therefore, the inherent retail business model needs to focus on transformation. The personalization and differentiation of individual customer needs are becoming more

and more obvious. To meet customer needs, commercial banks need to provide more accurate and customized products and services, which is also a big challenge. Different consumer groups have different needs and preferences. They hope to get customized financial solutions for their specific needs. Traditional banks need to have a deep understanding of customer preferences, and provide differentiated services and products through big data screening and artificial intelligence technology to increase customer stickiness and trust and maintain competitive advantages[34].

Strengthening market supervision and compliance requirements. Financial supervision has entered a new stage of in-depth, all-round, and multi-field collaborative governance of financial risks. The two sessions held in 2022 passed a new round of institutional and mechanism reform plans of the State Council, and established the State Financial Supervision and Administration Bureau to assume some of the responsibilities of the central bank and some of the responsibilities of the China Securities Regulatory Commission on the basis of the original functions of the China Banking and Insurance Regulatory Commission, and strengthen the function of supervising finance. In addition, the release of new regulatory regulations such as the "Commercial Bank Financial Asset Risk Classification Method" and the "Commercial Bank Capital Management Method (Draft for Comments)" will promote the banking industry to comprehensively strengthen risk prediction and control capabilities, standardize business operations, protect consumer rights, and increase work in anti-terrorism financing.

At the same time, in response to the current situation of financial technology innovation and development, requirements for strengthening digital risk control management capabilities and preventing information security levels have been put forward. Stricter financial supervision, rising compliance risks and regulatory costs

have brought certain pressures to the development of retail business. Banks need to comply with various laws, regulations and regulatory rules to open retail businesses and ensure the safety and compliance of customer funds. However, the frequent adjustments and uncertainties of regulatory policies, as well as the regulatory authorities' increased regulatory requirements for the financial technology field, have added considerable challenges to banks' compliance risks. Banks need to maintain communication and cooperation with regulatory agencies while strengthening risk management and compliance construction to ensure the normal operation of retail business[36].

3.3 Countermeasures and Suggestions

Strengthen cooperation with financial technology companies. With the advancement of the financial technology wave, cooperation between commercial banks and financial technology companies is particularly critical.

With its keen technical insight and innovation ability, financial technology companies have achieved remarkable achievements in the research, development, and application of digital technology. However, commercial banks have used digital technology to expand their business relatively late, restricting their development potential in certain areas. Therefore, commercial banks can draw inspiration from the valuable technical resources and business models of financial technology companies,

They should cooperate sincerely with financial technology companies to explore innovative business models, develop financial technology applications, and jointly promote long-term collaborative progress to serve customers better and enhance market competitiveness. Through the integration and development with

financial technology companies, commercial banks can not only solve the problems in technology application and customer service but also help them achieve digital transformation[39]. The cooperation between commercial banks and financial technology companies can further broaden the service scope and meet more diversified customer needs. In the collaboration process, the two sides can share resources, complement each other's advantages, and jointly promote the prosperity and progress of the financial technology and banking industries. Through deepening cooperation, commercial banks can better meet the needs of various customers and enhance their competitiveness and profitability. Commercial banks should improve service quality and efficiency through close collaboration with financial technology companies to achieve this goal. At the same time, they should be prepared to respond to market challenges, actively seek cooperation opportunities, and jointly promote the development of financial technology through complementary advantages to achieve a win-win effect. This cooperation model helps promote commercial banks' digital transformation, enhance their market competitiveness, and ultimately achieve a win-win situation for both parties[41].

Innovative financial service means. Fintech has brought significant changes to the domestic mobile payment business. Various payment products continue to appear in people's sight, and their application scenarios have also changed accordingly, which profoundly impacts people's daily lives.

Commercial banks should take relevant measures in a targeted manner according to their actual situation, make full use of the relevant concepts of financial technology, and combine the specific business scenarios of commercial banks to realize the digital transformation and upgrading of the payment and settlement business.

This requires commercial banks to develop practical payment tools actively, continuously meet the new needs of customers, and enhance business competitiveness by enhancing user stickiness.

Specifically, commercial banks should start from two aspects: first, continuously optimize and upgrade payment tools for actual application scenarios to make them closer to customer needs; second, strengthen the publicity and promotion of new payment and settlement tools to enhance the popularity and influence of bank brands. At the same time, to realize accurate, innovative counter services, commercial banks need to increase R&D investment, widely deploy self-service business processing machines in business outlets, improve service efficiency and customer experience, highlight real self-service, innovative finance, etc., so that customers do not have to worry about queuing problems and can enjoy convenient and timely financial services[35].

Vigorously develop intermediary business. In the current market environment, fees and investment businesses have become the main pillars of bank non-interest income. At the same time, income from bank cards, custody, and wealth management businesses was prominent in fees and commissions.

Therefore, increasing the income of these three businesses is beneficial to improving the operating efficiency of banks and the key to optimizing the profit structure. By optimizing the income structure of these businesses, banks can better adapt to market changes, improve overall profitability, and lay a solid foundation for future development.

Facing the downward trend of bank card business operating income of major banks in my country, commercial banks urgently need to respond to this challenge through innovative credit card business. Through the power of financial technology,

commercial banks can gain insight into customers' consumption habits and preferences, thereby providing customers with more accurate and personalized services. Secondly, commercial banks should increase their promotion efforts; for example, China Merchants Bank has a 50% discount promotion every Wednesday to increase the number of customers and improve customer loyalty; finally, commercial banks.

Can also handle credit card business online through cooperation with Internet companies. With the rise of modern financial technology, commercial banks have achieved massive profit growth through their wealth management products. First, to obtain a steady profit, a particular scale is required, so commercial banks should actively promote its development and increase its transaction volume; second, commercial banks should expand their business scale through segmentation and encourage the rapid growth of trust products; while expanding trust business, commercial banks must actively use financial technology to improve and perfect their risk control system. This can ensure that banks can achieve functional diversification on a stable basis and help them cope with the challenges of emerging competitors such as financial technology companies. In recent years, the wealth management business has become an important development strategy for commercial banks[33]. Its vast development potential has brought rich non-interest income to my country's banking industry. Despite this, the wealth management products launched by my country's commercial banks are often limited by narrow investment channels, high participation thresholds, and relatively low returns. To overcome these challenges and seize potential opportunities in the market, commercial banks should actively use financial technology tools to gradually realize the transformation and upgrading of wealth management products, constantly adapt to market demand, and better meet the

needs of small and micro customers. In addition, popularizing financial risk knowledge and providing customers with free professional financial advisory services are also the keys to improving customer experience and enhancing customer stickiness. Commercial banks also need to build a financial management platform that breaks through the time and space constraints of transactions to reduce costs further and provide more convenient services. This will minimize service costs and give customers a more efficient and flexible financial management experience [26].

Strengthening financial technology risk prevention.

The development of financial technology is a key factor in promoting the digital transformation of banks and improving profitability. However, technical risks such as information leakage cannot be ignored in this process. Therefore, when pursuing the profit growth brought by financial technology, banks must attach great importance to risk management, use current advanced technical means to build an effective risk control system and conduct a comprehensive assessment of their ability to resist risks. In addition, from a long-term perspective, banks also need to combine the characteristics of the financial industry and strengthen their supervision to ensure the stability of the financial market. In times of economic uncertainty, banks should appropriately develop financial technology based on their development and profitability, formulate a rigorous business review system, and effectively prevent non-systemic risks to achieve sustainable growth and profitability improvement. Commercial banks need comprehensive software and hardware support to effectively supervise financial technology, which is the cornerstone for ensuring the safe operation of financial technology. However, with the rapid advancement of technology, the risks involved in banking business are increasing. To maintain competitiveness and achieve sustainable development in the new digital environment,

commercial banks must build a risk management system that matches their business needs[35]. To achieve this goal, establishing an intelligent risk control system has become a wise choice for commercial banks to deal with financial risks, which can significantly improve the efficiency of risk management. In the new digital environment, when conducting risk control, commercial banks must conduct a more comprehensive and accurate evaluation of customer information and data to determine the type and source of information provided by customers and then find out the risk factors and possible fraud contained in this information, and take effective countermeasures to avoid potential risks. Commercial banks can protect user privacy by establishing a distributed, encrypted, and unforgivable information-sharing platform. In addition, in cooperation between commercial banks and fintech companies, they should strictly follow fintech security specifications to ensure compliance with daily operations. Refer to the guidance of industry experts, conduct detailed compliance risk reviews regularly, and accept professional supervision to continuously optimize and improve the technical capabilities of data processing and system maintenance. In this way, banks can improve the adaptability of financial services while continuously enhancing risk prevention capabilities, ensuring that financial technology promotes the development of the banking business and protects the safety of customers' funds [39].

CONCLUSIONS

To study the impact of financial technology on bank profitability and the occurrence of its impact path, this paper uses a combination of theoretical and empirical methods; taking China Merchants Bank as an example, first analyzes the relationship between financial technology and China Merchants Bank's comprehensive profitability from a theoretical perspective. Then, the impact mechanism of financial technology on commercial bank profitability is discussed. Based on the data of China Merchants Bank from 2009 to 2022, an empirical analysis is conducted to examine the impact of financial technology development on China Merchants Bank's profitability and the intermediary transmission mechanism. The research results show that:

Financial technology can improve the profitability of commercial banks. From theoretical research, financial technology drives China Merchants Bank's innovative development. China Merchants Bank has also continuously increased its investment in financial technology and actively carried out digital transformation. From the perspective of the impact mechanism, with the rapid development of financial technology, the assets, liabilities, and intermediary businesses of traditional commercial banks will have a technology spillover effect. At the same time, financial technology can also help commercial banks improve their development level and profitability and positively impact profitability. From the mediating effect analysis perspective, financial technology is conducive to commercial banks improving their asset-liability management capabilities and risk management level, thereby promoting the improvement of commercial banks' profitability. The empirical results show that financial technology positively impacts the profitability of China Merchants Bank. With the acceleration and improvement of the development of

financial technology, the profitability of China Merchants Bank will also be further improved.

The financial technology service model of commercial banks needs to be innovated. In the empirical part, this paper regresses the "development level factor" and "profitability factor," of profitability respectively, and finds that the application of financial technology has a significant impact on the "development level factor." Still, the effect on the "profitability factor" is not substantial enough. The increasing diversification of new payment channels and transaction methods can effectively expand the service channels of commercial banks, enhance their ability to obtain income, and thus improve their profitability. Therefore, there is much room for improvement in commercial banks' financial technology service model.

The reform and development of commercial banks in intermediary business needs to be improved. The test of the mediation effect shows that the use of financial technology by China Merchants Bank can enhance the bank's profitability by improving the bank's asset-liability management capabilities and risk management level. Still, the impact of the bank's application of financial technology on its intermediary business income is not significant. Since the application of financial technology is mainly based on traditional credit services and personalized payments, the intermediary business of commercial banks has not been well innovated and developed. Therefore, under the development situation of the new era, commercial banks should fully explore the development opportunities of financial technology, combine their specific conditions, actively develop intermediary businesses, carry out financial technology innovations that are suitable for them, improve their services and profits, and promote their own better development.

Economic uncertainty will affect the impact of financial technology. The moderating effect shows that the higher the uncertainty of monetary policies, the lower the banks' profitability. Economic uncertainty negatively moderates the relationship between financial technology and the profitability of China Merchants Bank. Therefore, commercial banks can use financial technology to improve profitability, but in periods of economic uncertainty, banks should appropriately develop financial technology based on their development and profitability. It is essential to pay attention to the comprehensive assessment of the bank's operating ability and ability to resist risks in expanding business and formulate a rigorous business review system to avoid the decline of commercial bank profits due to business expansion.

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APPENDICES