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THE APPLICATION AND DEVELOPMENT TREND OF FINETECH IN COMMERCIAL BANKS ON THE EXAMPLE OF CHINESE COMMERCIAL BANKS

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GENERAL CHARACTERISTIC OF THE WORK

Master's thesis: 77 p.,6 figures, 13 tables, 43 sources.

FINTECH, COMMERCIAL BANKS, OPERATIONAL EFFICIENCY, APPLICATION, ASSET BUSINESS, LIABILITY BUSINESS, INTERMEDIARY BUSINESS, RISK PREVENTION, STRATEGIES, CHINA

The aim of study is under the background of Fintech, commercial banking business optimization countermeasures.

In order to achieve the above stated goal, the following **objectives** have been developed: defining the concept of Fintech; described the function and application of Fintech; explained the theoretical analysis of Fintech on the operational efficiency of banks; explored the impact of Fintech on the business model of traditional commercial banks; formulated methods to improve the operation of commercial banks.

Object of the research is commercial banks under the background of Fintech. Ant financial services and Ten Pay of Fintech representative enterprises were selected for the corresponding empirical research.

Subject of the research is combined with the characteristics of the traditional business model of commercial banks, analyzed the impact of Fintech on commercial banks.

Research methods: qualitative analysis, quantitative analysis, literature research, case analysis.

Realm of the possible practical application: improve the theoretical development and method requirements to the level of specific practical suggestions, which can be used for both further scientific research and theoretical research and be used in the business improvement of commercial banks to form the effectiveness of the combination of Fintech and commercial banking business.

The author of the paper confirms that the computational and analytical material provided in the thesis reflects the state of the process under investigation correctly and objectively, and all theoretical, methodological and methodical provisions and concepts are referenced to their authors.

CONTENTS

INTRODUCTION

Fintech mainly refers to the application of new technology in the field of financial services, thereby creating a new financial product or service model, enabling customers to enjoy more superior financial services, and controlling the cost of financial services at a lower level. Fintech can reshape financial business, improve customer experience, make financial business more in line with market needs, and generate a continuous vitality. In China, Fintech permeates all aspects of daily life. The majority of urban and rural residents have been inseparable from WeChat and Alipay businesses, and people's daily economic activities are gradually changing. Fintech can not only bring more convenient financial service experience to people, but also have a direct impact on traditional commercial banks.

As a component of social economy, the financial activities of commercial banks are inseparable from science and technology. Only under the organic integration of science and technology and finance, can commercial banks innovate more new financial businesses that are suitable for social development and people's living needs, so as to ensure the healthy and sustainable development of commercial banks under the background of Fintech, otherwise they will be eliminated by the market. Under the background of Fintech, all commercial banks are actively expanding the field of financial business, from Inclusive Finance for low-income people to green finance for environmental protection, which is inseparable from Fintech instead of simply pursuing efficiency maximization, Fintech should not only serve the operation and development of commercial banks, but also serve the society.

With the society stepping into the information age, the extensive application of big data, artificial intelligence, cloud computing and other technologies in the financial field has made the technology and finance better integrated. Commercial banks should not only actively respond to the challenges from Fintech, but also constantly optimize and innovate banking business with the help of Fintech, so as to provide more comprehensive and effective financial services to the public and promote the sustainable development of social economy. Therefore, it is of great practical significance to choose the research on the development of commercial banks under the background of Fintech to help commercial banks improve their own business system and establish a Fintech mechanism to meet their own development needs, so as to promote their own sustainable development.

As a new concept, Fintech needs detailed analysis, including its definition, function, theory involved and application. This is also conducive to in-depth analysis of the impact of the development of commercial banking business under the background of Fintech, such as asset business, liability business and intermediary business. Based on this, the Bank improved its business process, avoided risks and explored new development trends of commercial banks.

The object of research is commercial banks under the background of Fintech.

The subject of the research is combined with the characteristics of the traditional business model of commercial banks, analyze the impact of Fintech on commercial banks.

The purpose of the work is combined with the characteristics of Fintech, this paper analyzes the transformation ideas of the integration development of commercial banks and Fintech and proposes scientific transformation countermeasures and Implementation Paths.

Research Objectives:

-describe the overview of Fintech.

-show the impact of Fintech on the operational efficiency of commercial banks.

-analysis the impact of Fintech on the business of commercial banks.

-analysis of the impact of Fintech on the profitability of commercial banks

-explore the risks of Fintech development.

-purpose transformation countermeasures and Implementation Paths for commercial banks.

The theoretical and methodological basis of the study was the work of domestic and foreign economists on the problems of financial management, analysis of financial and production activities of commercial banks.

In the process of research, the paper analyzes and uses the analysis made by the research teams of various economic colleges, scientific conferences and seminars on the integration of Fintech and commercial banks.

To achieve the goal set in the work, the following research methods were used: Qualitative analysis, quantitative analysis, literature research, case analysis.

The scientific novelty of the work is based on the annual report data of 16 listed commercial banks and the related data of ant financial services and Ten Pay on behalf of Fintech enterprises, a panel data model is established to conduct empirical analysis on the impact of traditional business profitability of banks. And using the panel data of 29 A-share representative listed banks from 2007 to 2019, the sample includes 5 large banks, 8 joint-stock banks and 16 other banks (including 11 urban commercial banks and 5 rural commercial banks), to analyze the impact of financial technology on the profitability of commercial banks.

The practical significance of this research lies in the selection of Fintech background of commercial banks to carry out research, help commercial banks to improve their own business system, so that they can establish a Fintech mechanism to meet their own development needs, as to promote their own sustainable development.

CHAPTER 1
THE OVERVIEW OF FINTECH

1.1 The development stage of Fintech

The term Fintech is a combination of Finance and Technology, which is defined in the Oxford dictionaries as computer programs and other technologies used to support banks and other financial services.

From the perspective of the application of technology in the financial field, up to now, the development of Fintech has 3 stages: the first stage is 1.0, the second stage is 2.0, and the third stage is 3.0.

-In the period of 1.0

Fintech was mainly used in banks, securities and other financial service institutions, with IT technology as the main technology and top-down promotion to make the operation Electronic and automatic. At that time, the data used was small and closed. Most of the small and medium-sized city commercial banks were still in the stage of infrastructure construction and did not bring significant leading advantages.

-In the period of 2.0

Products such as a third-party payment platform and P2P lending can be used. This stage is characterized by mobile Internet applications, that is, the era of "Internet + finance". During this period, many non-traditional financial companies developed rapidly. They established an online business platform, from offline to online, and collected users and their information online to achieve the connectivity of financial assets transactions and payments.

-In the period of 3.0

Technology is known as intelligent Fintech. With the use of new technologies such as cloud computing, big data, artificial intelligence and Internet of things, financial institutions have made breakthrough changes in product optimization, risk prevention and control, customer information collection and investment and financing decisions, such as big data credit investigation and fraud prevention, intelligent investment management, intelligent finance and Inclusive Finance. Finance has been completely digitalized, and many links can be replaced by scientific and technological means. Therefore, finance and technology are closely related business forms. Science and technology have a very important driving force in the development of the financial industry, which can make the financial industry full of vitality and promote the vigorous development of the financial industry.

IOSCO (International Organization of Securities Commissions) released the Fintech research report in February 2017, which divides the development process of

Fintech into the following three stages from two aspects of emerging technology and innovative business model evolution:

Fintech 1.0 era (1866-1967) the Fintech 1.0 era started in 7 businesses, such as ATM and POS The application of credit machine, credit system, clearing system and credit reference system has significantly improved the service efficiency of financial institutions, and continuously reduced the operating costs. At this stage, the development of Fintech mainly relies on policy guidance and capital support. In 2011, the central bank and other departments identified 16 areas as the pilot areas for the combination of technology and finance, which effectively promoted the development of Fintech.

Fintech stage 2.0 - financial channel networking

2013 is the first year of the development of Internet Finance and the beginning year of China's Fintech 2.0 stage. At this stage, the essence of the development of Fintech is the gradual realization of network financial channels, and the emphasis on channel development gradually turns from offline channels to online channels. Through the construction and improvement of online platform by emerging technologies, more financial business will be transferred to online, providing more convenient services for customers, which is also conducive to the expansion of "long tail customers"; at the same time, Internet technology is also used to collect and analyze customers' information, so as to achieve real integration in information sharing and business development.

Fintech stage 3.0 - deep integration of Finance and technology

Stage 3.0 of China's Fintech since 2016 At this stage, finance and technology need to be deeply integrated. Besides Internet technology, more emerging technologies such as big data, cloud computing, Internet of things, blockchain, etc. are applied by financial institutions to the innovation of business, products, models, etc. in this process, financial institutions are constantly seeking transformation and upgrading to improve market competitiveness, Narrow the gap with developed countries in the development of Fintech. This stage is the era of artificial intelligence, the combination of Finance and technology, which has a profound impact on the development of traditional finance.

With the closer integration of Finance and technology, Fintech will have the following development trends:

Relying on cloud computing technology, there will be financial cloud. Financial cloud service aims to provide IT resources and Internet operation and maintenance services for banks, funds, insurance and other financial institutions.

Big data application realizes the cross-border integration of finance. For example, the cross-border integration of Weizhong bank and Tencent, and the cross-border cooperation between Shanghai Pudong Development Bank, Baidu and China Mobile.

Artificial intelligence will be more widely used in the financial field. For example, from face payment to high-speed ETC automatic payment and so on, all reflect the development of artificial intelligence in financial technology.

Financial blockchain from concept to practical application. The development of blockchain technology has laid the foundation for financial business reform, and its development is also inseparable from the support of data and information technology.

Since the subprime mortgage crisis in 2008, the capital absorbed by Fintech companies of various countries in the world has shown an obvious upward trend every year, which has increased 20 times this year. The annual growth rate of global investment in Fintech is also very fast. In just a few years, in 2008, the amount of investment in Fintech was US $930 million. In 2014, the amount rose to US $12 billion, and in 2015, it reached a record US $19.1 billion.

According to the data provided by 01 financial investment and financing database, in 2016, global Fintech companies received a total of 504 investments, with a total amount of 117.7 billion yuan, of which the number of financing transactions in China accounted for 56% of the total investment and 78% of the total financing. In 2017, there were 649 financing transactions of global Fintech companies, with a total financing amount of 139.7 billion yuan, among which China had the largest financing amount, with a total financing amount of 79.6 billion yuan, accounting for 57% of the total financing amount, ranking first in the world. In 2017, the number of Fintech investment and financing reached its peak in December, and the amount of financing reached its peak in November. In the second half of this year, the wave of Fintech listing in China helped to promote global Fintech financing, which was higher than that in the first half of this year, as shown in Figure 1.1.

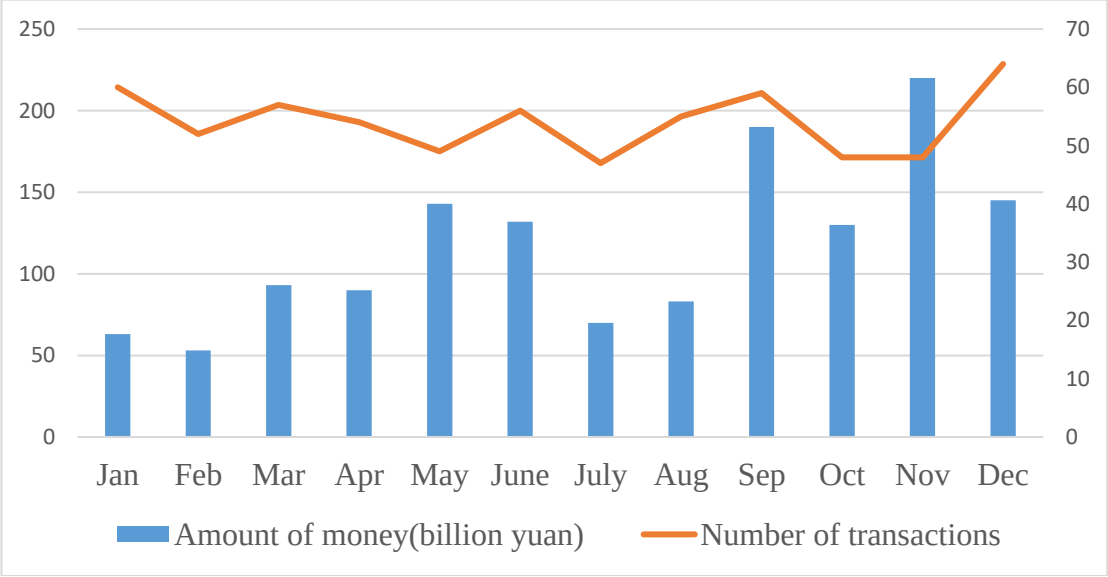

Figure 1.1 – Global Fintech investment trend in 2017

Note – Source: Zero one data

Since the second half of 2017, Fintech companies have been competing for listing and there has been an explosive phenomenon. Of the 10 Chinese Fintech companies listed, 8 are U.S. companies, 2 are Hongkong companies and 10 are IPO companies, as shown in Table 1.1.

Table 1.1 – 10 IPO companies in 2017

Name	Time to market	Listing location	Listing method	Financing scale (million yuan)	Market value (million dollar)
Pleasant loan	2015-12-18	US	First round	4.87	26.27
Trust and wealth	2017-4-28	US	First round	4.14	3.70
Shengyingxin	2017-7-28	US	First round	1.32	9.24
Zhongan Online	2017-9-28	HK	First round	99.6	1018.6
Fun shop	2017-10-18	US	First round	59.6	41.4
And credit	2017-11-3	US	First round	3.3	5.73
Patting loan	2017-11-10	US	First round	19.78	21.4
Yixin	2017-11-16	HK	First round	57.3	32.3
Jianpu Technology	2017-11-16	US	First round	11.91	10.7
Lexin	2017-12-21	US	First round	1.08	22.8

Note – Source: Zero one data

In 2017, seven major countries in the world conducted Fintech financing activities, including China, the United States, India, the United Kingdom, Sweden, Canada and Australia. China has 328 investments and financing in Fintech, followed by the United States and India, with 101 and 63 respectively, and the United Kingdom with 40. In 2017, other countries did not reach 30, with the highest being Singapore's 25. In terms of financing amount, China's annual financing amount is 79.6 billion yuan, accounting for 57% of the world's, far ahead of the second us (25.8 billion yuan) and the third India (16 billion yuan).

The participation of Fintech companies in the financial industry can be traced back to 2003, that is, the emergence of Alipay. Subsequently, many third party payment platforms have emerged in the financial market. The most important role of these payment platforms is to provide convenience for physical transactions and reduce the credit risk faced by both parties. In 2013, Alipay launched the balance of treasure business, marking the beginning of its money market business, and accumulated a large number of users and funds. This shows that Alipay will begin to provide financial services as the goal and direction of its strategic development. After that, various kinds

of treasure such as current treasure (Tiantian Fund), wealth management link (Tencent) and Jingdong's small Treasury were born one after another, which mushroomed into the market, making financial consumers overwhelmed. This more directly shows that Fintech companies gradually provide financial services to their accumulated customers, and then slowly enter the field of financial market. In terms of deposits, financial products launched by Fintech companies, P2P platforms and crowdfunding platforms are constantly competing for social idle funds. In the loan market, Baidu micro loan, Tencent micro loan and Ali micro loan intensify the competition in the loan market. In 2015, Jingdong baitiao and ant Huabei provided customers with the convenience of credit based purchase. In essence, these businesses are consumer credit products. It can be seen that the scope of financial services provided by Fintech companies is becoming wider and wider, and the development speed of China's Fintech is also accelerating. At present, China's Fintech is mainly concentrated in traditional financial enterprises, emerging technology companies, supporting service institutions and other fields, including Internet payment, online lending, crowdfunding, consumer finance, enterprise financial services, credit survey and data services, and presents a trend of continuous innovation.

To sum up, no matter in the three times of foreign Fintech development, or in the three stages of domestic Fintech, the entry point of Fintech development is science and technology, which is the product of the combination of Finance and technology, the deep integration of emerging technology and finance, and the emerging technology here Technology mainly includes big data, cloud computing, artificial intelligence, blockchain, etc.; the development of Fintech aims to enable science and technology to finance, constantly innovate financial products, business methods, business models, financial supervision methods, etc., reduce operating costs, improve service efficiency, and then promote the development of various industries in the financial field.

1.2 The concept of Fintech

Finance Technology is a compound of Finance and technology. With the gradual acceleration of the integration of Finance and technology, many scholars have put forward their own views and opinions on the definition of Fintech.

In 2015, Arner et al. believed that Fintech refers to the organic combination of information technology and finance, and the use of emerging technologies to solve problems that are difficult to solve in traditional finance [1, p. 47].

In 2016, Liudmila et al. believes that Fintech is the marriage of Finance and information technology, which profoundly reflects the impact of digitalization on the financial industry [2, p. 16].

In 2017, Schueffel P. reviewed all references to Fintech over the past 40 years and considered that Fintech is a new financial industry applying technology to improve financial activities [3, p. 32] .

In 2017, Peter G. believes that Fintech is a combination of modern Internet related technologies and the existing financial services industry. While making use of high-tech means such as the Internet and information automation to carry out innovative activities in the financial industry, it also disrupted the order of the original financial system 4, p. 537].

In 2017, Chen Jing defines Fintech as the application of specific scientific and technological achievements in the financial industry. The purpose is to create the mode of financial business services, improve the scene habits of users, improve the efficiency of business and reduce the cost of services.

In 2019, Chen Liang believes that Fintech is a process, a reshaping of the mode, business, process and products of traditional financial institutions given by new technology. Profoundly change the business model of traditional financial institutions [7, p. 66].

In 2019, Huang Zhen believes that Fintech is a reshaping process of traditional financial institutions based on new technologies such as cloud computing, blockchain and artificial intelligence. More directly point out that Fintech is the innovation, transformation and even remodeling of the traditional business, management mode and even the essential content attribute of the financial industry with the development of science and technology. It is a relatively objective development process of financial format. It basically shows that Fintech is the general direction of the development of the traditional financial industry, and it is also the performance of higher-level financial service needs of customers whose material base has been met [8, p. 46].

In addition to academic perspectives, many international organizations and government agencies have also defined their views on Fintech.

In 2015, the financial conduct authority of the United Kingdom considers that Fintech is a disintermediation activity of innovative enterprises using new technology to the original financial service institutions.

In 2016, the monetary authority of Singapore, Fintech refers to the activities that drive innovation in the financial industry through the use of emerging technologies.

In 2017, the National Economic Commission of the United States, Fintech refers to the technological innovation applied in the field of traditional financial services and financial industry regulatory compliance.

In 2017, the organization of the International Securities Regulatory Commission, Fintech is a financial innovation that can subvert the traditional financial system.

In 2019, the people's Bank of China believes that Fintech refers to the innovative development of Finance driven by technology.

At present, the most widely accepted definition of Fintech by the financial stability Council is that Fintech refers to emerging financial products, financial services and financial models with emerging technology attributes that can have a far-reaching impact on the traditional financial services industry and traditional financial markets.

Based on this, the financial industry has only one role, that is, the financing of funds. The application of Fintech also serves the financial industry, improves the service efficiency of the financial industry and reduces the cost of capital use. So in essence, Fintech is still finance. No matter which new technology is used, it will not change at all. The development and supervision of the financial industry should follow the development law of the financial industry itself, and should not engage in the false innovation and false development that violates the financial law and evades financial supervision. The development of Fintech has had a far-reaching impact on the social economy, and the related product formats have penetrated into the financial industry and even the whole society. For example, in the development process of science and technology finance, the third party payment represented by Alipay, P2P network lending, etc., formed 4 business models, namely payment and settlement, resource allocation, technical support and financial information, from transfer and payment. From basic business to core business such as credit assessment and capital allocation, there are overlapping and overlapping with traditional business models. In addition, technology spillover, industry competition and talent flow brought by Fintech have also promoted the transformation and development of traditional financial institutions.

1.3 The function of Fintech

In recent years, the function of Fintech to promote the transformation and upgrading of the traditional financial industry has gradually emerged, especially after major breakthroughs have been made in the underlying technologies such as big data and artificial intelligence. Under the guidance of these technologies, a new round of integration of traditional financial services such as payment, financing and wealth management and Fintech is developing rapidly, which will promote the financial industry to improve the efficiency of financial services, provide better and more targeted products and services, and enhance the inclusiveness of the financial system.

In 2016, Philippon T. comprehensively analyzed the potential impact of Fintech on the financial industry, and believed that the inefficient and expensive traditional financial services were one of the reasons for the vigorous development of Fintech [5].

In 2017, Greg et al. studied the relationship between shadow banking and Fintech in the United States, and believed that Fintech played an important role in the rapid development of shadow banking; compared with shadow banks that did not use Fintech, shadow banks using Fintech allocated credit resources to borrowers with better credit, It has also been more actively involved in the refinancing market, and Fintech has improved the overall efficiency of resource allocation in the financial market [6].

In 2017, Brainard believes that under the global wave of Fintech, traditional financial institutions can achieve a win-win situation through cooperation with Fintech enterprises. Fintech enterprises need to obtain customer data and access payment system through traditional financial institutions. As long as the correct response strategies are adopted, the creative effect of Fintech on traditional financial institutions will be greater than the "destructive effect" [7].

Chinese scholars also believe that Fintech can improve the allocation efficiency of the financial system and promote the development of Inclusive Finance.

In 2015, Wu Xiaoqiu believes that Fintech can improve the resource allocation efficiency of the financial system and enhance the transparency of market information. On the one hand, Fintech can break through the business constraints of traditional financial services in time and space, concentrate the available financial resources, provide financial services in a flexible and convenient way, so as to improve the efficiency of resource allocation of the financial system; on the other hand, through advanced scientific and technological means such as big data, Fintech can effectively solve the problem of information asymmetry between supply and demand, so as to improve the efficiency of resource allocation Enhance the transparency of financial market related information [10, p. 15].

In 2015, Guo Tianyong and Ding Xiao believe that Fintech can expand the traditional financial boundary, solve the imbalance of resource allocation under the original financial system, make financial services cover the people who could not obtain financial resources at low cost, improve the supply and demand structure of financial market, and promote the extensive establishment of inclusive financial system [11, p. 55].

At present, the traditional profit model of financial institutions in China, which takes deposit and loan spread as the main source of income, is facing challenges. The traditional "deposit and loan remittance" business is facing transformation pressure and severe competition of low efficiency and homogeneity. The traditional functional positioning and business model are difficult to adapt to the changing environment of business environment and competition. This paper summarizes the current financial defects from 4 aspects of liabilities, assets, payment and business model, and then discusses the role of Fintech in financial institutions. See Table 1.2.

Table 1.2–The enabling role of Fintech in the development of financial institutions

	Business model	**The enabling role of Fintech**
Debt side	Low cost capital loss	Platform finance is built by using mobile computing, cloud computing, big data, machine learning and other technologies to provide panoramic personal financial information services, corporate human capital financial services, and personal credit management services.
	Traditional wealth management services rely on labor	Provide efficient and low-cost wealth management services by using mobile computing, big data, intelligent investment advisory and other technologies, and introduce intelligent investment research.
Asset side	The competition for high-yield assets in the traditional credit field is fierce, and the coverage of inclusive credit is insufficient.	Taking retail business as a breakthrough point, we will innovate and develop consumer finance, and provide scenario based services in the field of consumer credit by using mobile computing, big data, machine learning and other technologies.
	Traditional information flow and logistics tracking mainly through documents, tickets, mortgage registration, on-site inspection, etc., which is difficult to effectively eliminate potential risks in the field of credit.	The use of Internet of things technology to improve the effectiveness of inventory supervision, the use of blockchain to achieve reliable tracking of information flow, capital flow and logistics in supply chain finance, improve risk screening and management capabilities, and ease the financing difficulties and high financing costs of small and micro enterprises.
	Traditional credit approval relies on manual experience, complicated application process and limited risk control ability.	Use big data to optimize the process design of credit approval, fund issuance, post loan management, etc., and realize the whole process risk management of credit business.
Payment terminal	Cumbersome payment and transfer, poor user experience.	Make use of big data and artificial intelligence to simplify the payment process, optimize customer experience and realize small and high-frequency payment.
	Payment and clearing, especially cross-border payment with many intermediate links, long turnover cycle and high cost	Optimizing cross-border payment and clearing infrastructure by using blockchain Technology

End of Table 1.2

	Business model	The enabling role of Fintech
Business model	It is difficult to meet the needs of customers due to the high cost and low efficiency of operating tangible outlets.	Direct banking, smart banking, open banking

Note – Source: author's elaboration on the basis [10]

In a word, Fintech develops low-cost capital channels by borrowing online platforms on the liability side, asset side relies on "blockchain + supply chain finance" to serve SMEs, payment side improves payment and clearing infrastructure by mobile payment and blockchain, and creates an intelligent, digital and open business model.

There are 7 specific roles in financial institutions:

1) Promote the digital transformation of financial business;
2) Promote the optimization and upgrading of technical architecture;
3) Expand the coverage of financial services;
4) Enhance the efficiency of financial services;
5) Reduce the cost of financial services;
6) Prevention and control of operational risks;
7) Guard against customer and credit risks;

-Promote the digital transformation of financial business

One is customer digitization. Information technology can analyze and process customer data, behavior preferences and life scenes, and outline multidimensional and digital customer portraits. Second, digital marketing. With the help of big data, we can predict hot spots, analyze customers' demand preferences, identify customers' potential needs, and improve marketing foresight. Third, digital service. Through mobile clients, Internet sites, etc., to create online and offline experience consistent services. For example, the Guangdong Branch of Agricultural Bank of China cooperated with Tencent to develop the "Guangdong Agricultural Bank micro service" small program to provide online booking function for Guangzhou financial social security card with the help of the flow import and user system of Wechat platform and taking the online booking function of Guangzhou financial social security card as the breakthrough point.

-Promote the optimization and upgrading of technical architecture

On the basis of ensuring the security and stability of core business, financial institutions explore the use of cloud computing, software defined network (SDN) and other technologies to build a new IT architecture. The information system architecture with high availability, high performance, high flexibility and high controllability further supports the development of various new businesses (especially Internet related

businesses), provides higher business carrying capacity and business continuity level, and effectively supports the multi-channel service collaboration, information sharing linkage and personalized and intelligent service of financial business.

-Expand the coverage of financial services

First, relying on the Internet, password technology, intelligent terminals, etc., to promote the online, mobile and intelligent offline business. With the help of website, mobile app and other technologies, we will continue to expand service channels, and carry out innovation in the fields of transfer and remittance, micro credit, investment and financing, so as to realize financial services at any time, anywhere and with you, and make up for the lack of financial outlets and financial supply in underdeveloped areas To extend the scope of services and promote the development of Inclusive Finance.

-Enhance the efficiency of financial services

First, use big data technology to improve service efficiency. Mining and using multi-dimensional and networked user data, establish data association analysis model, classify and refine customers, form user panoramic view, customer capital relationship network, customer credit rating and other data products, and construct differentiated service strategy, dynamic management mode, customer relationship maintenance, fund collection and other fields in product marketing, recommendation, customer relationship maintenance, fund collection and other fields Intelligent operation decision and business analysis support. Second, the use of voice semantic recognition technology to create intelligent customer service. Using semantic analysis, knowledge search and other technologies, based on the customized knowledge base content, through mobile phones, Internet and other channels, according to the keywords and other information provided by customers, we can intelligently respond to customer queries and reduce the operational pressure of customer service. Third, machine learning is used to realize the precision marketing of financial products and services. Through the construction of financial products and other precision recommendation model, we can carry out precision marketing for customers. By using machine learning and modern portfolio optimization model, an intelligent investment advisory platform is built to provide customers with predictive investment analysis and targeted investment suggestions.

-Reduce the cost of financial services

One is to reduce the cost of financial services through new technologies. The application of big data, artificial intelligence and other technologies has gradually shortened the chain and intermediate links of financial transactions, reduced human intervention, and reduced labor costs; mobile Internet and intelligent terminals have enabled some businesses to operate online, reduced the number of physical outlets and personnel of financial institutions, and reduced transaction costs. The second is to use new technology to reduce the operating costs of it and reduce the operating costs of

financial institutions. The use of cloud computing and open source software to change the way of infrastructure deployment greatly reduces the cost of hardware and software procurement and maintenance of financial institutions, shortens the supply cycle of IT resources, and helps financial institutions reduce operating costs and improve service efficiency.

-Prevention and control of operational risks

One is intelligent authorization. Based on the comprehensive assessment of counter transaction risk, customer risk and teller operation risk, through the construction of intelligent authorization, the operation risk and moral risk are controlled by means of science and technology. For example, Guangfa bank actively promotes the construction of smart authorization. For medium and low-risk authorization transactions, the system automatically matches the basic business rules and dynamically selects whether the system will automatically authorize. Second, the use of biometric technology to assist customer identification. Using face recognition, fingerprint recognition, iris scanning and other technologies, through business outlets, self-service machines, mobile app and other channels to assist in customer identification, effectively improving the recognition rate of customer identity and the effect of real name authentication. For example, in July 2017, the Guangdong Branch of industrial and Commercial Bank of China added face recognition technology to counter identity authentication, which effectively improved the recognition rate of counter business and the effect of customer real name authentication in key business.

-Guard against customer and credit risks

Through a series of processing, such as feature engineering, model building, training, feedback and release application, we can assist or partially replace the business personnel in the whole process of credit risk monitoring and early warning before, during and after lending, so as to generate accurate credit strategy. For example, the Guangdong Branch of Agricultural Bank of China has developed the "personal loan monitoring system", which uses big data technology to complete the functions of personal loan fund flow monitoring, loan risk warning and daily loan monitoring by establishing the framework of personal loan system and the supervision subsystem of personal loan funds.

In summary, from the micro perspective, Fintech not only plays an important role in the asset side, the liability side, the payment side, and the business model; from the macro perspective, Fintech promotes the transformation and upgrading of financial institutions, boosts financial services to the real economy, and assists in financial risk prevention and control, which greatly improves the efficiency of financial operation

1.4 The theoretical analysis of Fintech on the efficiency of bank operation

The vigorous development of Fintech will have an impact on all aspects of commercial banks. Specifically, the impact of this section on the operational efficiency of commercial banks. Through the following 6 related theoretical analysis, we can better lay a foundation for commercial banks to improve their operational efficiency and better development under the background of Fintech.

-Long tail theory

It is a new theory rising in the Internet era, which was proposed by Chris Anderson and detailed in the book long tail theory published in 2004. It subverts the traditional "28 laws" .The traditional "28 laws" refers to that 20% of high-quality customers in the operation of commercial banks bring 80% of operating profits, that is, a small number of customers create most of the profits, while the long tail theory focuses on the remaining 80% of non-quality customers, which are often ignored in the past [16, p. 13].

The specific content of the long tail theory is that when there are sufficient storage and circulation channels for products, the common market share of those products with low demand will not be smaller than that of those with hot sales .That is to say, the demand energy gathered in the small market can also exceed the demand capacity of the mainstream market .Long tail theory provides a new sales concept and sales model for enterprises. It points out that under the Internet economy, the tail economy, which is traditionally ignored, can also bring great sales potential to enterprises. With the deepening of the Internet and the application of scientific and technological means, the traditional sales curve of enterprises will shift from the "best-selling goods" at the head to the "cold goods" at the tail. Long tail market has also been called "niche market". Niche market is a narrower division of certain groups. This market is small and its demand has not been satisfied. However, there are many homogeneous small markets in the market. Once its demand is satisfied, it will generate huge economic benefits.

In 2016, Lining, Wei Yanqiu and Wang Mengnan believe that the development of Fintech is conducive to the development of the long tail market.

In 2016, Lu Minfeng and Wu Jianping suggest that the development of Internet finance is conducive to the continuous development of the long tail market by relevant enterprises, so as to achieve Pareto optimization.

In 2019, Shi Chaofan proposes the development of Fintech, so that the value of the long tail customers is increasingly prominent, and the long tail theory is further demonstrated .The long tail theory requires commercial banks to break the traditional concept, expand "long tail customers" and promote the rational allocation of financial resources, while the development of Fintech is actively promoting banks to pay attention to "tail".

In the traditional era, commercial banks mainly rely on offline channels to expand customers. The development cost of this channel is high, and it is unable to

accurately understand the needs of most customers. As a result, the design and development of bank related products often refer to the opinions of high-quality customers, while the needs of the majority of retail customers are ignored, which largely leads to the unreasonable allocation of financial resources. The overall efficiency of banks will also be low. With the rapid development of Fintech, on the one hand, banks can capture and analyze a large number of customer data through emerging technologies such as big data and cloud computing, greatly reducing the cost of information search and processing, and develop products in accordance with the overall needs of customers to tap the potential of "long tail customers"; on the other hand, the development of Fintech promotes the networking of financial channels, free from the limitation of time and space, and provide convenient and fast financial services for "long tail customers". In general, "long tail customers" have great potential and are new profit growth points for commercial banks. The development of Fintech provides strong technical support for commercial banks to expand "long tail customers", and the long tail theory provides theoretical support for the development of commercial banks under the background of Fintech [31, p. 176].

-Catfish effect theory

The catfish effect originated from the transportation of sardines by people in Norway. Sardines are quiet in nature and do not have a clear understanding of the danger. They often die due to suffocation during the transportation. After adding a fish as food, the problem of oxygen shortage of sardines will be solved. From the perspective of economics, catfish effect refers to that after entering new competitors in the industry, the original competitors will have a stronger sense of crisis, abandon their sense of advantage and dependence, and participate in the competition in a more active manner [21, p. 56].

In 2018, Chen pointed out that the catfish effect of the development of Internet finance is very obvious, breaking the existing balance of the development of commercial banks, and the banks must constantly make use of Internet financial innovation to break the current impasse.

In 2019, Ding Hao pointed out that the rise of Internet finance companies is the "catfish" that forces the banks to carry out reform.

The development of Fintech is both an opportunity and a challenge for commercial banks. The third party payment methods with WeChat and Alipay as the core have achieved rapid development relying on Internet technology, occupying a large market scale in the payment field, weakening the payment intermediary status of commercial banks; Fintech has spawned a large number of Internet financial enterprises, which use various new models and platforms to provide convenient and fast financial services, seizing a large number of “Long tail customers "have impacted the bank's profit channels; and Internet enterprises also effectively use big data technology to collect and analyze customer information, quickly form credit records,

complete credit rating, and realize the direct connection between Internet enterprises and customers. The bank's credit intermediary function cannot be played, forming a serious financial disintermediation phenomenon. The challenges brought by these financial technologies are like "catfish" for banks, which forces banks to keep up with the trend of the times and rely on financial technologies to continuously innovate products, channels, services and other aspects to improve operational efficiency.

-Theory of economies of scale

For each manufacturer, the larger the production scale is, the better. It has a critical value of the optimal production scale. If the critical value is not reached, the marginal cost will decrease with the increase of production, which belongs to scale economy. If the critical value is exceeded, the marginal cost will increase with the increase of production, showing the state of scale diseconomy. The production and operation of commercial banks are also applicable to this theory. The business volume and product quantity of banks also have an optimal scale. When the scale exceeds this optimal scale, the banks will be diseconomic in scale and the optimal scale efficiency will not be achieved. Traditional banks invest more in online and offline channels, and most of the relevant businesses are handled manually, which is time-consuming, low efficiency and high transaction costs. With the rapid development of Fintech, emerging technologies such as big data, cloud computing, artificial intelligence and blockchain continue to empower finance, providing commercial banks with many innovative models to learn from and providing continuous technical support .It is beneficial for banks to continuously optimize their own scale, avoid investment redundancy, reduce transaction costs, and achieve economies of scale in terms of business volume and related products [17, p. 12].

-Platform economic theory

The development of platform economy relies on data-driven, platform support and network coordination, and the 3 together constitute a new economic system. The platform itself is not a product, it is a medium that can facilitate transactions between the supply and demand of both parties or multiple parties, and from which appropriate fees are charged or differences are earned. The platform economy has the following characteristics: firstly, there must be a bilateral or multilateral market, which can be said to face both the supplier and the demander; secondly, the platform relies on the development of electronic information technology; secondly, the platform economy has network externalities, and the more sellers and buyers, the more valuable the platform will be. The rapid development of emerging technologies such as big data, cloud computing, artificial intelligence and blockchain has promoted the online flow of bank related products and businesses. Online banking, mobile banking and other online platforms have been continuously improved, and the pace of digital transformation has been accelerated. However, Fintech has also spawned a series of platforms that compete with banks, such as third party payment platforms, P2POnline

loan platform, etc., these platforms have low threshold and simple procedures, and have captured a large number of "long tail" customers, posing challenges to the existing platform of the bank, forming a certain impact on the bank's profitability, and thus affecting the bank's operating efficiency.

-Transaction cost theory

Transaction cost theory was first proposed by the British economist Kos. Kos believed that in order to obtain accurate market information, it must pay a certain fee, which is the transaction cost.

In 1975, Williamson further refined the transaction cost into 6 categories: search, information, negotiation, decision-making, supervision of transaction and default cost. The existence of transaction costs is inevitable, but excessive transaction costs will reduce the profitability of enterprises, so it is crucial to reduce transaction costs.

In 2011, Chen Xiaowei believes that the transaction costs can reflect the transaction efficiency of the bank to a certain extent, so it is crucial for commercial banks to continuously improve their own efficiency by reducing transaction costs.

Technology continues to empower the application of finance, big data, cloud computing and other technologies, improving the ability of data analysis and mining, and greatly reducing the bank's information search cost; the application of artificial intelligence provides. It provides biometric recognition capabilities such as face recognition, voice recognition and meaning recognition, simplifies relevant business processes and improves handling efficiency. On the one hand, it reduces unnecessary investment in human resources of the bank, on the other hand, it also reduces customer waiting time and improves service level. Network security technology provides security for various departments and platforms of the bank and improves risks. The ability of prevention, to a certain extent, reduces the cost of supervision. In a word, the development of Fintech to a certain extent reduces the transaction costs and operating costs of the bank, which is conducive to the reasonable allocation of financial resources of the bank, and thus helps to improve the operational efficiency.

-Information asymmetry theory

In the 1970s of the last century, American scholars Joseph Stiglitz, Michael Spencer and George Akel Love proposed the information asymmetry theory. 3 scholars studied the information asymmetry from 3 perspectives of financial market, labor market and commodity trading, and finally formed the information asymmetry theory. The core of the theory is that there are significant differences in the amount and extent of information obtained by different market participants. Information asymmetry in the financial industry leads to adverse selection and moral hazard. If it is not effectively controlled, it will generate huge financial risks, or even become a systematic risk at the macroeconomic level. The specific performance is deliberately concealing information before the transaction, leading to adverse selection. Taking P2P platform as an example, in the case of poor risk and solvency, some irregular platforms are willing to

conceal information from the public and deceive investors with high interest rates, which makes some public choose these irregular platforms under the mechanism of information asymmetry, reduces the flow of deposits to formal financial institutions, and produces the phenomenon of "bad currency expelling good currency" [26].

The digitalization of Internet Finance reduces the intermediate links of information, reduces transaction costs, breaks through the restrictions of information time and space, reduces the impact of information asymmetry, and improves the operational efficiency of commercial banks. In addition, Internet finance has promoted the innovation and application of Fintech. The upgrading of technical means has greatly improved the processing capacity and efficiency of data and information, and it is also conducive to easing the information asymmetry in the financial market. On the other hand, due to the short development time of China's Internet finance, the application of Internet technology also faces technical barriers and restrictions, and there are still irregularities in the early stage of industry development, coupled with the immature regulatory policies and regulations, Fintech can ease the information asymmetry, but ultimately cannot completely eliminate the asymmetry of trust interests.

- Summary

Based on the long tail theory, the catfish effect theory, the scale economy theory, the platform economy theory, the transaction cost theory and the information asymmetry theory, this chapter analyzes the impact of Fintech on the operational efficiency of banks, which lays a theoretical foundation for the construction of the empirical model and how to better develop commercial banks under the background of Fintech. Through the above theoretical analysis, we can see that the impact is not entirely positive or negative, but more complex and comprehensive. Specifically, on the one hand, the development of Fintech is conducive to the expansion of long-tail customers, the strengthening of platform construction, the optimization of its own development scale, the reduction of transaction costs, etc., which is conducive to the improvement of the bank's operating efficiency; on the other hand, Fintech also promotes the development of other platforms and transaction methods, causing impact on the bank's existing platforms and businesses, and seizing part of the long term. The impact of tail customers on the profitability of banks is negative.

1.5 The application of Fintech in commercial banks

No matter which definition of Fintech is inseparable from the part of science and technology, and these technologies are not fixed, and will continue to innovate and deepen with the development of time. The past IT technology and Internet technology

have brought disruptive changes to traditional financial institutions. So far, the technology of Fintech has developed rapidly, and new technologies and old technologies have been continuously improved. Therefore, there is often no definite content for the technology of Fintech. However, the more mainstream of Fintech currently includes 5 core technologies, including cloud computing, big data, blockchain, Internet of things and artificial intelligence. The reason why the 5 technologies are called core technologies is that the 5 technologies represent a general direction of the current development of Fintech, and the 5 technologies are basic. In the broad technical content of Fintech, the 5 technologies are continuously improved and derived as the basic source, resulting in different new branches of Fintech. [25, p. 209].

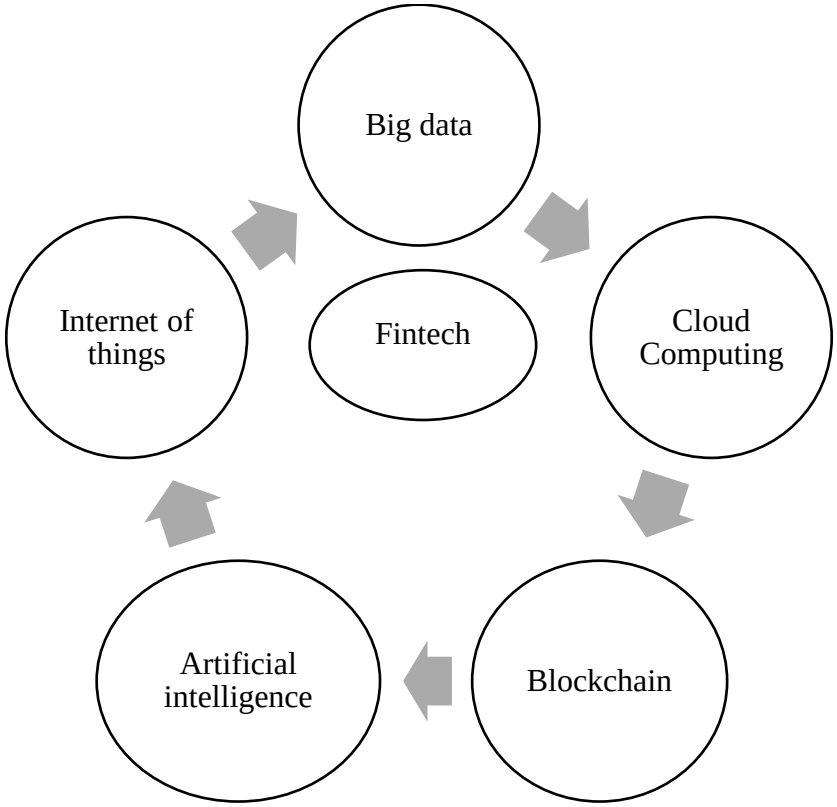

Figure 1.2 – 5 Financial Technologies

Note – Source: author's elaboration on the basis of [11]

1.5.1 Big data

Big data refers to a large number of data sets that cannot be accurately obtained, analyzed and processed by common tools due to time constraints. This is a powerful information resource. Owning it can save us a lot of human and material costs, and improve our insight, judgment, decision-making ability, etc. Nowadays, big data has penetrated into various businesses, such as "big data + finance", "big data + real estate", "big data + healthcare", "big data + retail", etc [27].

Successful cases of big data promoting the competitiveness of the banking industry:

With the arrival of the digital era, data has become a powerful engine to promote economic development. Under the call of national strategy, major banks have accelerated the research and development and application of big data technology. By building a big data platform, the bank can not only integrate the system and data of the whole bank, but also apply big data technology to specific business areas to promote the transformation of traditional business.

1) Agricultural Bank of China - enterprise level big data platform

In the form of "domestic PC Server+ domestic MPP database + open source Hadoop framework + self-developed whole process supporting tools", the big data platform of Agricultural Bank of China provides enterprise level big data solutions integrating computing capacity, data storage and self-developed tools for institutions at all levels of the bank. The platform has the following characteristics: first, it has realized the 3 major functions of daily incremental backup, query and batch separation, and 2 activity switching in case of abnormal occurrence, which has improved the system's high availability, disaster recovery and service capabilities; second, it has constructed more than 10,000 models and stored more than 11PB by using the composite modeling methodology3, provide full application support for the business of the bank, covering 8 business areas including financial management, customer marketing assets and liabilities, risk management, and provide data support for 33 business lines and more than 120 business scenarios. Through the construction of big data platform, the competitiveness of Agricultural Bank of China has been improved in 4 aspects: first, it has reduced the dependence on foreign products and improved the control over the data platform; 2, it has improved the speed of data processing within the bank, accelerated the response speed to the industry supervision, and reduced the regulatory reporting cycle and implementation costs; 3, it has improved the operation and management decisions policy efficiency and level, reduce the cost of operation and management decision-making; 4, improve the risk control ability and fresh air management level, reduce the operation risk and risk management cost.

2) Minsheng Bank - Retail big data application system

Based on the "Aladdin" big data platform, Minsheng Bank has established a set of big data application system for retail business. Through the construction of standardized and standardized big data model project development process framework, Minsheng Bank sorted out more than 5,500 major retail customer characteristic variables, and established 72 application models in eight categories, including customer acquisition, customer segmentation, customer promotion, customer churn prediction, product response, product recommendation, product sequence and capital transaction model. For large retail customers, Minsheng Bank transformed the successful marketing experience of the business front line into data fields, built a label

system for large retail customers, developed applications such as associated label analysis, label visual display and flexible query platform, provided theoretical and technical support for the development of Minsheng Bank's retail business, and further promoted the "customer centered" of Minsheng Bank.The retail business transformation. The application coverage rate of big data research and application results of Minsheng Bank in retail business in branches reached 100%, covering product precise marketing, customer financial assets enhancement, customer loss recovery, etc., which promoted the enhancement of the retail business capacity and the competitiveness of the retail business of Minsheng Bank.

According to the characteristics of big data, it is widely recognized that the characteristics of big data summarized by McKinsey Global Research Institute are "4 major characteristics of massive data scale, rapid data flow, diversified data types and low value density." Massive data scale, such as the traditional commercial banks, which are the major information producers, has a huge demand for the storage of information data, and the demand for data storage units is also very huge; rapid data flow, if the big data is processed by a single massive static data, the entire information processing results may have deviation or even completely failure to decision-making; big data display without the limitation of single text, information data is collected from multi-dimensional and multi-type sources in various aspects such as image, sound and positioning, so as to capture the information content of the target object in multiple directions and more objectively; the value density is low, which is opposite to the scale of massive data. Data technology is to ensure that the collection of massive information is complete, how to do more effectively improve data value density.

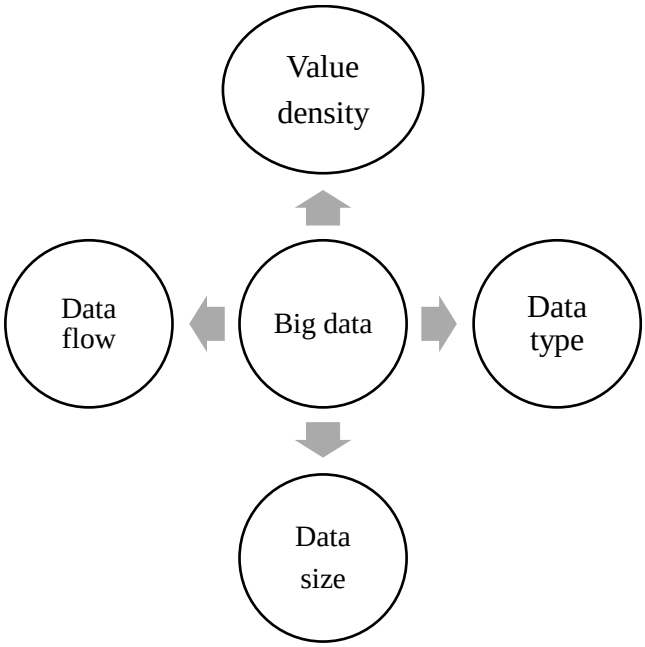

Figure 1.3 – Features of big data technology

Note – Source: McKinsey Global Institute Report

Through the massive data processing, we can get a lot of valuable data information. In the financial sector, big data is mainly used for financial information analysis, asset allocation, risk control, credit investigation, etc. For credit rating, banks should conduct internal rating for customers, mainly including 2 rating methods, i.e. manual and automatic. The credit rating obtained by the credit officer through the completion of financial data is still relatively one-sided. Many companies have hundreds of pages of annual reports. Therefore, big data text mining is carried out through thousands of annual reports of listed companies. At the same time, it uses machine learning algorithm to evaluate the company's credit rating more accurately and quickly, and takes the results as a key reference. It belongs to big data that can use scene time, machine learning algorithm belongs to new artificial intelligence technology, and artificial intelligence and big data technology are complementary. Through big data, banks can not only accurately and effectively identify some possible risks in the business and identify suspicious transactions, but also prevent criminal activities such as theft, money laundering and illegal transactions. They can also conduct more off-site digital audit, reduce inspection costs and detect problems in a timely manner.

1.5.2 Cloud computing

Combined with the National Institute of standards and Technology (NIST)According to the definition of the meaning of cloud computing, it is a model of paying by traffic, providing convenient and on-demand network access to the configurable resource sharing pool (involving resources such as network, application, service and storage). These computing resources can be provided quickly, without investment and management, or with less interaction with service providers.

Successful cases of cloud computing promoting the competitiveness of the banking industry:

At present, many banks in China have used cloud computing technology to improve the IT system architecture, reform business model and innovation process, among which the private cloud platform of Huaxia Bank and the cloud platform of characteristic business of China CITIC Bank are typical representatives of the bank's application of cloud computing technology.

1) Huaxia Bank: a private cloud platform defined by diversified software

Huaxia Bank built a private cloud platform based on the definition of diversified software, which effectively responded to the dilemma of "dual mode" operation and maintenance of the data center. The platform provides centralized operation and maintenance management functions integrating process, automation and monitoring, realizes centralized and unified cloud scheduling of multi center, multi environment and multi shape software and hardware resources, improves the management level and

service efficiency of the data center, and achieves the goal of Cloud Architecture Transformation of the data center of Huaxia Bank. At the same time, the Huaxia private cloud platform has realized the elastic expansion of resources, cross cloud migration and cross cloud disaster recovery between different private clouds, and can provide related services with the public cloud interface. The private cloud platform of Huaxia Bank realized the dynamic adjustment of resources through the adoption of software defined computing, software defined storage and software defined network technology. Meanwhile, based on the standardized service directory management mechanism, it provided one key deployment and flexible expansion of resources for financial applications. Currently, the private cloud platform of Huaxia Bank covers the data center of "two places and 3 centers" of Huaxia Bank as well as the development, testing and production environment in the data center. The underlying physical equipment includes about 500 x86 virtualized environments, 200 physical machines, 300 Power small machines and 200 Through a number of operation and maintenance systems integrated by the cloud platform, the storage equipment greatly improved the information processing capacity of the data center of Huaxia Bank.

2) China CITIC Bank - a cloud platform for characteristic business jointly developed by the head office and branches

China CITIC Bank, formerly known as CITIC Industrial Bank, was founded in 1987 and changed its current name at the end of 2005. China CITIC Bank is one of China's national commercial banks, headquartered in Beijing. In order to meet the diversified needs of customers and improve the financial efficiency of the economic ecosystem, the personalized financial service platform built by Zhou Haipeng in May 2017 and the ecological financial cloud platform launched are important measures for the bank to actively embrace innovation and change and give full play to the advantages of the Internet.

China CITIC Bank has built an intensive cloud platform for featured businesses developed by its head office and branches. The platform includes the development platform of cooperation between the head office and branches, the unified business processing platform of the bank and the operation and management platform of cooperation between the head office and branches, which solves the problems of low response efficiency and poor system reusability of branches' characteristic businesses. The promotion and application of the platform strengthened the intensive use of IT resources inside and outside the bank, saved the cost of IT system hardware and operation and maintenance of the branch, shortened the research and development cycle of innovative applications, improved the technology level of the bank, and better supported the business development of the branch. As of the end of 2,018, the platform has carried 788It provides CITIC Bank customers with high-quality services in areas such as life services, transportation services and Internet payment, promotes the rapid growth of retail, corporate and institutional businesses, brings hundreds of billions of

capital deposits such as deposits and social security and medical provident funds, and expands the income source of branches' intermediary business. At the same time, Internet payment applications in education, property, scenic spots, Party fees and other different industries also provide strong business support for the innovation of public private linkage and the retail volume of CITIC Bank.

In fact, cloud computing has started to be widely used in the financial industry. According to a survey in 2017, 72% of financial executives of U.S. financial institutions said that they would use cloud based solutions or plan to do so in the future, compared with 62% in 2016. It is expected that nearly 40% of companies will use cloud computing to support more than half of their transaction recording systems (extracted from D1Net) by 2,020. Commercial banks can use cloud computing technology to cooperate with the Fintech service platform to optimize the inventory, warehouse receipt and other chattel mortgage management of small and micro enterprises through self built or service outsourcing, so as to achieve professional and real-time post loan monitoring of mobile loans and more timely and reliable control of enterprise operation. As a new technology, cloud computing is still in the early stage of development, and the financial industry is the most receptive to emerging technology industries. However, cloud computing technology has special requirements in terms of security and reliability in the financial field. At present, there are many deficiencies in the use of cloud computing technology in the financial industry. However, it should be believed that with the in-depth study of cloud computing technology, it will certainly be in the financial industry in the future. It has been widely used to promote the development of the financial industry into a new stage [40, p. 27].

1.5.3 Blockchain

Blockchain, which can support bitcoin transactions, is a very important technology and the basic guarantee for the safe transaction of bitcoin. The blockchain is composed of many data blocks, which are generated by using encryption methods. All the data blocks contain information related to bitcoin transactions, so as to verify the authenticity of customer information and generate the next data block. We can informally think of it as a series of data blocks associated with a password. In the process of using bitcoin, any transaction information will be recorded by the blockchain and cannot be modified or deleted, which also ensures the openness and accuracy of bitcoin transactions. In a word, the blockchain can be regarded as a transparent and open account book.

Successful cases of blockchain promoting the competitiveness of banking industry:

Blockchain has not been developed for a long time, but it does not affect its global influence. At present, many financial institutions at home and abroad have begun to lay out the basic research and development and application of blockchain technology, hoping to solve the problem of information asymmetry and trust

mechanism difficult to establish in many businesses in the industry through the characteristics of blockchain decentralization and information tampering.

1) CITIC + China Minsheng Bank - letter of credit information transmission system

China CITIC Bank and China Minsheng Bank jointly developed a blockchain based information transmission system for domestic letters of credit to solve the problems of low efficiency, low security, poor transparency and fraud in paper documents. Through the introduction of mainstream open source technology, the system has built an open domestic letter of credit exchange system. Compared with the traditional letter of credit business, the system has the following advantages: firstly, the security of all connections between the client and the server is guaranteed through the use of encryption algorithms and security protocols among the nodes of the blockchain, and at the same time, the unified public key mechanism is adopted to solve the trust problem among members; secondly, through the visual monitoring and management platform, the system provides credit. The certificate business provides a complete monitoring function with convenient operation and high availability of network nodes. Finally, the unified proxy service is realized by packaging the underlying interface and resource management of the original blockchain system as a whole service. The application of the system has significantly improved the efficiency of the bank's letter of credit business and enhanced the security of the letter of credit business.

Micro banks - inter agency reconciliation platform

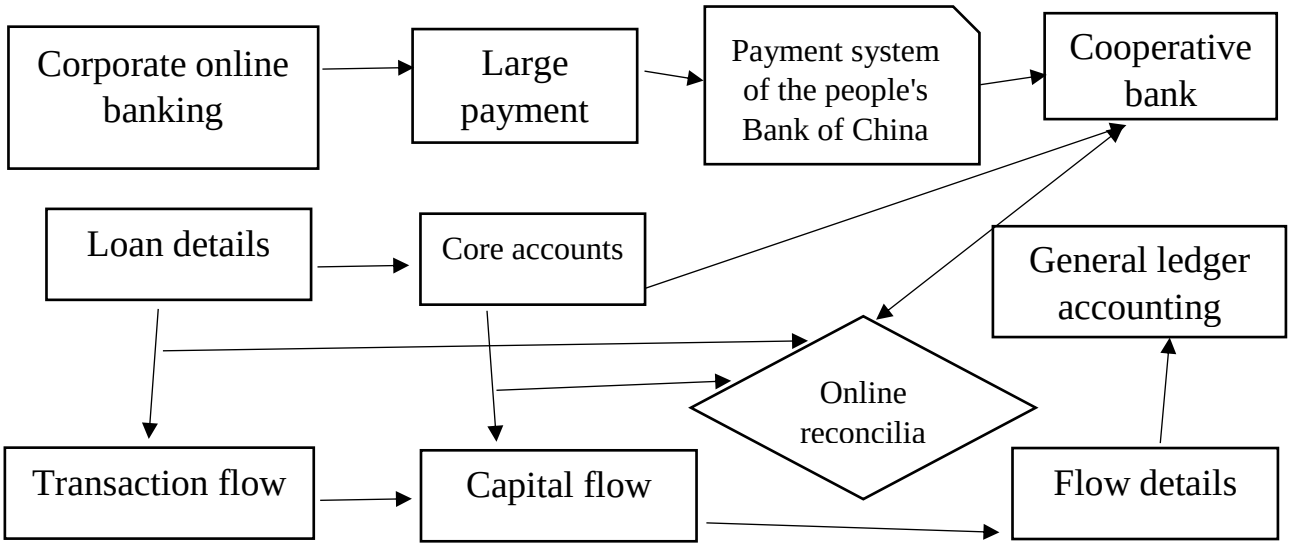

Figure 1.4 – Inter agency reconciliation platform of micro banks based on blockchain

Note – Source: micro banks report

Based on the blockchain technology, Shenzhen Qianhai Weizhong bank has built a reconciliation platform among cooperative institutions, providing efficient and

open clearing services for cooperative institutions. Compared with the traditional reconciliation method, the platform improves the efficiency of reconciliation query, and solves the problems of not being able to understand the account information in real time, the details of loan borrowing and repayment and the difficulty in liquidity management for both parties in the business development process. In addition, the inter agency reconciliation platform based on blockchain technology also has the following characteristics: (1) the platform introduces open-source blockchain technology, and makes in-depth customization of the underlying system of the blockchain. Through the implementation of open-source code audit, it ensures the technical security and controllability; (2) the platform constructs functions such as identity access, storage encryption, etc. Consistency, accuracy and non falsification; (3) the platform improves the clearing efficiency and reduces the operation and maintenance cost of system construction through cloud service architecture and standardized software and hardware modules; (4) the platform improves the cooperation efficiency among various institutions by providing 2 development interfaces and business management functions. At present, the transaction capacity of the platform is more than 300TPS and the query capacity is more than 500TPS. The block chain account book transaction flow of the system reaches 10 million level, which greatly improves the efficiency of reconciliation business between cooperative institutions.

As blockchain is still in the early stage of development and its application is still in the experimental stage, its impact on financial stability is still unclear. If widely adopted in the financial sector, it may pose a major challenge to future regulation. For example, the "multilateral mutual trust" and "decentralization" features of the technology may make users less dependent on traditional financial intermediaries, affect the market position and competitiveness of traditional financial institutions, and more OTC transactions will make financial regulation more difficult. In addition, some technology companies are likely to carry out financial business without supervision, which will affect the stable development of the financial industry. Therefore, the regulatory authorities should pay close attention to and analyze the development and application of these technologies, actively carry out observation and research, analyze whether these new technologies are conducive to preventing and controlling financial risks, and have an important impact on promoting the stable development of the financial industry.

1.5.4 Artificial Intelligence

It is a method of researching, developing and expanding human intelligence and a new technological science. Artificial intelligence is divided into several levels. The initial level is to use the program to automatically extract data from the PDF to the table and perform consistency check. In the second level, simply analyze the data to form and filter some rules. For example, the auditor confirms the customer's response in the confirmation letter or clarifies the key character identification in the contract

under review. In a deep sense, natural language is often used to process massive and different data, and generate corresponding research reports after analyzing the data.AI can make relevant predictions through learning. The application of artificial intelligence, such as machine learning, artificial network and deep learning, aims to realize the comprehensive upgrade of customer credit rating model, mainly to make up for the shortcomings of the traditional bank rating model, solve its difficult to handle non-linear relationship and rating outlook and other complex problems. Through the use of natural language technology in artificial intelligence, banks can establish an expert system of regulatory rules. It integrates laws and regulations, regulatory requirements, industry norms, internal systems, industry news and internal and external cases to form an organic cross knowledge base. [20, p. 13].

Successful cases of artificial intelligence promoting the competitiveness of banking industry：

Artificial intelligence is one of the hottest underlying technologies in the field of Fintech in recent years. At present, many foreign banks begin to incorporate AI technology into the transformation development strategy, and vigorously promote the innovation and application of AI in banking business.

There is an example of JPMorgan Bank which was merged by J.P. Morgan Construction Company and J.P. Manhattan in December 2,000 and is the major commercial bank in the United States.

1) JPMorgan Chase

JPMorgan Chase is in the forefront of the world banking industry in the application of artificial intelligence. According to the data, JPMorgan's investment in artificial intelligence technology is almost twice the average technology budget of most Wall Street banks. The introduction of artificial intelligence technology into JPMorgan's traditional business not only meets its need to improve transaction efficiency, but also hopes to increase revenue, reduce costs and squeeze out more profits from its existing business through artificial intelligence technology. In the field of intelligent investment consulting, JP Morgan has developed an artificial intelligence system based on machine learning technology, which can predict in real time and provide product recommendation services. At first, it mainly serves the stock market. Its biggest feature is that it can automatically analyze the financial status of listed companies, individual companies and the overall market. Before the invention of the system, the analysis of single stock and the whole stock market needs to rely on a professional analyst team, which consumes a lot of material resources and energy. Even so, the results of the stock market analysis can’t guarantee a high accuracy, and can’t guarantee to provide customers on time and on demand. In the field of intelligent contract, JPMorgan uses machine learning technology to build an intelligent contract platform called coin, which can analyze complex financial market transactions. Through the analysis of financial related legal documents, the platform can identify

and extract important data points and terms in the documents. Previously, it took about 36 hours for the legal team and credit personnel to manually review an annual commercial credit contract, which inevitably led to manual errors, and it would consume a lot of manpower and material costs to complete the review in a short time. The machine learning technology of coin platform shortens the time to seconds, reduces the artificial error rate of loan business, effectively improves business efficiency and reduces business risk.

One more example is Bank of America which was founded in October 1,968. Headquartered in San Francisco, the bank is the first largest commercial bank in the United States in terms of assets.

2) Bank of America

The application of artificial intelligence technology in Bank of America is mainly concentrated in three fields: intelligent investment advisor, intelligent account receivable and intelligent robot. In the field of intelligent investment consulting, Bank of America has developed an intelligent investment consulting system called Merrill edge guided investing for the retirement savings accounts of retired customers. The system will collect information such as age and gender, risk tolerance, investment target and investment time from customers, and provide personalized asset allocation suggestions for customers by combining intelligent algorithm and financial management skills of investment consultants. Secondly, in the field of intelligent accounts receivable, Bank of America has developed an intelligent accounts receivable system. Through the comprehensive utilization of machine learning and optical character recognition technology, the system realizes the point-to-point reconciliation and simplifies the accounts receivable process and business cost. In addition, the system can also send the automatically generated e-mail to the unpaid customers for collection; at the same time, it can predict the cash flow of the payer by analyzing a large amount of remittance information and summarizing the behavior of the payer. Finally, in the field of intelligent robots, Bank of America launched Erica, an intelligent virtual assistant. Through Erica, an intelligent virtual assistant, customers can view historical transactions and find nearby ATMs in Bank of America's mobile app through language input, gesture operation, etc., and can consult Erica about investment and financing.

In the era of artificial intelligence, the Fintech business of China's commercial banks is becoming more and more mature. Due to the increasing demand for Fintech services in the market, the innovation mode of Fintech is gradually valued, and commercial banks are constantly expanding the scope of Fintech services. These businesses mainly involve information system services (operation, maintenance, etc.) of commercial banks, e-financial service platform of industrial Internet of things, digital finance and cloud computing financial services, and intelligent risk control, etc.

1.5.5 Internet of Things

The Internet of things refers to the interconnection between goods like information network. Internet of things finance is developed on the basis of traditional finance and Internet finance, which refers to the new financial services and innovation relying on Internet of things technology and facing all Internet of things applications. Internet of things finance breaks through the limitations of traditional financial service objects, expands the service objects to all physical entities related to people, integrates the information of business, service, finance and other fields, constructs a huge and detailed database, and realizes the connection between things and people, things and things through the advantages of high intelligence with the help of many intelligent technologies [19, p. 10].

The practice of "Internet plus" deepens the development system of traditional Internet finance, laying the foundation for the construction of the Internet financial system. To a certain extent, Internet of things finance can be regarded as the Pareto improvement of Internet finance. The Internet of things finance effectively connects the virtual economy and the real economy, establishes the relationship between people and things, and expands the financial development scene. Through technical means, the real economy will be intellectualized, digitized and mobile, and the financial information and the real economy information will be fully integrated to form a large information database, so as to improve the efficiency of resource allocation and exchange.

Successful cases of Internet of Things promoting the competitiveness of banking industry：

Relying on the application of new technologies such as the Internet of things, the Bank improved its core processes, services and products to improve customer experience. Through digitalization and mobility, the service process is more simple and fast, which not only reduces the operating costs of the banking industry, but also improves the service efficiency. Combined with data analysis capabilities, the bank can better quantify financial risks and improve information security.

Agricultural Bank of China Huinongtong project

This is the product of cooperation between Intel and Fujian Shida Co., Ltd., bringing Internet finance to the countryside. The state's policies and funds for supporting agriculture can be transferred directly from banks to farmers' accounts, and farmers can easily use and manage their own money nearby.

Huinongtong is a strategic project for the Agricultural Bank of China to improve the rural financial payment environment and channel system and open up the "last mile" of rural financial services to benefit people's livelihood, so that rural villagers can not get basic financial services out of the village. In terms of technology, Huinong terminal adopts Intel's products and technology, and its simple and friendly touch-screen interface is convenient for farmers to operate. The remote management technology can master the equipment operation status in real time, carry out software

upgrade and maintenance, and avoid many worries caused by scattered sites, traffic inconvenience and other factors.

The ingenious integration of Internet of things technology and finance optimizes the transaction path under the traditional financial mode, changes the development concept of the traditional financial industry, and promotes the operation of the traditional financial system to be more efficient, smooth and safe. The Internet of things makes full use of advanced means such as cloud computing to improve computing efficiency, reduce computing costs and resource and time costs, make the transaction process more standardized, and effectively reduce financial transaction costs. Relying on the Internet of things technology to establish a large database of material information, help information users quickly access and share information, effectively alleviate the problem of information asymmetry. The continuous deepening of Internet of things finance will completely change the information bottleneck faced by traditional finance, so as to truly establish a comprehensive, efficient and perfect financial risk prevention and control system.

For commercial banks, if they want to seize the opportunities of Fintech development, they must break through the thinking limitations in the financial field, establish innovative thinking, lay a network facility platform for the real economy, gradually establish a cloud platform integrating big data such as transactions, payment and settlement, information services and consulting services, and always pay attention to the new development of Internet of things technology, artificial intelligence technology and cloud computing technology trend, forming a new development path for commercial banks.

The development stage of Fintech is Fintech 1.0 (1866-1967), Fintech 2.0 (1967-2008) , Fintech 3.0 era (2008 to present).

The concept of Fintech is that Fintech refers to emerging financial products, financial services and financial models with emerging technology attributes that can have a far-reaching impact on the traditional financial services industry and traditional financial markets.

The function of Fintech from the micro perspective, Fintech not only plays an important role in the asset side, the liability side, the payment side, and the business model; from the macro perspective, Fintech promotes the transformation and upgrading of financial institutions, boosts financial services to the real economy, and assists in financial risk prevention and control, which greatly improves the efficiency of financial operation.

The theoretical analysis of Fintech on the efficiency of bank operation based on the long tail theory, the catfish effect theory, the scale economy theory, the platform economy theory, the transaction cost theory and the information asymmetry theory.

The application of Fintech in commercial banks currently includes 5 core technologies, including cloud computing, big data, blockchain, Internet of things and artificial intelligence.

CHAPTER 2
THE IMPACT OF FINTECH ON THE BUSINESS MODEL OF TRADITIONAL COMMERCIAL BANKS

2.1 The impact of Fintech the asset business model of commercial banks

Asset business is one of the core businesses of the banking industry. It is the business that banking financial institutions use their capital to obtain income, namely the use of funds, including loan business, cash asset business, securities investment business, etc. these businesses can bring income to the bank, allow the bank to obtain interest spread, and are the main source of income for the bank. Due to the high threshold of bank access, loans often have complicated procedures, many procedures, "one" (the contributor) facing "many" (customers) and other problems, often "voluntarily give up" small and medium-sized and micro enterprises and enterprises with poor personal solvency, which gives P2P Fintech companies such as online lending platforms, crowdfunded financing institutions and institutional micro lending companies have provided rise and development opportunities. According to the report of China Securities Journal on 26 February 2020, as of the end of 2019, the total amount of commercial bank loans reached 136 trillion and 300 billion yuan, of which the balance of loans to individuals and small and micro enterprises reached 33 trillion and 500 billion yuan. In 2019, the scale of online lending has reached 528 billion 600 million yuan, accounting for 1.57% of personal and small and micro enterprise loans of commercial banks [14, p. 15].

P2P lending (Peer to Peer Lending) is a new lending model that relies on the Internet to provide funding matching for both parties. Compared with the traditional banking credit business, Internet credit has the following advantages:

-With high-tech credit means. Through deep integration with big data technology, Internet credit integrates, analyzes and filters multi-dimensional and fragmented information in more scenarios, and depicts users with long tail that cannot be covered by traditional finance from different perspectives, breaking the limitations of high cost and low efficiency of traditional credit investigation, which is conducive to improving loan quality and easier to small and micro enterprises and low-income groups to carry out credit business.

-The business process is simple and convenient. Internet credit has simplified the process of handling credit business procedures in the past, and the business processing is mainly completed through the network, which is shorter than the traditional bank lending business.

-The loan amount is more flexible. Internet lending can customize lending products according to the needs of both sides of the borrower and the borrower with high flexibility; while bank credit often has a single product and a large amount of single credit [30, p. 51].

-Low operating costs. Internet credit business is usually operated by means of information technology, mainly with online services and low operating costs.

Internet Finance provides loan services for individuals, small and micro enterprises and entrepreneurs. The larger the scale of Internet finance is, the less consumption loans, personal mortgage, guarantee loans and small and micro enterprise loans of commercial banks will be correspondingly reduced. Consumer purchases of bulk consumer goods no longer need to go to bank outlets for loan business, but directly through the Internet for shopping and consumption, and then for regular repayment. And the mortgage loan does not need to be handled at the commercial bank outlets, because the online loan is based on the credit of the borrower and does not need guarantee mortgage, which has a great impact on the growth of the bank's asset business.

2.2 The impact of Fintech on the liability business model of commercial banks

The liability business can bring a large amount of capital to commercial banks, which is the source of capital and the cornerstone of the development of commercial banks. The liability business of commercial banks mainly includes deposit business and interbank business. Deposit business is the basic business, accounting for more than 80% of the source of funds and more than 70% of the total liabilities. Only through deposit business can commercial banks develop loans and investment business. Therefore, continuing to expand the deposit business of commercial banks is the main way to expand the scale of loans and investment. The amount of deposits of commercial banks determines the amount of loans, which directly determines the future interest income of commercial banks, and then determines the economic benefits of commercial banks. At present, the number of middle-class people in China is increasing, and wealth management is gradually out of people's vision. Thanks to the development of Fintech, there are more and more wealth management products, more and more channels for customers to access financial services, and more and more choices for users. For example, the emergence of "Ten Pay" and "yu'ebao" has broken the previous single threshold of wealth management services and purchase channels, which has greatly shaken the stable position of banks and reduced the operating income of the banking industry. In order to seize customer resources, the third party payment platform provides a high yield. The 7 day annualized yield of Yu’ebao can reach more than four percent, which is 10 times or more than that of bank demand deposits. At

present, the financial services of traditional commercial banks are still based on face-to-face communication and written recommendation model, while Fintech transfers the interaction with customers into digital channels, which makes the business more efficient and friendly. Customers only need to fill out a questionnaire online, indicating the amount of investment, expected profits and risk tolerance and other information, this platform can use procedural algorithms to divide funds into various assets, and help customers to quickly complete their financial plans online. These will result in the transfer and competition of investment time deposits held by customers and affect the scale of bank deposits. According to the data of China Banking Regulatory Commission, as of the end of September 2017, the interbank assets of the banking industry decreased by 2 trillion and 600 billion yuan compared with the beginning of the year; the wealth management products showed a downward trend for 8 consecutive months, and had dropped to four percent by the end of September. In 2018, the growth rate of deposits of commercial banks remained weak due to the overall liquidity tension, the pressure of deposit transfer did not decrease, and financial deleveraging continued.

According to the data in the annual reports of 2016, 2017 and 2018 issued by the people's Bank of China, the total number of bank cards issued by the people's Bank of China was 465 million in 2016, increased to 588 million in 2017 and further increased to 612 million in 2018. The transaction value of bank card business in China was 741 trillion and 810 billion yuan in 2016, increased to 761 trillion and 640 billion yuan in 2017 and further increased to 862.10 yuan in 2018 Trillion yuan. The details are shown in the Table 2.1.

Table 2.1 – Statistical table of card issuance and transaction amount of commercial banks in China, 2016 -2018

Project	**2016**	**2017**	**2018**
Total number of cards issued (100 million)	4.65	5.88	6.12
Card transaction amount (trillion yuan)	741.81	761.64	862.1
Card cash (trillion yuan)	71.16	67.01	60.03
Cash withdrawal by card (trillion yuan)	65.12	64.48	58.90
Average consumption per card (ten thousand yuan)	0.94	0.98	1.22

Note – Source: People's Bank of China website

During the 3 years from 2016 to 2018, the number of cards issued, the transaction amount of cards and the average consumption amount of cards in China have shown a continuous increase trend. This is because commercial banks are increasing the marketing of bank cards, especially the cooperation between UnionPay cards and Internet finance, which has promoted the issuance of bank cards and card transactions. However, at the same time, it can be clearly seen from the table that during the 3 years from 2016 to 2018, the deposit and withdrawal of bank cards in China have shown an accelerated downward trend. Bank card deposits decreased from 71 trillion and 160 billion yuan in 2016 to 67 trillion and 10 billion yuan in 2017 and then to 60 trillion and 30 billion yuan in 2018; Cash withdrawal from bank cards decreased from 65 trillion and 120 billion yuan in 2016 to 64 trillion and 480 billion yuan in 2017 and then to 58 trillion and 900 billion yuan in 2018. This is due to the strong impact of third party payment, resulting in the continuous decline in the scale of bank credit card deposit and withdrawal [18, p. 41].

Therefore, it is very important for commercial banks to expand intermediary business such as bank cards and strive to maintain the necessary market share under the background of Fintech.

2.3 The impact of Fintech on the intermediary business model of commercial banks

Intermediary business is the third largest business of the banking industry in addition to liability business and asset business, and also the main position for business innovation of banking financial institutions. Intermediary business is mainly divided into financial service business without contingent assets or contingent liabilities and off balance sheet business with contingent assets or contingent liabilities. [24, p. 101].

The rise of e-commerce in China breeds a number of new payment tools based on B2B, B2C and other platforms - third party payment, such as Alibaba's Alipay, Tencent's fortune pay (WeChat payment), etc.

In the past, residents used to use cash and bank cards for small transactions and bank professional payment instruments such as online banking or "3 bills and one exchange" for large transactions when making payment and settlement, but the transaction process was complicated and inefficient. With the characteristics of convenient, efficient and low-cost transactions, new payment instruments have changed residents' past payment habits, especially in some micro payment scenarios, where residents prefer to use mobile terminals for payment. These changes in habits have had a negative impact on the traditional payment and clearing business of the banking industry. According to the payment system operation report of the central bank over the years, with the development of third-party payment, various business indicators of the banking industry in the payment and settlement field are affected to

varying degrees. From the perspective of bill business, the bill business volume of China's banking industry has declined for 5 consecutive years.

Table 2.2 – List of changes in bill business of China's banking industry from 2014 to 2018

	2014		2015		2016		2017		2018	
	Number (Ten thousand times)	**Amount of money (Trillion)**	**Number (Ten thousand times)**	**Amount of money (Trillion)**	**Number (Ten thousand times)**	**Amount of money (Trillion)**	**Number (Ten thousand times)**	**Amount of money (Trillion)**	**Number (Ten thousand times)**	**Amount of money (Trillion)**
Check business	55200	242.57	39125	211.53	27300	165.8	23700	153.8	20200	131.47
Draft business	308	1.68	212	1.56	153	0.95	53	0.36	27	0.2
Promissory note business	477	4.36	459	4.15	235	2.09	165	1.42	116	0.99
Total	55985	248.61	39796	217.25	27688	168.84	23918	155.59	20343	132.66

Note – Source: People's Bank of China website

As shown in the table 2.2, from 2014 to 2018, the business of cheques, bills of exchange and promissory notes, which are traditional payment instruments in China's banking industry, declined significantly. Cheques are the main component of China's banking bill business. In 2018, the number of business was 202 million, representing a decrease of 63.41% compared with 552 million in 2014. The amount of business decreased from 242 trillion and 570 billion in 2014 to 131 trillion and 470 billion, representing a decrease of 45.8%.

The booming development of third-party payment also affects the bank card business of commercial banks. Bank card is an important payment tool in the banking industry. In countries with developed financial systems in Europe and the United States, bank card (mainly credit card) is also the most commonly used payment method in the daily consumption of residents. With the increasing use of online payment, the demand for bank cards has also decreased significantly. From the perspective of the number of bank cards issued, from 2014 to 2018, although the number of bank cards issued in China is still increasing year by year, the year-on-year growth rate has dropped significantly. As shown in 2.1, in 2014, the number of bank cards issued in

China increased by 17.13% year-on-year, and then maintained a downward trend of folding. The year-on-year growth rate in 2017 fell below 10%.

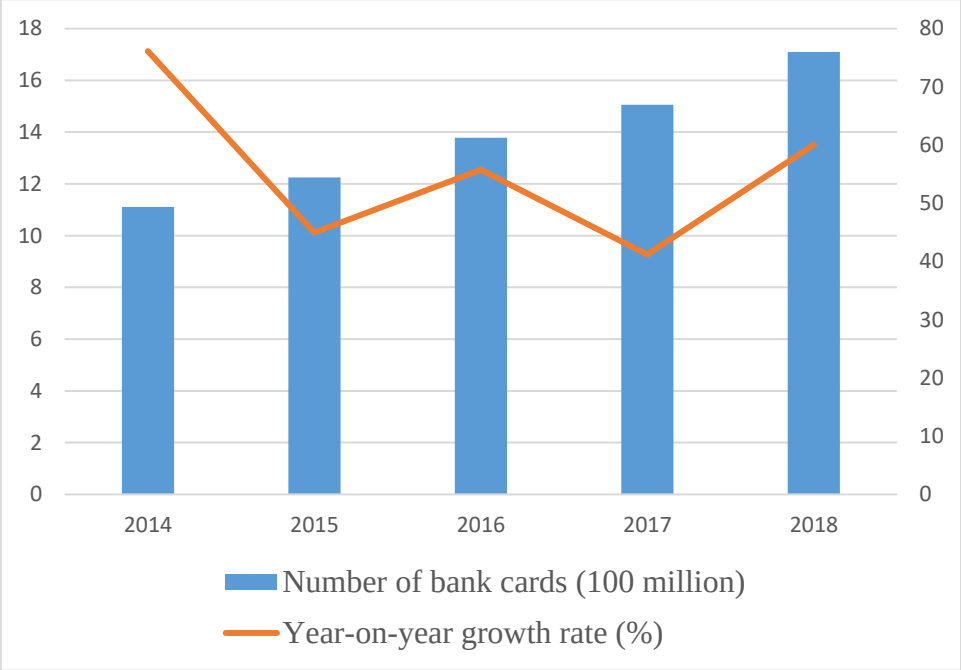

Figure 2.1 – The number of bank cards issued in China and the year-on-year growth rate in 2014-2018

Note – Source: People's Bank of China website

With the convenience of Internet Finance and the advantages of being free from time and space constraints, more and more residents are keen on using Internet Finance for investment and financing, wealth management, payment, handling various payment businesses, etc., which correspondingly reduces the reliance on intermediary business of banks. In the long run, the income of intermediary business of commercial banks will be further affected.

-Summary

This section analyzes the impact of Fintech on the banking industry from 3 aspects: liability business, asset business and intermediary business. Through the analysis, we found that Internet financial models, such as Internet wealth management, P2P credit, third party payment and so on, have affected the traditional banking business to varying degrees, of which the impact on liability business and intermediary business is the most obvious, and the impact on asset business is different according to the types of financial institutions in the banking industry. The impact of these emerging financial models on the competitiveness of the banking industry is mainly reflected in the reduction of the market share and profitability of the banking business, and the expansion of the risk bearing in the banking business. [28, p. 74].

2.4 Empirical analysis on the impact of Fintech on China's commercial banking business

In order to further quantitative analysis of the impact of Fintech on the business of commercial banks in China, this paper selects the annual data of 16 listed commercial banks from 2015 to 2020 as samples, establishes econometric models, and conducts empirical research on the impact of the sustainable development of Fintech on commercial banks.

Taking Alibaba small loan of ant financial and micro payment of Ten Pay as representatives, the paper makes an empirical analysis of the impact on the profitability of traditional banking business from 2 aspects, namely, loan business and deposit business, and proposes 2 assumptions.

-Research design

1.Research hypothesis

In this paper, ant financial services and Ten Pay of Fintech representative enterprises are selected for the corresponding empirical research. Alibaba small loan of ant financial provides convenient and almost all-round micro credit loans for many consumers. In this sense, it plays an alternative or competitive role in the consumption credit of commercial banks. This seems to erode the consumer credit of commercial banks, which will have a negative impact on the profitability of the traditional credit business of commercial banks; However, the micro credit loans of Alibaba small loan are scattered and micro loans for various consumer goods except for bulk consumer durables. In theory, with the expansion of Alibaba's small loan business, it will help to effectively expand the production and sales of mass enterprises producing more consumer goods, increase their performance, increase their profits and accumulation, and thus increase their deposits. Of course, it will also increase the deposits and loans of these enterprises in commercial banks and improve the profitability of traditional business of commercial banks.

In this way, it is assumed 1 that：

Assumption 1: Ant finance services Alibaba small loan can have a significant positive effect on the traditional profitability of commercial banks.

As a third party payment representative enterprise, Tencent's Ten Pay has a certain function of legal deposit taking, which has a clear competitive relationship with the deposit business of commercial banks. In particular, as an enterprise with strong financial and technological attributes, Ten Pay has more prominent advantages in big data, cloud computing, and even blockchain and artificial intelligence. This enables it to control the transaction costs in the deposit business at a low level and to snatch deposit users from the bank at a low cost. In other words, in the process of competition with commercial banks' deposits, its advantages will become more and more obvious,

and it will obtain more and more market share of deposits from commercial banks, thus the traditional profit model of deposit and loan interest spread of commercial banks will be more and more impacted, and the profitability of traditional business will be reduced.

In this way, it is assumed 2 that：

Assumption 2: Ten Pay micro payment can have a significant negative effect on the traditional profitability of commercial banks.

2.Variable selection

This research takes the return on total assets of commercial banks as the variable indicator to reflect the profitability of commercial banking business, and Ant finance and Ten Pay as the variable indicator of Internet Fintech. According to the research assumption of this paper, the research variables need to be determined first, and can be divided into the following parts according to the difference of variables: explained variables, control variables and explanatory variables, the specific situation is shown in the table.

Table 2.3 – Model variable selection

	Variable	**Symbol**	**Data acquisition**
Explained variable	Profit margin of total assets	ROTA	Net profit / total assets
Control variables	Transaction amount of ant financial	LNM	Natural logarithm
	Transaction amount of Ten Pay	LNC	Natural logarithm
Explanatory variables	Bank assets	LNSIE	Natural logarithm
	Non performing loan ratio	BLR	Total non-performing loans / loans
	capital adequacy ratio	CRAR	Total assets / risk assets
	Proportion of income from intermediary business to revenue	NIR	Income from intermediary business / Total revenue

Note – Source: author's elaboration on the basis of [27]

3.Sample selection and data source

The empirical sample is the annual data of 16 listed commercial banks from 2015 to 2020. In order to ensure the accuracy of the research results, this paper first classifies banks into 3 small samples, namely state-owned commercial banks, joint-stock commercial banks and urban commercial banks, and selects commercial banks with different numbers as actual research samples according to each small sample. The sample span is 5 years, and the data source is based on the annual report data of

commercial banks in the city above. Ant finance and Ten Pay are based on the annual report of enterprises and relevant data of listing in the United States. After preliminary data sorting, basic panel data are obtained.

4.Model setting and testing

The panel data model generally adopts the constant coefficient model, and its basic formula is

$$Yit = \alpha + xit\beta + uit$$
$$I = 1,2,\ldots..,N; t = 1.2\ldots..,T \quad (1.1)$$

The intercept term and the dimensional coefficient vector are the same in each equation. According to the formula, the panel data model can be obtained.

$$ROTA = \alpha + LNMit\beta 1 + LNSIEit\beta 2 + BLRit\beta 3 + CRARit\beta 4 + NR\ it\beta 5 + Uit \quad (1.2)$$

It in the above formula represents the data of year t of I individual, a represents the intercept to be estimated, β represents the corresponding coefficient of the explanatory variable to be estimated, and uit represents random error.

The results are shown in table 2.4.

Table 2.4 – Description of statistical results

	N	mean	min	P50	Max	Sd
ROTA	124.000	1.012	0.489	1.117	1.467	0.179
LNM	124.000	4.493	0.408	6.095	9.905	3.238
LNC	124.000	11.905	0.294	11.696	13.984	1.184
LNSIE	124.000	10.298	7.308	10.298	12.403	1.209
BLR	124.000	1.109	0.381	1.012	2.894	0.4448
CRAR	124.000	12.089	8.790	12.003	15.976	1.503
NIR	124.000	17.975	5.501	17.097	50.890	8.096

Note – Source: author's elaboration on the basis of [27]

From table 2.4, it can be found that the minimum value of ROTA is 0.489 and the maximum value is 1.467, with a difference of less than 1, indicating that the profitability of 16 listed commercial banks is basically similar. The transaction volume of Ant finance and Ten Pay, which measure the development of Fintech, fluctuates greatly, with the minimum value of 0.408 and 0.294, and the maximum value of 9.905 and 13.984, respectively. This shows that the development of Fintech is fast, and there are significant fluctuations in both NIR and LNSIE. Compared with these 2 variables, the volatility of other variables is relatively small, which means that the assets of 16 listed commercial banks show a rapid growth trend, especially the explosive growth of intermediary business. Pearson correlation coefficient formula was used to calculate the correlation between the variables and analyze them. The results of correlation analysis are shown in table 2.5.

Table 2.5 – Correlation analysis

	ROTA	**LNM**	**LNC**	**LNSIE**	**BLR**	**CRAR**	**NIR**
ROTA	1.000						
LNM	-0.100 0.2564	1.000					
LNC	-0.197 0.020	0.970 0.000	1.000				
LNSIE	0.259 0.002	0.318 0.002	0.309 0.003	1.000			
BLR	-0.371 0.000	0.318 0.002	0.411 0.000	0.418 0.000	1.000		
CRAR	0.423 0.000	0.205 0.020	0.298 0.009	0.280 0.045	0.176 0.109	1.000	
NIR	-0.139 0.146	0.407 0.000	0.419 0.000	0.423 0.000	0.380 0.000	-0.144 0.132	1.000

Note – Source: Weak correlation below 0.5, medium correlation between 0.5-0.8 and strong correlation above 0.8.

From table 2.5, it is not difficult to find that the total asset profit margin of the 16 listed commercial banks in the sample data has a negative correlation with the transaction amount of ant financial services, the transaction amount of Ten Pay, the non-performing loan rate and the proportion of income from intermediary business to revenue, and a positive correlation with the bank's asset size and capital adequacy ratio. However, since all of them are below 0.5, the correlation between variables is relatively weak, and it can be preliminarily judged that there is no multicollinearity between variables.

5.Regression analysis

Before the overall regression of the model, the Houseman test of the overall data of the model is carried out, and the results are shown in the table.

Table 2.6 – Model test results

Hausman		
	Statistics	**P value**
Ant finance model	9.09	0.064
Ten Pay model	4.87	0.485

As can be judged from table 2.6, both ant financial and Ten Pay select fixed effect model for regression analysis. The regression results of ant financial are shown in table 2.7.

Table 2.7 – Regression analysis of ant financial Ali small loan model

	coef	**Std.Err**	**t**	**P>| t |**	**[95%Conf.Tnterva]**	
LNM	0.021048*	0.010439	1.89	0.054	-0.00513	0.424744
LNSIE	-0.158749*	0.079865	-1.86	0.066	-0.339051	0.010897
BLR	-0.203428***	0.032568	-6.36	0.000	-0.249754	-0.134964
CRAR	0.018954*	0.010953	1.71	0.087	-0.003057	0.043032
NIR	-0.000057	0.001897	-0.03	0.968	-0.003764	0.003696
_cons	2.654324***	0.879463	2.97	0.003	0.896573	4.382745
F test that all u_i=0:F(15,107)=4.67				Prob>F=0.000		

Note – Source: * * *, * *, * represent significant level at 0.01,0.05 and 0.1 respectively

As can be seen from table 2.7, the F value is 4.67, corresponding to the P value of 0, then we can reach the following conclusion: reject the model's insignificant assumption at the 0.01 significant level, that is, the current model is reasonable; and the LNM can have a significant positive impact on the explained variables at the 0.1 significant level, whenever the trading scale of ant financial services increases1%, then the total asset income of commercial banks will increase by 0.021. In general, the development of ant financial services, which represents Fintech, will enhance the profitability of traditional business of commercial banks. In this way, assumption 1 is verified.

The regression results of Ten Pay are shown in Table 2.8.

Table 2.8 – Regression analysis of Ten Pay model

	coef	Std.Err	t	P>| t |	[95%Conf.Interval]	
LNC	-0.073241***	0.026654	-2.71	0.007	-0.129057	-0.021046
LNSIE	0.178447**	0.074963	2.36	0.0016	0.032953	0.340812
BLR	-0.137402***	0.031869	-4.31	0.000	-0.209522	-0.084927
CRAR	0.041937	0.005955	3.37	0.001	0.012056	0.069038
NIR	-0.001356	0.001694	-0.63	0.462	-0.004961	0.002894
_cons	-0.2054354	0.571462	-0.37	0.703	-1.196793	0.862643
F test that all u_i=0:F(15,107)-4.46				Prob>F=0.000		

Note – Source: * * *, * *, * represent significant level at 0.01,0.05 and 0.1 respectively

As can be seen from table 2.8, F value is 4.46, corresponding to P value of 0, then we can reach the following conclusion: under the significant level of 0.01, reject the insignificant assumption of the model, that is, the current model is reasonable; under the significant level of 0.1, LNC has a significant negative impact on the explained variables, when the transaction scale of Ten Pay micro payment increases by 1%,The return on total assets of commercial banks decreased by 0.073.Therefore, with the improvement of the payment level of Ten Pay, the profitability of traditional business of commercial banks will decrease accordingly. In this way, assumption 2 is verified.

6.Empirical results and analysis

Based on the annual reports of 16 listed commercial banks and the related data of Ant finance services and Ten Pay on behalf of Fintech enterprises, a panel data model is established. Based on the analysis of the impact of Alibaba small loan and Ten Pay micro payment of ant financial on the profitability of traditional banking business, the paper concludes that: the Alibaba small loan of ant financial has a significant positive effect on the traditional profitability of commercial banks; the Ten Pay micro payment has a significant impact on the traditional profitability of commercial banks negative effects.

At present, the rapid development of Fintech in China has had an impact on the business operation of commercial banks, and different stages of development and different development models can have an impact on commercial banks, but there are certain differences in this impact. The Alibaba small loan of ant financial can complement the commercial banks, which is mainly reflected in the difference of borrowers. At present, the traditional business of commercial banks mainly relies on the expansion of corporate loan business, especially the provision of credit business services for those large and medium-sized enterprises. Compared with individuals and small and micro enterprises, there are certain deficiencies in credit business, which are filled by Alibaba small loan of ant financial. In particular, Alibaba small loan provides credit loans to a lot of consumers to meet their consumption, which not only helps to stimulate the economy, but also increases the derivative deposits of commercial banks and improves the purchasing power of consumers, thus providing protection for the development of corporate loan business and the improvement of profitability of commercial banks.

As a third-party payment of Fintech, Ten Pay, which represents an enterprise, has certain deposit functions. Internet companies have more prominent advantages in Fintech, which enables them to control transaction costs at a lower level and to snatch users from banks at a lower cost. Therefore, the larger the transaction scale of Ten Pay, the greater the crowding out effect of the deposit business of commercial banks, which

will have a direct negative impact on the liability operation of commercial banks, that is, there is a negative correlation between Ten Pay and the business operation and profitability of commercial banks.

-Summary

In order to achieve sustainable development under the background of Fintech, commercial banks must first fully recognize the challenges of the development of Fintech to the traditional business of commercial banks, including asset business, liability business and intermediary business, as well as the opportunities faced by commercial banks. The theoretical and empirical analysis in this chapter shows that the development of Fintech in some areas will bring certain opportunities to the traditional business of commercial banks. For example, Fintech enterprises such as Ant finance Ali small loan, which involves the field of small loan, can have a significant positive effect on the traditional profitability of commercial banks. At the same time, the development of Fintech in some areas will have a great impact on the traditional business of commercial banks. For example, Fintech enterprises such as Ten Pay, which are involved in the deposit field, can have an obvious negative effect on the traditional profitability of commercial banks. The positive or negative impact of the development of Fintech enterprises on commercial banks is undeniable and can’t be ignored. If commercial banks do not pay enough attention to this and alert, this opportunity will be wasted by commercial banks to a considerable extent. With the reform and development of the economic and financial system, Fintech enterprises entering the non-bank financial field will gradually "nibble" various loan businesses of commercial banks and force them to continue to give in and shrink due to more diversified licenses, including certain forms of banking business licenses. If commercial banks do not pay enough attention to and be alert to this, the impact of the development of Fintech enterprises on commercial banks will continue to increase, forcing commercial banks to decline, resulting in the bankruptcy and bankruptcy of a large number of small and medium-sized commercial banks. Therefore, according to the research conclusion of this chapter, commercial banks must actively adopt a comprehensive response strategy to effectively respond to the development of Fintech and embrace Fintech.

CHAPTER 3 THE IMPROVEMENT METHODS OF COMMERCIAL BANKS.

3.1 The impact of Fintech investment on the profitability of banks

The transmission and generation process of productivity effect of Fintech investment is also the spillover and penetration process of bank performance. The direction and strength of productivity effect will undoubtedly have an important impact on bank profitability. In essence, the decision-making of Fintech investment is the profit maximization behavior of commercial banks based on the consideration of "cost-benefit". The core goal of Fintech investment of commercial banks is to improve operational efficiency and enhance market competitiveness.

3.1.1 Research hypothesis

Banks rely on Fintech investment to directly improve their profitability, mainly from two aspects.

First, on the income side, the investment in banking Fintech has broadened the business boundary and income source channels of banks by improving the efficiency of basic services such as transaction and settlement, integrating into more scenarios. From e-commerce, social networking, information and other multi-point access to cover the long tail demand, the information flow is transformed into revenue increment. By providing professional, intelligent and personalized financial services, we can bring better service experience, increase the stickiness and activity of bank customers, and improve the added value contribution of customers. The application of Fintech also enables commercial banks to collect internal business data and external industry data to serve management and operation, and form income increasing productivity.

Second, on the cost side, the investment in banking Fintech promotes the integration of personnel, business, technology and data, as well as the effective integration of products and services, and reduces the marginal service cost of banks. Business process realizes the migration from offline outlets to online channels, which improves the automation and accuracy of banking services. Internal communication and coordination are more efficient, fixed cost expenditure and single business marketing expenditure are reduced, and the release of bank human resources saves labor costs. Compared with the old development mode relying on traditional means such as shop outlets, setting up institutions and expanding scale, the innovation of exhibition mode brought by Fintech investment has greatly reduced the operating cost and saved the management cost. On the contrary, the low-cost operation of banks provides support for expanding business scale and increasing market share, and further promotes the growth of business income.

To sum up, this paper puts forward the hypothesis to be tested for the mechanism of the impact of bank Fintech investment on profitability.

Assumption: The investment in banking Fintech can improve the profitability of banks by directly reducing operating costs and broadening revenue sources.

3.1.2 Variable Selection

1.explained variable.

-bank productivity

The non-parameter data envelope (DEA) method does not rely on the production function and sample size, and its calculation results are relatively stable. In this chapter, the total factor productivity index calculated by DEA-Malmquist model [43, p. 4].is used as the proxy variable of bank productivity. The intermediary method covering the banking business scope is adopted to determine the variables of the DEA model. Taking deposit taking, operating expenses and the number of employees as the input indicators and taking the total amount of loans and advances and profits as the output indicators, the TFP of the sample banks is calculated. The results are shown in Table 3.1.

Table 3.1 Calculation results of DEA-Malmquist index of Listed Banks

Year	**Large banks**	**Joint-stock banks**	**Other listed banks**	**Listed banks in general**
2007	1.0704	1.0999	1.0957	1.0925
2008	0.9416	0.9715	0.9360	0.9467
2009	1.0805	1.0421	1.0211	1.0371
2010	1.0727	0.9832	0.9579	0.9847
2011	1.0469	1.0345	0.9810	1.0071
2012	1.0126	1.0010	1.0395	1.0243
2013	1.0232	1.0046	1.0078	1.0095
2014	0.9961	1.0033	0.9505	0.9729
2015	0.9697	0.9866	0.9154	0.9444
2016	1.0257	1.0311	0.9794	1.0017
2017	1.0094	1.0803	1.0470	1.0497
2018	0.9705	1.0190	1.0223	1.0125
2019	0.9974	0.9943	1.0124	1.0049
Average value	1.0158	1.0187	0.9967	1.0060

Note: The calculation results of various banks are the weighted average value of TFP of each bank in the classification weighted by the relative asset share; The overall value of listed banks is the weighted average of the calculated value of 3 types of banks weighted by the number of each type of bank; The average is the geometric average of the calculation results of various banks over the years.

According to the calculation results in Table 3.1, the average TFP of listed banks from 2007 to 2019 is 1.006, which indicates that under the background of financial technology, the overall productivity of listed banks in China is in the path of improvement. From the dynamic change trend, the annual average of TFP of listed banks in 2008, 2010, 2014 and 2015 is less than 1, which may be due to the global financial crisis and the downward pressure of economic stages, to a certain extent, reflecting the pro cyclical characteristics of bank productivity. Compared with the average productivity of various types of banks, joint-stock banks are the highest, followed by large banks, and urban commercial banks and rural commercial banks are the lowest.

-bank profitability

In order to further reveal the performance of productivity effect of Fintech investment in commercial banks' operating performance, this paper studies the impact of Fintech investment on banks' profitability by combining the direct and indirect mechanism of productivity spillover. In the selection of variables, we try to attribute the bank's profit performance to the direct contribution brought by "increasing revenue and reducing expenditure" and the indirect contribution brought by the improvement of management service efficiency. ROA is not only a common index to comprehensively evaluate the operational performance of banks, but also a regulatory index included in the core index system of risk supervision of China's commercial banks. It decomposes the return on total assets into net profit rate (the ratio of net profit to operating income) and asset turnover rate (the ratio of operating income to total assets). From the connotation of indicators, the net profit rate reflects the bank's cost control ability. The higher the net profit rate, the more effective the bank's cost saving, the greater the net profit contribution of unit operating income, and more assets or services are allocated to the areas with higher profitability. Asset Turnover represents the efficiency of bank asset utilization and reflects the long-term mechanism of bank profit growth. The faster the asset turnover, the higher the "activity" of banks as financial intermediaries and the stronger the sustainability of serving the real economy.

Macroeconomic environment, industry structure and bank assets and liabilities business will also affect the bank's production efficiency, so the control variables are added into the 3 levels of macro, industry and bank. On the macro level, the impact of economic aggregate and capital market will be controlled by the nominal GDP growth rate and the proportion of A share market value in GDP respectively; At the industry level, the influence of industry concentration and openness is controlled by the proportion of 5 large banks and foreign banks in the total assets of the banking industry; At the bank level, deposit liability ratio and loan asset ratio represent the market constraints of the bank, and bank liquidity ratio, non-performing loan ratio and equity coefficient control the operational characteristics of the bank.

The relevant variables are described in Table 3.2

Table 3.2 Variable descriptive statistics

Variable symbol	Variable name	Processing method	Mean value	Standard deviation	Minimum value	Maximum value
Tfpch	Total factor productivity	DEA-Malmquist index	1.012	0.038	0.876	1.153
Npm	Net profit margin	Ratio of profit after tax to operating income (%)	35.042	6.151	4.231	47.358
Tat	Asset turnover	Ratio of operating income to total average assets (%)	2.961	0.449	1.820	4.120
Fintech	Fintech investment	Proportion of Fintech investment in operating expenses (%)	10.109	12.655	0.580	65.083
Loan	Loan to asset ratio	Proportion of loans and advances to total assets (%)	47.301	7.765	26.070	61.320
Liq	mobility	Liquidity ratio (%)	48.541	12.250	25.490	97.490
Nonp	Asset quality	NPL ratio (%)	1.412	1.442	0.360	23.570
Equi	Equity coefficient	Ratio of total assets to equity capital (%)	16.115	4.849	7.650	59.860
Ngdp	GDP growth	Nominal GDP growth rate (%)	11.662	4.642	7.04	23.080
Cap	Capital market situation	Ratio of total market value of A shares to GDP (%)	61.219	19.450	38.020	121.100
Cop	Banking concentration	Proportion of assets of top 5 banks (CR5) (%)	42.739	5.552	36.670	53.250
Open	Openness of banking industry	Proportion of assets of foreign banks (%)	1.738	0.277	1.360	2.360
Sech	Scale efficiency	Scale efficiency index	1.000	0.035	0.850	1.180

End of Table 3.2.

Variable symbol	Variable name	Processing method	Mean value	Standard deviation	Minimum value	Maximum value
Pech	pure technical efficiency	Pure technical efficiency index	0.999	0.044	0.740	1.230
Techch	Technological progress rate	Technology progress index	1.014	0.039	0.830	1.240
Cir	Cost income ratio	Ratio of operating cost to net operating income (%)	31.607	5.080	17.700	48.770

Note – Source: author's elaboration on the basis of [32]

3.1.3 Sample selection and data source

In the empirical part of this chapter, the panel data of 29 A share listed banks from 2007 to 2019 are used for research, and the sub IPO banks with less than 4 consecutive years of financial data and the banks with lack of information on Fintechinvestment in the existing listed banks are eliminated. The samples include 5 large banks, 8 joint-stock banks and 16 other banks (including 11 urban commercial banks. There are 5 rural commercial banks). Among them, the input data of fintech is collected and sorted according to the bank's annual report and IPO prospectus, and other variable data are from the Wind database. Since 2,007, the total assets of the sample banks accounted for more than 65% of the total assets of the financial structure of the banking industry, so the selection of 29 listed banks is representative.

3.1.4 Model setting and testing

In order to verify the relationship between Fintech investment and productivity and profitability, this paper establishes a double fixed effect model of individual and time

The model should be described as follows:

$$P_{it} = \beta_0 + \beta_1 \text{fintechit}_{it} + \lambda_j \sum_{i=1}^{n} control_{jit} + \delta_i + \mu_t + \varepsilon_{it} \qquad (3.1)$$

In the formula, subscript i is commercial bank and subscript t is year; P_{it} represents the performance variables of banks, which are tfpch, NPM and Tat respectively. $control_{jit}$represents the set of macro, industrial and bank level control variables. δ_i is the time fixed effect, $\mu_t$is the fixed effect of individual bank, $\varepsilon_{it}$is the random error term.

3.1.5 Regression analysis

By Hausman test, fixed effect model (1) was used for regression analysis. The benchmark regression results are reported in table 3.3. No matter whether the control variable is added or not, the regression equation of tfpch is not significant. This shows that under the current input conditions, the direct and indirect mechanism of bank Fintech investment on productivity is superimposed, and it does not have a significant impact on the total factor productivity effect of banks.

Table 3.3 Benchmark regression results

	Tfpch	**Npm**	**Tat**	**Tfpch**	**Npm**	**Tat**
Fintech	0.002 (0.0012)	0.1152** (0.0472)	0.0018 (0.0048)	0.0002 (0.0008)	0.0785*** (0.0347)	-0.0027 (0.0040)
Dep				-0.0027** (0.0011)	0.0771 (0.0658)	0.0139** (0.0054)
Loan				0.0009 (0.0013)	-0.0085 (0.1007)	0.0107 （0.0078）
Liq				0.000 （0.0005）	0.0232 （0.0318）	-0.0107 (0.0023)
Nonp				-0.0084** （0.0042）	-0.2049 (0.2888)	-0.0529*** (0.0122)
Equi				-0.0038** （0.0015）	-0.3721*** （0.0922）	-0.0213*** （0.0049）
Ngdp				-0.0057 （0.0072）	0.0522 （0.2234）	0.0551*** （0.0122）
Cap				0.0031*** （0.0010）	0.0897 （0.0764）	-0.0019 (0.0024)
Cop				-0.0069* （0.0041）	-0.5595*** （0.1545）	0.0434*** (0.0095)
Open				0.2044* （0.1090）	3.1446 （3.7837）	-1.3025*** （0.2520）
Constant term	1.0982*** （0.0259）	30.7124*** （1.5085）	3.1579*** （0.0726）	1.0246*** （0.0934）	42.0079*** （5.2404）	1.6303*** （0.2891）
Sample size	288	288	288	288	288	288
R-squared	0.2129	0.3602	0.4875	0.2977	0.4524	0.6075

Note – Source: author’s elaboration on the basis of [32]

3.1.6 Empirical results & analysis

Fintechinvestment has improved the overall profitability of listed banks, which has the largest impact on the net profit margin of joint-stock banks, followed by large banks, urban commercial banks and rural commercial banks; There is little evidence

that Fintech investment improves the asset utilization efficiency of listed banks, which is true in all kinds of banks.

Based on the above research conclusions, although Fintech has a certain role in improving profitability, we should also analyze the advantages and disadvantages, effectively avoid the risks, in order to better promote the combination of Fintech and traditional commercial banks, so that commercial banks can get better development.

3.2 Risk prevention in the development of commercial banks

3.2.1 Risk types of cooperation between traditional commercial banks and Fintech enterprises

The definition of risk in the field of economics mainly includes the following aspects:

1) measurable uncertainty;
2) possible losses;
3) the uncertainty of event factors in the process of loss occurrence;
4) thinking about the possible results of future development;
5) the actual situation in the future is different from the expected effect;
6) the frequency of possible losses in the course of development;
7) the extent of potential losses.

Risks are various, including the risks brought by external markets, hidden in the original market, static risks and dynamic risks. The identification of risks in the market is mainly to determine the risks related to the economy [23].

The Basel Committee believes that there may be 8 types of risks in the banking sector, including market, credit, operational and reputational risks. Among them, the Fintech risks of commercial banks are mainly operational risks, but they will also cause institutional and credit risks. The main features are wide range of influence, strong concealment and high technicality. The CBRC defines the concept of Fintech risk as finance in accordance with the guidelines for Fintech risk management of commercial banks (March 2009). During the use of technology in the field of commercial banks, operational risks and reputational risks are caused by natural and human reasons, incomplete bank management and technical loopholes.

To sum up, the Fintech risk is originated from technology and focuses on management. The following is an introduction to the types of Fintech risks.

-Technical risk

Technical risk refers to the risk of threatening people's production and life with the development of science and technology and the change of production mode.

The application of emerging technologies in the field of finance can enable the sharing of various information. However, these technologies also have risks, such as information leakage, etc., and also need to consider how to complete effective data interaction of cross industry information.

At present, the development of Fintech is not mature, there are certain risks and hidden dangers. Firstly, there are some deficiencies in the software design, such as poor cohesion, poor fault tolerance and poor self-defense ability. In August 2017, WeChat fell into a wide range of failures, such as unsuccessful login and abnormal transfer function. As an application with 700 million users, its failure caused a lot of public panic. As the giant of bao online payment, payment was also involved in software breakdown last year, which made it impossible for hundreds of millions of users to make transfer payment. Secondly, facing the information risk, the security of information during the storage, extraction and transmission is insufficient. And the authenticity of information quality and the integrity of data will also cause differences in decision-making, or even major errors. The risk of information leakage and identification technology will inevitably encounter some threats during the development of Fintech, resulting in capital losses and user information leakage and other problems.

According to the International Monetary Fund ***Finance & Developmen*t**, “cyberattack is the most important threat to the application of Fintech” [12, p. 9]. It is understood that the cloud vulnerability reporting platform discovered more than 11,000 "white hat" hackers from 2010 to 2016, involving more than 200,000 vulnerabilities. It is publicly pointed out that large Fintech companies such as Alipay and Jingdong have high-risk loopholes, and many domestic commercial giants such as Ctrip, Tencent and qunar.com have security problems such as user data leakage. Coincidentally, the bitcoin virus blackmail incident in the first half of 2017 still spooked the global Internet users. In the context of big data, Fintech machine companies master the personal information of a large number of users. The accumulation of various non-confidential information may cause the privacy of users to be disclosed. If the information is used by illegal organizations, it may seriously threaten the property security of users [13, p. 8].

The financial industry is closest to money and has the highest rate of return. For a long time, hackers have been targeting financial institutions. To resolve these technical risks, we must not only rely on more comprehensive technical guarantee, but also the risk monitoring throughout the cycle.

-System risk

System risk, also known as market risk, also known as non-dispersible risk, refers to the possibility of increasing investors' risk and bringing losses to investors due to the influence and changes of various factors.

There are several important features in the operation of Fintech. Firstly, the financial services provided by financial institutions, including banks, securities and insurance, will continue to penetrate and integrate, and the boundaries between financial institutions will be gradually eliminated. Secondly, non-financial institutions can also launch convenient "quasi financial business" by virtue of Fintech, constantly breaking through the boundaries between the 2 types of institutions, namely non-financial and financial institutions. Finally, on the basis of network and other technologies, the interaction between different economic entities has also broken regional constraints. Therefore, if the risk erupts, the wide penetration and rapid spread of Fintech will allow the risk to spread to many regions, different departments and different industry sectors, and at the same time affect the confidence and expectation of the public, so as to make the financial risk spread faster and stronger. Due to the systemic risk, the global financial crisis in 2008 spread from Citigroup in the United States to Deutsche Bank in Germany, HSBC in the United Kingdom and UBS in Switzerland, etc., and was the largest financial crisis in history with a wide range of impacts. Finance is the core of the national economy. Under the background of the new normal, financial stability has become the key guarantee to boost supply side reform and complete economic transformation and optimization. Therefore, in recent years, the relevant national regulatory authorities have attached great importance to financial risks, and have repeatedly emphasized that "we should put prevention and control of financial risks in an important position, and continuously improve risk prevention and control capabilities to ensure that no systematic risk occurs.".

-Institutional risk

Institutional risk is an endogenous process and possibility of deposit insurance system which leads to the weakening of risk awareness of banks.

With the development of Fintech, the supervision and management is facing increasingly difficult challenges. First, it challenges the ability to monitor and manage industry risks. The regulators may not be able to quickly update their own knowledge structure and deploy a strong supervision and management team, thus affecting the effectiveness of supervision and management. According to DDT, since the beginning of the financial crisis, the total fees of financial institutions around the world have increased by about 5 times, reaching more than US $300 billion in total, which means that the financial supervision after the crisis is increasingly tightening. Second, the regulatory order has been changed in essence. In the past, the supervision order was relatively stable and perfect, and the regulators and actors played their roles under the restriction of the open system and rules. However, the high-level form of Fintech adopts code replacement rules, such as smart contracts based on blockchain technology, and uses trigger conditions to implement self-correction, while the current regulatory system does not clearly define smart contracts. Whether smart contracts can be regulated through existing legal norms, such as contract law has not yet been decided

by the academic community and regulatory authorities. Therefore, whether the regulatory authorities can quickly adapt to the new supervision and management order in the future is worth exploring.

-Credit risks

Credit risk, also known as default risk, refers to the possibility that the borrower, securities issuer or counterparty is unwilling or unable to perform the contract conditions due to various reasons, resulting in losses to banks, investors or counterparties.

Credit risk is mainly caused by information asymmetry. The progress of Fintech has promoted the development of banking business from offline to online. However, the virtuality of the identities of both parties in online transactions increases the difficulty of bank identification and transaction identification, resulting in information inequity. If there is no way to accurately study the needs and identity of the counterparty, the lawbreakers may use malicious trading activities to attack the bank. Moreover, Fintech companies may reach the high-risk group and increase the market risk by promoting financial business to small and medium-sized companies and low-income groups. Some Fintech companies use the name of Fintech to package themselves and sell "false innovation" technology. Meanwhile, the privacy of information and the separation of information systems make it difficult for commercial banks to identify and select, which may cause greater credit risk. In the context of the development of Fintech, credit risk has become more infectious and harmful.

-External risks

External risk refers to the risk generated outside the banking system relative to the internal risk of the banking system. This kind of risk is different from the general enterprise operation risk and other risks but arises from the risk of financing activities or quasi financing activities.

During the transformation of commercial banks, it is bound to use all kinds of new technologies to improve and upgrade the system, which will inevitably increase the risk of external loss caused by wrong operation. In addition, during the cooperation with external Fintech companies, traditional commercial banks will inevitably face some risks that may be brought by third party cooperative institutions. This obviously expanded the scope of the initial supervision and management of the border and created more burden for the supervision and management of banks.

-Long tail risk

Long Tail risk, sometimes called "fat tail risk," is the financial risk of an asset or portfolio of assets moving more than 3 standard deviations from its current price, above the risk of a normal distribution.

The most representative feature of Fintech is that it has a "long tail" effect, and its marginal cost of serving customers is quite low, so it can expand its service field. Many people are not covered by traditional finance, which makes Fintech and

traditional finance show different risk characteristics. First of all, this group lacks financial knowledge, has low risk tolerance and is vulnerable to false guidance and deception. Secondly, because the amount of investment of this group is relatively scattered and not high, the cost of supervision on Fintech companies by a single customer is much more than the return obtained, so the role of market constraints is very weak. Finally, it is inevitable to have "irrational excitement" behavior, and there will be a large number of participants. If there is a risk of Fintech explosion, the social impact will be unusual. During the campaign of "making wealth through science and technology", hundreds of thousands of ordinary investors have joined in, from craziness to broken dreams of wealth and wealth, resulting in serious losses, which leads to difficult to assess the social impact.

3.2.2 Risk prevention of cooperation between traditional commercial banks and Fintech enterprises

Commercial banks are the foundation of the domestic financial market, and stable and healthy development has always been the primary premise for the banking industry to ensure. Because the Fintech has the characteristics of breaking through the time and space limit, fast information dissemination and strong dependence on information technology, which increases the risk of traditional commercial banks, the cooperation between traditional commercial banks and Fintech enterprises needs to do a good job in risk prevention from the government, financial institutions, Fintech enterprises and other aspects [29, p. 113].

-Government supervision

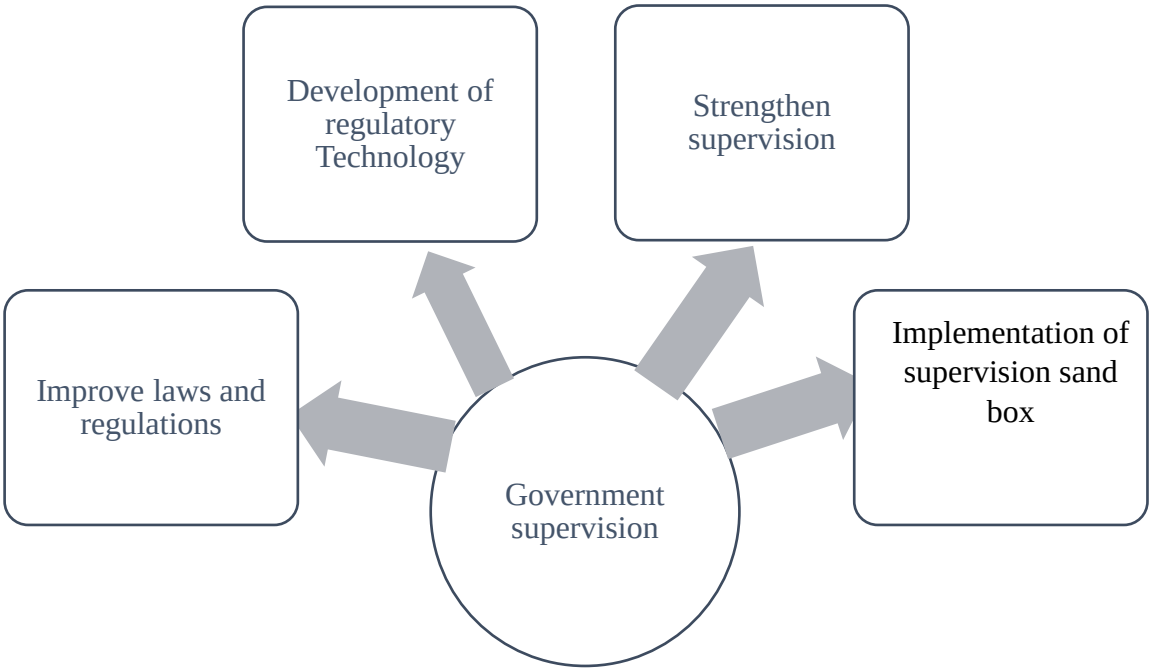

Figure 3.1 – 4 measures involved in government regulation

Note – Source: author's elaboration on the basis of [37]

Laws and regulations are an important basis for the government to implement supervision, and the improvement of laws and regulations is an effective guarantee mechanism for the healthy development of Fintech. With the continuous updating and application of Fintech, new problems are emerging, which requires the regulatory authorities to take the initiative and adopt strict supervision. According to the new problems, we should actively supplement and adjust the existing regulatory system, timely revise relevant laws and regulations, and continuously improve the level of supervision.

To strengthen supervision, it is necessary to continuously improve the management and technical level of supervisors, so that they can adapt to the rapid development of Fintech and form a compound talent team with Fintech knowledge, financial knowledge and supervision knowledge. It can be implemented in terms of talent selection, training and skill certification. The supervision process can be divided into 3 parts: before, during and after. Supervision should run through the whole process. Once problems are found in a certain link, they should be dealt with in a timely manner.

The implementation of regulatory sand boxes, the so-called sand boxes, is to provide a test environment for some destructive procedures, is to test the application in a specific environment, the application has access restrictions, and test whether the application can be used in the financial field. Through risk testing, regulatory authorities can decide whether to adopt a certain Fintech project, and determine whether the existing laws and regulations need to be adjusted, and whether to adapt to the development of the financial industry, so as to promote the development of Fintech within the scope of risk control.

We will develop regulatory technology to further the whole technology of data analysis, modeling and risk simulation, so as to improve the efficiency of regulatory work as a whole. Through the establishment of information system and the integration of artificial intelligence, we actively develop regulatory technology and build an intelligent monitoring system to achieve real-time and comprehensive monitoring, thereby promoting the stable development of Fintech.

-Traditional commercial bank

Traditional commercial banks have been focusing on the financial industry for a long time, with rich experience in financial services and a large customer base. First of all, traditional commercial banks need to build a digital Fintech regulatory mechanism. The development of Fintech is inseparable from digital information technology, so we should also adopt technical means to prevent and control financial risks. Commercial banks need to control the source of risk, improve the risk management system, make reasonable risk judgment and control the risk as much as possible through more real name account information and inject more scientific and technological means in the process of risk identification and risk assessment. Secondly, the establishment of technical risk prevention system. Traditional commercial banks should strengthen the

management, improve the internal control system, strengthen the code of conduct, and prevent the risks of Fintech in the system level. Finally, strengthen the risk awareness of personnel, including prevention and control awareness. Traditional commercial banks should establish strict selection standards and procedures for financial and technical talents, establish term audit system and leaving audit system for positions, strengthen risk prevention awareness and strengthen talent management.

-Fintech enterprise level

Emphasis on IT governance. Risk management needs to consider the overall situation and maximize the use of resources.IT governance not only emphasizes the importance of security technology, but also points out the important role of security management. Software and hardware facilities and services shall be invested according to the actual situation, and professional suggestions shall be provided if necessary. The company needs to establish an information security management mechanism in combination with its long-term development goals, ensure the stability and continuity of the system, use resources in a scientific and reasonable manner, and promote its own healthy development. In addition, it is necessary to further clarify the scope of authority and responsibility of each department to improve the overall work efficiency of each department.

Attach importance to innovative audit technology. The internal audit department shall review and supervise the software and hardware environment related to the big data artificial intelligence block chain technology, monitor the server, client, software and hardware configuration, and conduct necessary security tests on them. Focus on monitoring and troubleshooting the possible risk environment to ensure the stability of the system. At the same time, it is necessary to provide appropriate information system business training and audit training for technology professionals [38].

Attach importance to talent training. In risk events, the losses caused by unknown risks are very huge and may be catastrophic. Most of the efforts are now being made to quantify known risks more scientifically. Emerging technologies may bring unknown risks, and financial institutions should invest more resources to explore the possible risks in emerging technologies. The prevention of unknown risks requires excellent technical and management personnel, reasonable and flexible decision-making and clear operational objectives. In terms of strategic objectives, the consistency of risk management, system management and operation management should be maintained. In terms of risk management, in order to deal with the unknown risks, special matters and corresponding processing procedures should be set up, which means that the front-line business personnel can automatically obtain certain special permission in case of special emergency without waiting for the unified instructions of the superior. Front line personnel should receive comprehensive training on how to calmly handle unknown risks. In addition, all employees should have a consistent understanding of the organization's risk appetite and operational objectives. Although

there are no standards to follow when unknown risks come, the objectives to be achieved are clear and consistent. This process requires a forward-looking understanding of management and adequate internal communication and training.

Attach importance to technical departments. In January 2017, Alipay was exposed to a vicious incident in which the internal staff changed the user password without authorization. In fact, the internal security technicians of Alipay have discovered this problem and have also put forward the problem to the relevant departments for a long time, but they have not been paid attention to before the problem. The risk model of machine learning can use some rules to judge the controllability of risk. However, their trust in machine learning models overlooks human avarice and the possibility that humans may intentionally deceive machines, which could lead to huge losses in the financial industry. Therefore, as a product manager, in addition to pursuing convenience, we also need to pay attention to product safety and possible risks. Technicians need to maintain active communication with R & D personnel to control the overall risk.

3.3 Development strategies and trends of commercial banks

The arrival of the era of Fintech is inevitable, which is the historical trend of the development of human finance and technology to today. China's commercial banks must comply with this historical trend, maintain a high level of profitability and achieve sustainable development [39, p. 76].

3.3.1 Conclusion

In order to achieve sustainable development under the background of Fintech, commercial banks must first fully recognize the challenges of the development of Fintech to the traditional business of commercial banks, including asset business, liability business and intermediary business, as well as the opportunities faced by commercial banks.

The theoretical and empirical analysis shows that the development of Fintech in some areas will bring certain opportunities to the traditional business of commercial banks. For example, Fintech enterprises such as ant financial Ali small loan, which involves the field of small loan, can have a significant positive effect on the traditional profitability of commercial banks. At the same time, the development of Fintech in some areas will have a great impact on the traditional business of commercial banks. For example, Fintech enterprises such as Ten Pay, which are involved in the deposit field, can have an obvious negative effect on the traditional profitability of commercial banks.

The positive or negative impact of the development of Fintech enterprises on commercial banks is undeniable and can't be ignored. If commercial banks do not pay enough attention to this and alert, this opportunity will be wasted by commercial banks to a considerable extent. With the reform and development of the economic and financial system, Fintech enterprises entering the non bank financial field will gradually "nibble" various loan businesses of commercial banks and force commercial banks to continue to concession and shrink due to more diversified licenses, including certain forms of banking business licenses; If commercial banks do not pay enough attention to and be alert to this, the impact of the development of Fintech enterprises on commercial banks will continue to increase, forcing commercial banks to decline, resulting in the bankruptcy and bankruptcy of a large number of small and medium-sized commercial banks. Therefore, according to the research conclusion of this paper, commercial banks must actively adopt a comprehensive response strategy to effectively respond to the development of Fintech and embrace Fintech.

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3.3.2 The development trend of commercial banks under the background of Fintech

According to the research conclusion of this paper, the author systematically puts forward some targeted countermeasures and suggestions for the development of commercial banks under the background of Fintech.

1.Enhance the application capacity of Fintech

Under the background of Fintech, the optimization of the business model of commercial banks needs to start from the improvement of the application ability of Fintech. Only by applying cutting-edge technologies such as big data, blockchain and cloud computing to financial business, we will try our best to strengthen the application ability of Fintech and improve the operation efficiency of traditional financial business of commercial banks, and to ensure the healthy development of the emerging business model of commercial banks. In this way, in the era of rapid development of Fintech, we can continuously improve our core competitiveness, remain unbeaten and embark on the road of sustainable development [42, p. 84].

1) Strengthen the application of Fintech in payment and settlement

With the continuous development of Fintech industry, commercial banks want to improve their own payment and settlement business system, it is necessary to start from the application of cutting-edge technologies such as big data, cloud computing and blockchain. It can establish a payment and settlement sharing center of commercial banks based on the cutting-edge technologies of big data and cloud computing. The payment and settlement sharing center has comprehensive technical functions such as informatization, intelligence and digitalization. It is a business model improvement and

Optimization for the payment and settlement of commercial banks, and also a restructuring of payment and settlement businesses, which integrates network information, communication technology. Big data exchange and artificial intelligence realize the high sharing of payment information and settlement information, so that commercial banks, users and regulatory authorities can become the payment and settlement business processor, users and regulators. In terms of payment and settlement, the bank has a sound payment and settlement system, and each bank is directly connected to the payment and settlement system established by the people's Bank of China, so as to ensure the smooth completion of interbank transfer. The payment services provided by ant financial services and Tencent Fintech (Ten Pay) Fintech enterprises are mainly concentrated in the customer initiation stage, and the actual fund allocation and settlement are all completed by the bank. The specific process is as follows: the funds are transferred from the bank card held by the customer to the Alipay account, and transferred to the Alipay account held by the merchants through their own Alipay account, and then the merchants withdraw the funds from the Alipay account into the bank card. Although the fund is directly from the bank to the bank, the specific accounting is completed by Alipay company, and the bank cannot obtain the transaction data. From the bank's perspective, although the issuers of bank cards held by customers and merchants are not the same, they generate transfer behavior after trading through Alipay. On the surface, the payment operation is completed by Alipay, but in fact, the funds are directly settled by the issuers [37].

Therefore, banks can focus on the settlement system, optimize the payment channel in technology through cooperation, achieve faster payment, and achieve win-win situation between commercial banks and Fintech enterprises.

2) Applying Fintech to strengthen cooperation in different industries for mutual benefit and win-win results

Traditional commercial banks should cooperate with internet Fintech enterprises such as ant financial, Tencent Fintech (Ten Pay), rong360 and Baidu crowdfunding to effectively respond to the challenges of Internet, mobile Internet and other financial technologies, and make full use of their Fintech strength to achieve a win-win situation through cooperation. Traditional commercial banks should cooperate with the developed Internet platform to jointly build network channels, and log more users into the business system of commercial banks through drainage and links, so as to form multiple internet marketing channels. For example, it cooperates with e-commerce platforms such as Taobao, Tmall and Jingdong, and with internet service platforms such as Baidu, Tencent and tuniu. Traditional commercial banks can establish strategic cooperation relationships with tuniu to provide tourism micro loan services for tourists and Internet + services for individuals who want to travel but are short of funds for a while, so as to expand financial business relying on the Internet platform. In addition, traditional commercial banks can cooperate with the corresponding product platforms

of Internet financial enterprises such as paipaipai loan, Alibaba small loan and Baidu finance to launch new Internet financial products through cooperation between the two parties. The above measures can not only help commercial banks to cultivate a group of excellent Internet Finance talents, but also establish a highly skilled Fintech service team to improve the Internet channel operation technology and level of traditional commercial banks.

3) Fintech improves business quality

After the application of cutting-edge technologies such as big data, cloud computing and artificial intelligence to the financial field, the business quality of commercial banks can be greatly improved. Based on the existing research and development and application of Fintech, commercial banks should standardize and optimize their business processes to achieve intelligent management of commercial banking business. For example, the application of Fintech to establish data centers, cloud platforms, blockchain, etc., has made the business standardization of commercial banks higher and the process standardization more complete. This is because the big data center and cloud computing platform are various operating procedures set up on the basis of comprehensive financial and accounting knowledge theory, industry standards, international and national standards and laws and regulations. In addition, these Fintech control software can also be upgraded, especially the commercial banking business operation system based on artificial intelligence, which not only has a complete standardized operation process, but also more importantly can use and make use of large data, cloud computing, etc. in financial analysis and financial risk prevention and control to achieve standardized and systematic operation procedures. To a large extent, it avoids the occurrence of accounting errors. For example, in the big data center module, commercial banks have CRM customer relationship management system, including asset customers, liability customers and quasi customer information; The CRM customer relationship management system is mainly based on "customer as the core" and the construction of information and intelligent system to maintain customer loyalty and find more customers [34].

4) Fintech applied in risk control system

Under the background of Fintech, the optimization of business model of commercial banks must include the application of Fintech in risk control system. As a typical commercial bank with liabilities, risk control is always the prerequisite for carrying out various businesses. In the process of extensive application of Fintech, financial risks are also increasing. This requires commercial banks to keep pace with the times in risk control and apply financial technologies such as big data, cloud computing, blockchain and artificial intelligence to ensure the optimal risk control system of commercial banks. For example, ant financial Alipay has applied artificial intelligence to achieve face swiping payment. China UnionPay has reached consensus with more than 60 commercial banks to promote face swiping payment. Face swiping

payment has greatly improved the level of risk control. The application of Fintech in the risk control system of commercial banks is also reflected in risk assessment, risk early warning and risk control. Applying high technologies such as big data, cloud computing and artificial intelligence to evaluate the credit conditions of commercial bank loan borrowers, thus completely avoiding the subjective factors of artificial credit risk assessment and effectively controlling the occurrence of various illegal operations; In terms of financial risk early warning, we should also give full play to the role of Fintech, and evaluate all kinds of financial risks and credit risks with the help of big data and cloud computing, so that the investigation and evaluation originally mainly undertaken by the customer managers are completely within the risk control system; In terms of credit assessment, the application of Fintech to establish a review model suitable for the characteristics of the industry, and explore a variety of mortgage and pledge models to achieve a balance between risk and income.

2.Focus on financial product innovation

1) Asset financial product innovation

The development of Fintech has given birth to new models of Internet financial business, such as auction and loan, financial 360 and Baidu crowdfunding. Under the background of Fintech, commercial banks should start from meeting the needs of users for loans and facilitating users, optimize the existing asset business model, and apply Fintech to realize the differentiated development of asset products of commercial banks.

Supply chain finance is a kind of financial model that meets the needs of the development of loan financing business of commercial banks under the background of Fintech. With the formation of a complete system of information flow, capital flow, logistics, etc., the supply chain financial model has become more and more prominent the importance of Fintech. Commercial banks have a large number of customer resources, which include core enterprises in the supply chain and small and medium-sized enterprises in the supply chain. When the core enterprises and small and medium-sized enterprises in the supply chain have loan needs, they can apply technologies such as big data, blockchain and artificial intelligence to share information resources between commercial banks and supply chain enterprises and carry out online supply chain finance to meet more enterprise capital needs [36].

Green credit business – Under the background of Fintech, commercial banks should optimize loan financing business and increase the application of science and technology in green credit business. In terms of the existing technological advantages of mobile banking, WeChat banking and online banking, commercial banks apply high-tech technologies such as big data, blockchain and cloud computing to provide green credit services for users, which are the advantages that some Fintech enterprises of Internet finance do not have. For example, commercial banks launched "new energy loans" on the Internet. Consumers originally planned to purchase fuel vehicles. After getting familiar with the performance of new energy vehicles through various channels,

they would like to purchase new energy vehicles. At this time, commercial banks can provide green consumer loans for them and provide them with support below the interest rate of vehicle loans. Commercial banks can also launch carbon asset mortgage financing services. With the gradual development of carbon trading, it has become a valuable commodity. If a company owns carbon assets, it can use its own carbon assets to apply to banks for mortgage services. After detailed investigation of the carbon market, the bank gives credit line after reasonable evaluation of the carbon assets owned by the enterprise. If commercial banks want to reduce the loan risk, they can also employ a third party professional company to evaluate the corporate carbon assets, so as to reduce the loan risk.

Asset securitization - According to the data provided by the CSRC, the stock of asset securitization products in China has exceeded 3 trillion and 100 billion yuan by the end of 2020.This figure shows that the pace of asset securitization of enterprises in China has been significantly accelerated, of course, the CSRC and other regulatory authorities have maintained close supervision on this business. The development of asset securitization has provided some enterprises with high-quality assets with new financing channels and more support for their development. Commercial banks need to fully cooperate with securities companies in the field of Fintech. Through over-the-counter transactions and other ways, we will expand the asset securitization market with loan enterprises. Asset securitization has become an important way for enterprises to activate assets and obtain financing, and an important way to promote the further development of real enterprises [34].

Consumer finance business – With the rapid development of science and technology, in order to stimulate domestic demand and stimulate the economy, the State encourages commercial banks to expand consumer finance business. For example, when consumers need to purchase mobile phones, they can apply for the consumption credit business of purchasing mobile phones as long as they log in to the official website platform of commercial banks. Commercial banks and mobile phone franchised merchants carry out business docking with the help of big data, cloud computing, blockchain and other technologies, It will be mailed to consumers' mobile phones, or collected from local mobile phone stores, so as to not only meet the needs of consumers to purchase mobile phones, but also realize the development of consumer finance business of commercial banks, which can be said to kill two birds with one stone.

2) Innovation of liability financial products

In terms of the optimization of liabilities financial products of commercial banks, which mainly focus on deposits and savings, commercial banks should learn from the successful experience of Alipay and Yu Ebao of ant financial. Payment, deposit and wealth management can be handled at any time, which is convenient and fast. To change the time and space restrictions of traditional deposit management of

commercial banks through the application of Fintech, depositors can handle deposit, transfer and investment management at any time on the service platform of commercial banks. According to the principle of voluntary deposit and free withdrawal, commercial banks apply Fintech to optimize the deposit business in terms of the existing types of time deposit, current deposit and demand deposit business. For example, ant financial yu'e Bao not only has flexible trading, monthly wealth management and annual wealth management services, but also can analyze customers' wealth management habits to obtain a true credit analysis report. This enables it to tailor wealth management services according to the actual situation of its customers and develop more flexible payment methods for them. The investment and wealth management services based on big data can be more recognized by customers and can also precisely push more flexible deposits and investment and wealth management services for customers, which leads to both service quality and service efficiency are much higher than that of commercial banks.

Under the background of Fintech, commercial banks need to optimize the business model of deposit financing based on the existing traditional deposit financing business of commercial banks, with the help of big data, cloud computing, blockchain and other high-tech, in order to achieve the purpose of optimizing the business model of deposit financing. For example, the "cash treasure" launched by Minsheng Bank is essentially an innovative deposit financing business. Customers can directly use the funds in their own accounts to purchase funds, or directly withdraw and enjoy the interest on demand deposits when they need to use them. Under this mode, customers do not need to bear any investment risk. Fixed income products such as deposits and bonds can give full play to the application capacity of Fintech and carry out flexible financial management service activities, which not only meets the financial needs of commercial bank users, but also realizes the purpose of optimizing the business model of commercial banks under the background of Fintech [34, p. 14].

Strengthen the payment function and establish an e shopping mall for commercial banks – in terms of technological innovation of debt financial products, commercial banks should make use of scientific and technological strength, learn from the successful experience of the third party payment such as Ten Pay and Alipay, on the one hand, tap the bank's customer resources and improve the platform for the bank's customers to sell products; On the other hand, relying on the deposit savings client, it provides customers with a consumption platform for shopping, leisure and entertainment. In this way, it can not only meet the needs of optimizing the deposit and deposit business of commercial banks, but also extend the business channels of commercial banks. For example, under the promotion of Fintech, industrial and Commercial Bank of China took the lead in building the Rong e e-commerce platform, on which there are personal mall, enterprise mall and poverty alleviation hall. Personal mall is similar to Alibaba's Taobao, while enterprise mall is divided by industry.

Poverty alleviation Pavilion is a platform specially provided for poor areas to sell various products. As long as the customers register the mall on the platform, they can not only sell various products, but also obtain loan support from the industrial and Commercial Bank of China when they need funds. It is worth mentioning that all kinds of malls registered on the platform of industrial and Commercial Bank of China (ICBC) Rong e e-commerce purchase must open basic accounts with ICBC. Most of the customers in the corporate malls are credit granting enterprises of ICBC, and their integrity is reliable.

Extending and expanding community banking business - in recent years, with the rapid development of Internet of things in China, the Internet of things based on big data, blockchain and cloud computing is breaking the development bottleneck of the last kilometer of logistics. It has become extremely common for logistics delivery to go directly to the home, which is mainly due to the application of Internet of things technology. Therefore, commercial banks should give full play to the role of capital flow and cooperate closely with the Internet of things, which requires commercial banks to accelerate the pace of construction of community banks and actively expand the liability business of community banks. The optimization of community financial business can take advantage of the advantages of traditional business outlets of commercial banks, arrange ATMs in the community, and provide face-to-face payment in supermarkets and medical service centers in the community. Commercial banks can specially design a comprehensive business for the retired elderly in the community, which is mainly based on deposits and supplemented by wealth management.

3) Innovation of intermediate business products

Collection and payment - commercial banks should speed up the development of intermediary business under the background of Fintech. It is well known that the income from intermediary business belongs to the non-interest income of commercial banks. Collection and payment agency accounts for a large proportion in the numerous intermediary businesses of commercial banks. In the process of optimizing the business model of collection and payment agency, commercial banks need to apply Fintech to establish cooperation with government functional departments, enterprises and institutions to provide collection and payment agency services. For example, Shanghai Pudong Development Bank innovated the B2B2C service of "Internet + smart community" with the help of Fintech. It can develop a collection platform according to the actual needs of the community property, through which the community owners can bind their Alipay and online banking to it, so as to facilitate the residents to pay relevant fees [41, p. 33].

Wealth management - under the background of Fintech, commercial bank deposit wealth management business has achieved good development results. In the long-term development, ICBC has launched a number of deposit financing businesses and provided differentiated deposit financing services according to the actual needs of

customers “Xinxin E” is a deposit wealth management product specially provided for enterprise legal person “ICBC Tongli” is a product specially providing financial services for financial customers; Industrial and Commercial Bank of China has even customized precious metal wealth management services for some customers. However, most of these deposit management businesses are realized through marketing means by the wealth management managers and customer managers equipped with traditional business outlets. It is not enough to expand and optimize the deposit management business with the help of Fintech. In terms of the optimization of financial management business of commercial banks, in order to apply financial technologies such as big data and blockchain to expand and optimize cross-border asset investment and wealth management business, commercial banks must give full play to the role of Fintech, so as to create more wealth management products and enable customers to choose appropriate cross-border wealth management products according to their own needs. Commercial banks shall also carry out innovative development of existing wealth management products to provide customers with comprehensive wealth management services. For example, direct provision of financial product services, more common have closed, open, net value, etc. It can also provide asset side services, including money market, bond market, stock market, etc. The application of Fintech will integrate and share the information resources of various markets, which will make the wealth management business products more perfect [33, p. 15].

Credit card-Fintech has both challenges and opportunities for the development of credit card business of commercial banks. Credit card business products must be improved and enhanced with the help of Fintech. At present, the social security card being vigorously promoted is a new credit card with multiple functions including credit card and social security. Therefore, under the background of Fintech, the credit card business products of commercial banks should not be stagnant, but should apply Fintech, increase its product service functions, and make the credit card business develop better. For example, Shanghai Pudong Development Bank has developed new credit cards such as Ning Zetao fan card and Barca fan card based on the Internet red economy. The credit card business of commercial banks can integrate online and offline businesses through online point-to-point one-to-one communication services. On the one hand, the bank obtained customer information and card handling needs, on the other hand, it also provided customer information for offline outlets of the bank. The offline business outlets should contact customers in the first time and provide the corresponding credit card services if the door-to-door services are needed. In this way, a complete marketing chain is formed, which not only targets customers, but also increases the new account opening rate. In addition, the corresponding liability business of credit card deposits can also be developed accordingly. Commercial banks should continue to increase investment in research and development of Fintech products, and launch multi-functional credit card products with independent

intellectual property rights and obvious differentiation as soon as possible, so as to be unique in the Internet financial market. This can not only solve the problem of service homogeneity, but also greatly enhance the core competitiveness of commercial banks [32, p. 10].

3.Strengthen the construction of Fintech talent team

The establishment of Fintech knowledge indicators requires the establishment of relatively reasonable and applicable financial knowledge indicators. Under the background of Fintech, the construction of the compound Fintech talent training system of commercial banks should be guaranteed by assessment [22, p. 76]. Financial science and technology talents should be able to go up and down, improve the work and learning ability of financial science and technology personnel through assessment, and adjust some post personnel who are not suitable for the development and innovation of financial science and technology through assessment, so as to make the compound financial science and technology talent training system of commercial banks have strong vitality.

To improve the comprehensive ability of Fintech talents, we need to speed up the construction of compound Fintech team of commercial banks and give full play to the role of Fintech team. The comprehensive ability of Fintech talents is to have not only the research and development ability, but also the practical ability, but also the ability to deal with Fintech application emergencies and so on. Therefore, commercial banks should establish cooperative relationships with Fintech research institutions and research institutes through the cooperation of production, learning and research. Through rotation training and off post learning and training, talents at all posts of Fintech can charge these cutting-edge institutions of science and technology to master the cutting-edge Fintech at present. Under the background of financial science and technology, commercial banks should thoroughly break the disadvantages of traditional financial science and technology positions that do not communicate with each other, actively integrate financial science and technology human resources, give play to the advantages of financial science and technology human resources, focus on tackling difficulties, and constantly innovate financial business models.

Under the background of financial science and technology, commercial banks need to create a financial science and technology learning atmosphere and activate the learning ability of employees in order to successfully optimize the business model and build a team of financial science and technology talents. All commercial banks should form a unity from the head office to branches, vigorously promote the concept of Fintech development, and actively create a cultural atmosphere for Fintech learning. Through internal publications, websites, third party platforms, etc., the promotion of Fintech should be carried out, so that every commercial bank employee can fully understand the role of Fintech, and the president and ordinary employees are clearly aware of the importance of Fintech. On this basis, all commercial banks should

regularly organize cadres and employees to study and exchange Fintech theoretical knowledge and operational skills. Through lectures and knowledge competitions, more cadres and employees of commercial banks can learn and master knowledge and skills such as big data, cloud computing and blockchain, and form a good Fintech learning atmosphere throughout the bank. In order to achieve the purpose of optimizing the business model of commercial banks under the background of Fintech, it is necessary to start from the performance management of human resources, improve the content and standards of performance assessment for the optimization of the business model of commercial banks under Fintech, and strengthen the performance assessment, supervision and management of Fintech positions, business operation positions, audit and supervision positions of commercial banks. Only in this way can we ensure the construction of Fintech talent team.

CONCLUSIONS

The study allowed us to draw a number of conclusions:

Fintech refers to emerging financial products, financial services and financial models with emerging technology attributes that can have a far-reaching impact on the traditional financial services industry and traditional financial markets. The comprehensive analysis of Fintech shows that Fintech is conducive to the sustainable development of commercial banks.

This paper starts from the overview of Fintech and based on the unbalanced panel data of 16 commercial banks in China from 2015 to 2020, builds a model to empirically analyze the impact of Fintech on the business model of commercial banks. Then based on the panel data of 29 different types of commercial banks in China from 2007 to 2019, this paper constructs a model to analyze the impact of Fintech on the profitability of commercial banks. Finally, this paper discusses the various risk factors of commercial banks under the Fintech environment, and effectively explores the development direction of commercial banks, and draws consistent conclusions.

1. The function of Fintech from the micro perspective, Fintech not only plays an important role in the asset side, the liability side, the payment side, and the business model; from the macro perspective, Fintech promotes the transformation and upgrading of financial institutions, boosts financial services to the real economy, and assists in financial risk prevention and control, which greatly improves the efficiency of financial operation.

2.The theoretical analysis of Fintech on the efficiency of bank operation based on the long tail theory, the catfish effect theory, the scale economy theory, the platform economy theory, the transaction cost theory and the information asymmetry theory.

3.The application of Fintech in commercial banks currently includes 5 core technologies, including cloud computing, big data, blockchain, Internet of things and artificial intelligence.

4.In order to achieve sustainable development under the background of financial technology, commercial banks must first fully realize the challenges and opportunities of the development of Fintech to the traditional business of commercial banks, including asset business, liability business and intermediary business.

5.Fintech helps to improve the profitability of commercial banks. It is necessary to weigh the risks of financial technology and develop Fintech according to local conditions in combination with regional policies, laws and regulations to help the development of commercial banks.

With the maturity of the Fintech model and the expansion of the scale of the industry, the continuous deep integration of technology and the financial industry has made the financial boundary gradually blurred. It not only brings development

opportunities to commercial banks, but also forms new challenges, forcing commercial banks to adjust their strategic thinking and promote the transformation of science and technology to cope with the changes of financial system.

In order to deal with the above situation, in the actual work of commercial banks:

First, actively promote the transformation and innovation of credit business, innovate products based on market and customer demand, establish a comprehensive network credit service platform, and realize network operation and management by using key technologies such as cloud computing, big data, artificial intelligence, blockchain and Internet of things. Combine the advantages of real bank outlets and Internet virtual outlets, gradually transform to the direction of "light assets", and finally improve the profitability.

Second, we should actively cooperate closely with internet financial enterprises, make use of their business scale advantages to strengthen the innovation and channel construction of banking Internet financial management, Internet payment settlement and sales, expand the business to the field of e-commerce, integrate resources, enhance synergy, and strive to build a professional and comprehensive financial industry ecosystem and carry out diversified business, We should enhance the diversity of profit sources, reduce the unilateral influence of interest rate spread, and obtain new profit growth points.

Third, commercial banks with talent shortage, especially small and medium-sized banks, should speed up the construction of high-end Fintech talent team, strengthen the independent research and development of key technologies, actively integrate into the development trend of Fintech application through joint innovation or the establishment of Fintech subsidiaries, reduce the cost of Fintech innovation, and improve the management ability and performance level.

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