

Heterogeneity in the Efficiency of FinTech-Empowering Commercial Banks: A Research Review based on Artificial Intelligence, RWA and Blockchain

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Abstract

Against the deep integration of FinTech into the financial ecosystem, the heterogeneous effect of FinTech applications in the digital transformation of commercial banks has become a key proposition. Focusing on the heterogeneous effect of FinTech on commercial banks, this paper integrates literature review and logical deduction, and explores the differentiated effects of artificial intelligence (AI), blockchain, RWA and other technologies on their operational efficiency, risk transmission, and business innovation. The study found that the impact of FinTech presents dual heterogeneity in technical attributes and institutional endowments. In terms of operational efficiency, the empowerment effects of various FinTechs showcase different degrees of heterogeneity due to their differences in bank size and digital foundation. When it comes to risk transmission, there is tension between blockchain and regulatory compliance. RWA valuation and risk transmission can easily aggravate risk superposition due to the different technical capabilities of banks. In terms of business innovation, large banks rely on resources to achieve multi-technology collaborative innovation, while small and medium-sized banks fall into the dilemma of superficial technology application because of insufficient resources. In addition to deconstructing the heterogeneous logic of the interaction between the two, this paper not only clarifies the boundaries and risk exposures of technology empowerment, but also gives insight for commercial banks to allocate FinTech resources and regulatory agencies to build regulatory frameworks, thus assisting FinTech and commercial banks to deeply integrate under controllable risks with coordinated development.

Keywords

Fintech, commercial banks, heterogeneity, operational efficiency, risk transmission, business innovation, technological convergence.

1. Introduction

In recent years, China has increasingly emphasized technology and finance, intensively introduced relevant policies, and laid a solid institutional foundation for the deep integration of finance and technology.

In April 2025, the State Administration of Financial Supervision, the Ministry of Science and Technology, as well as the National Development and Reform Commission jointly issued the *Implementation Plan for the High-Quality Development of Science and Technology Finance in the Banking and Insurance Industry*. Concentrating on key areas and weak links of scientific and technological innovation, the plan aims to expand financial resource supplies through the policy coordination of multiple departments, and smooth the cycle of “three capital” in science and technology. In addition, it also encourages financial institutions to strengthen digital empowerment, and provides full life-cycle financial support for technology-based enterprises.

In May of the same year, seven departments jointly issued *Several Policy Measures for Accelerating the Building of the Technology Finance System and Providing Strong Support for High-level Self-reliance and Strength in Science and Technology*, so as to further construct a finance system that is compatible with scientific and technological innovation, and coordinate the promotion of policy tools such as venture capital and bank credit. To be specific, the National Venture Capital Guidance Fund is established to broaden the sources of venture capital funds and optimize the assessment and evaluation mechanism. It also requires the use of structural monetary policy tools, the establishment of a special mechanism for bank credit to support scientific and technological innovation, the strengthening of the capital market support, and the improvement of the bond market support mechanism.

Intertwined and coordinated to form a finance support system, these two policies guide the business of financial institutions, create an environment for the deep integration of financial technology and banking, and promote the flow of financial resources to science and technology innovation. In this context, the integration of emerging technologies and financial services is accelerating, reshaping the financial ecological landscape, which not only brings growth potential and transformation momentum to commercial banks, but also raises challenges such as technology adaptation, risk prevention and control. How to improve operational efficiency by relying on diversified FinTechs has become a core issue in academia and practical application.

Based on the policy orientation and industry change, the research purpose and significance of this paper are reflected in two aspects. On the one hand, the current integration of FinTech and the banking industry has shifted from general application to in-depth penetration in subdivided fields. This paper intends to sort out the specific impact paths of AI, RWA, and blockchain technologies on the operation of commercial banks, and clarify their unique mechanism and transmission logic. On the other hand, the three types of technologies empower efficiency and expose contradictions. For example, AI may cause “algorithm discrimination” and blockchain “decentralization”. This paper analyzes the disputes over the heterogeneity of such technologies to provide theoretical references for the balance between innovation and risk control.

There are three innovations in this paper. First, compared with the previous overall perspective, it analyzes the impact of three specific technologies on bank efficiency, and the research is more targeted and in-depth. Secondly, focusing on the emerging field of RWA, this paper fills the current related research gaps, and expands the research scope. Lastly, it pays attention to the heterogeneous impact of similar technologies on banks of different sizes and regions, which helps various banks implement precise policies.

2. Literature Review

2.1. Bibliometric Analysis

According to Figure 1, “blockchain”, “commercial banks”, and “FinTech” constitute the core research fields, reflecting the deep integration of FinTech with traditional financial institutions and emerging technologies. “Small and medium-sized enterprises” and “finance supervision AI” reflect that the research extends to financial service objects, regulatory adaptation and technology integration. “Cross-border payment” and “inclusive finance” indicate that the exploration of FinTech in expanding the boundaries of financial services echoes the needs of the digital economy and globalization.

Figure 3 presents the development context and research focus of FinTech:

The early underlying technical support was mainly concentrated from 2010 to 2018, represented by “cloud computing” and “big data”. They are technical cornerstones of developing FinTech and promoting the preliminary digitalization of financial services.

The current research trends are characterized by keywords from 2020 to 2025 such as “digital finance”, “digital economy”, “metaverse”, and “digital technology”. This reflects that the research is concentrating on two major directions under the wave of digital economy. One is technological iteration, such as the application of the metaverse and the integration of the digital technologies. The other is business innovation, such as the construction of the digital financial ecosystem.

The coordination of practice and policy is reflected from 2020 to 2022. “Small and micro enterprises” and “rural revitalization” demonstrate the practical orientation of FinTech serving the real economy, which are intertwined with policies such as inclusive finance and rural revitalization. “Finance risk” highlights the importance of risk prevention and control in technology application.

There are still gaps to be filled in existing research. First, cross-disciplinary integration research is weak, such as the correlation mechanism and integration mode of “metaverse” and “inclusive finance”, and systematic results are lacking. Second, the practical application of technology implementation is insufficient. Taking the compliance process of blockchain applied to cross-border payment as an example, its operational specifications, risk hedging mechanism and other details have not yet formed a mature theoretical framework and practical guidance.

In the research evolution trend of FinTech empowering bank efficiency, the value of deeply integrating digital technology continues to penetrate. The collaborative application of AI, blockchain and metaverse is expected to promote the reshaping of bank credit processes, the iteration of intelligent risk control, and build a financial service ecology suitable for the real economy, which is in line with the logic of this paper focusing on four types of technologies affecting bank efficiency. In terms of service entities, the long-term service mechanism of banks for rural revitalization and small and medium-sized enterprises will become the research focus. Exploring technology to solve the information asymmetry between banks and enterprises and reduce service costs echoes the direction of this paper’s focus on technology empowering bank service entities. The intelligence of regulatory technology is advancing simultaneously, and AI-driven real-time risk monitoring balances innovation and risk control, which supports the practical value of this research.

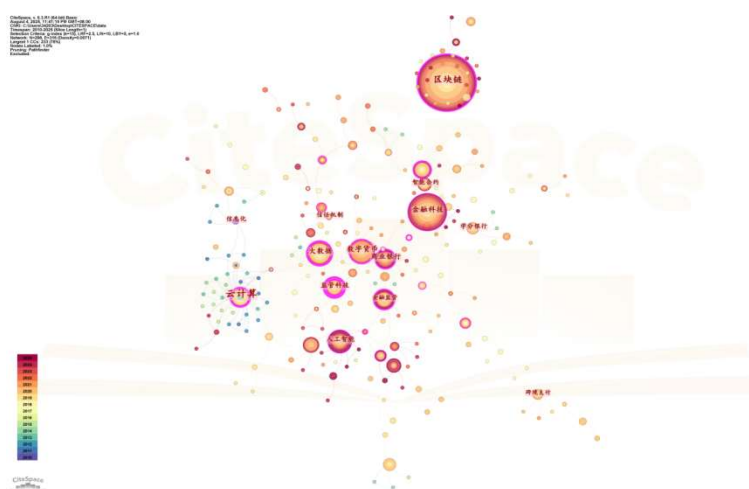


Figure 1. Keyword Co-occurrence Map of Related Papers from 2010 to 2025

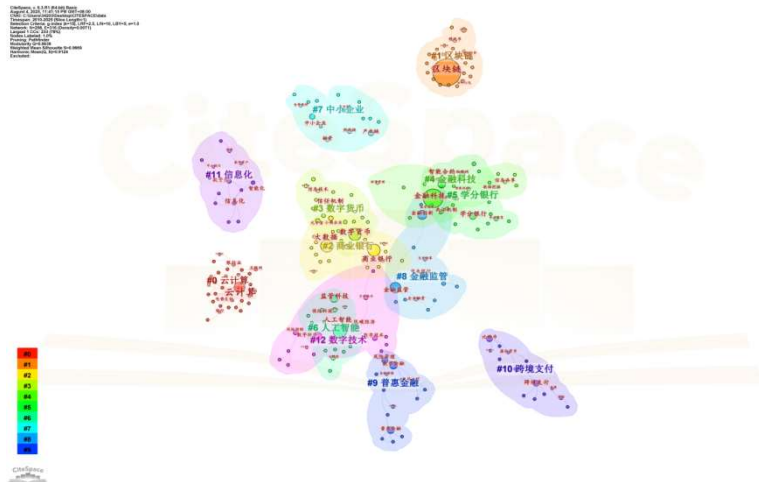


Figure 2. Cluster Analysis Map of Related Papers from 2010 to 2025

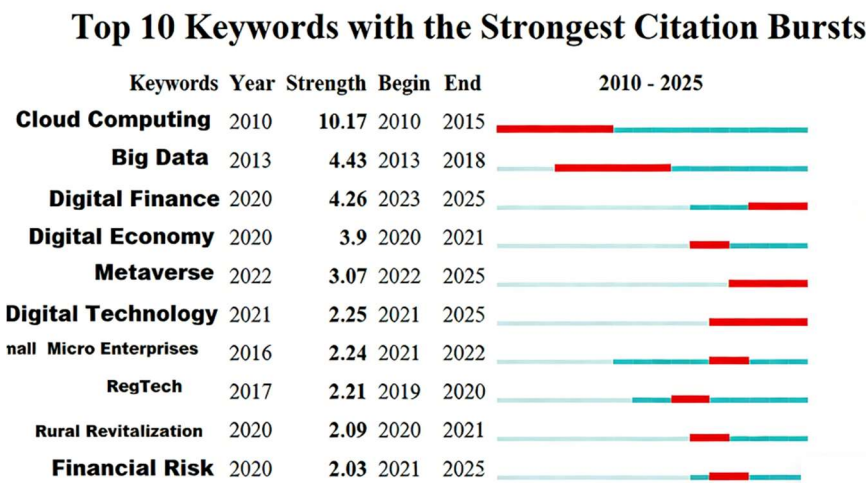


Figure 3. Surprise Detection Table of Related Papers from 2010 to 2025

2.2. Definition of FinTech

Yi Xianrong believes that FinTech is a new tool to identify, obtain, evaluate and quantify credit by using modern technology under the background of big data, so as to comprehensively improve the ability to price credit risk. As a result, there are fundamental changes in the credit foundation, credit relationship, credit media and credit guarantee of the financial market, thus creating a new financial format, a new FinTech market and a new business model. [1]

According to the Financial Stability Board, FinTech is not a simple combination of finance and technology, but refers to emerging business models, new technology applications, new products and services that are driven by emerging cutting-edge technologies such as big data, blockchain, cloud computing and AI. In addition, FinTech can innovate products and services in the traditional financial industry through various technological means to promote efficiency, effectively reduce operating costs, and significantly impact the finance market and the supply of financial services.

Regarding the role of financial technology, Ba Shusong, Bai Haifeng et al. put forward that Fintech is based on a series of technological innovations such as big data, cloud computing, AI and blockchain, which is fully applied to six financial fields such as payment and settlement, loan financing, wealth management, retail banking, insurance and transaction settlement, achieving a deep integration of finance + technology. In a word, FinTech is a technical means to

apply science and technology to the financial industry, serve the general public, reduce industry costs and improve industry efficiency. [2]

2.3. Impact of FinTech on Commercial Bank Efficiency

2.3.1. FinTech Improves the Profitability of Commercial Banks, Profit Efficiency, and Comprehensive Competitiveness

Strict regulation and compliance, stiff competition from new entrants, and rising costs are all driving the financial industry to embrace new FinTech.

FinTech helps improve the profitability of commercial banks from many perspectives. As for accurate credit, Wenxue Zhou, Qian Jinyue, et al. found that FinTech has vital advantages in alleviating information asymmetry and improving credit quality. They believed that it was an important driving force to increase the credit supply of small and micro enterprises. Moreover, they held that the innovative application of FinTech, such as big data, cloud computing and AI, was essential to explore how to use technical means to alleviate information asymmetry and solve credit problems. [3]

Guo Na, Wang Peiyao, et al. focused on the role of FinTech between banks and enterprises, as well as the impact of bank FinTech on the high-quality development of enterprises. Besides, they tested the intermediary mechanism between the financing effect and the supervision and governance effect of FinTech. According to the results, the application of FinTech significantly promotes enterprises' high-quality development. It is proposed that the FinTech development between banks and enterprises has crucial synergistic effects, and its consistency between banks and enterprises dramatically enhances the FinTech effect on promoting the high-quality development of banks and enterprises. [4]

According to Li Yanyu, FinTech reshapes the operating logic of commercial banks from a basic aspect by virtue of blockchain, big data, cloud computing and other technologies. IT innovates service models. For example, the Internet of Things realizes the integration of capital flow, information flow, and entity flow. Biometrics improves user experience and changes business processing methods. Furthermore, cloud computing reduces operational and IT costs, and AI promotes intelligent transformation, thereby reducing costs and improving efficiency. It also forces banks to adjust their strategic direction, transform into creators of social credit value, optimize system construction, build a flat structure and realize risk control automation. Meanwhile, it promotes the reform of operating models, creates multi-channel integrated services, innovates payment and settlement and other fields, thus ultimately helping commercial banks expand innovation potential, enhance competitiveness, and profoundly change the development pattern of the financial industry. [5]

2.3.2. FinTech Poses Multi-dimensional Challenges to Commercial Banks

Some scholars proposed that financial technology innovation poses challenges to commercial banks. For example, Yu Bo and Zhou Ning put forward that its negative impact is reflected in many aspects. First, it breaks the foundation that commercial banks rely on information asymmetry and information advantages to obtain intermediary profits. With the diversification of financial market entities, third-party payment and e-commerce platforms are penetrating into financial fields such as settlement and wealth management, which directly compresses the profit margin of banks. Secondly, based on the long tail theory, FinTech companies use AI and big data analysis to serve small businesses, millennial generations and other customer groups ignored by commercial banks, which accurately push financial products (such as "Ant Group Huabei") through online channels to divert potential customers and market share of banks. Thirdly, technology enterprises depend on the advantages of data and algorithms to embed financial services in key consumption scenarios to seize business opportunities, while commercial banks' service innovation is still mainly offline, making it difficult to meet customer

needs. Consequently, it results in serious customer loss. Fourthly, commercial banks have weak independent R&D capabilities and insufficient investment. Faced with the cross-border impact of technology enterprises, the disadvantage of backward technology further weakens their profitability. [6]

3. Heterogeneous Mechanisms of Fintech Affecting Bank Efficiency

3.1. Heterogeneous Effects of Three Different FinTechs on Commercial Bank Efficiency

3.1.1. The Role and Risks of AI to Commercial Banks

(1) Strengthen Risk Management and Control Ability

AI can improve the pertinence and effectiveness of risk management and control in commercial banks. With the help of long-term transaction data analysis of customers, banks can grasp their consumption habits and capital flow characteristics, and the system can quickly identify and intervene in abnormal transactions that deviate from the routine, such as large-amount transfers and high-frequency consumption, so as to avoid false transaction losses. In credit evaluation and risk prediction, relying on intelligent analysis models, banks can make more accurate judgments on corporate operating conditions and personal credit. For example, they can evaluate repayment capabilities based on customer multi-dimensional information and optimize the rationality of loan approval, thus reducing the risk of bad debts[7].

(2) Optimize Customer Relationship Management

AI promotes the customer service of commercial banks from the traditional “casting a wide net” to precision. For new customers, banks that integrate information such as income and consumption preferences can quickly build awareness and provide adaptive services, and avoid missing potential customers due to insufficient information. For existing customers, the risk of loss is predicted by analyzing behavioral data, and retention measures such as recommending adaptive products and adjusting service methods are adopted, which not only saves maintenance costs, but also enhances customer retention rate[8].

(3) Improve Service Quality and Coverage

AI makes commercial banking services more diversified and inclusive. In the past, professional financial advice was mostly aimed at high-net-worth customers. Thanks to intelligent analysis, banks can generate personalized financial plans based on the risk tolerance and investment period of ordinary customers. Moreover, they can adjust them in real time with market changes, so that more small-fund customers can enjoy professional financial services. At the same time, banks can accurately grasp the differences in needs of different groups through in-depth mining of customer data. For example, the youth prefer flexible investment products and the middle-aged prefer the steady appreciation of assets. Then, services in line with the market are launched to improve the overall service quality[9].

(4) Risk Challenge-Algorithmic Discrimination

Algorithmic discrimination is a digital extension of traditional social discrimination. In AI automated decision-making, affected by factors such as algorithm black box, data bias, subject preference embedding, and regulatory omissions, specific groups are systematically unfairly treated. The core is to transform social bias through algorithms. It is transformed into automated decision-making logic, leading to improper differences in resource allocation, opportunity acquisition and other dimensions[10].

In practice, algorithm discrimination penetrates many fields. In the labor market, the recruitment algorithms of technology enterprises are gender-biased, and the proportion of male interviews for technical positions exceeds 77%, implicitly excluding women. In the field of consumption, the platform sets high prices on previous users and infringes on the right to

fair trade. In the judicial field, the “high-risk” misjudgment rate of COMPAS for blacks and Hispanics is 19% higher than that of whites, exacerbating institutional injustice. In the allocation of public resources, the algorithm favors developed regions, ignores the needs of underdeveloped regions, and solidifies the resource imbalance[11].

The causes are multi-dimensional coupling. First, the algorithm black box provides hidden space, and the complexity of the neural network and the nature of commercial secrets make it hard to explain. Secondly, due to the “mirror bias” of training data, data analysis carrying historical bias is amplified by algorithms, which reproduces traditional discrimination. Thirdly, given the impact of transmitting the subject’s subjective preference, and the fact that the developer’s value tendency and user’s decision-making inertia are embedded in the system, the algorithm turns out to be a bias amplifier[12].

3.1.2. The Role of Blockchain in Commercial Banks

(1) Iterative Upgrade of Product System

Blockchain supports the iteration of commercial bank product systems. Its traceability and non-tampering features ensure the authenticity and integrity of transaction data and lay a data foundation for product innovation. Decentralization can simplify the supply chain financial process, eliminate complicated procedures and credit endorsement, and improve transaction efficiency. In terms of product innovation, we can develop new pledge financing products, optimize credit financing throughout the supply chain, provide online financing services for supply chain links, and promote the digital and intelligent upgrading of the supply chain financial product system[13].

(2) Innovation of Financing Models

The core of supply chain finance of commercial banks revolves around accounts receivable and movable property pledge. Blockchain provides key assistance for the innovation and optimization of two types of models, effectively improving business effectiveness. In the field of movable property pledge financing, blockchain and Internet of Things are integrated to build an online platform to realize real-time tracking of bulk goods in and out of warehousing; synchronize warehousing data and cargo information to ensure authenticity; define the ownership of goods rights; avoid repeated mortgages; and reduce corporate financing costs. In terms of accounts receivable financing, blockchain can automatically confirm the notice of creditor’s rights transfer, strengthen the credit endorsement of core enterprises, accelerate the capital turnover of suppliers, and connect with the registration system to realize automatic account registration, reducing manual intervention to reduce risks[14].

(3) Expansion of Long-tail Customers

Blockchain supports commercial banks’ supply chain finance to expand service boundaries, covering long-tail small, medium and micro enterprises that were previously difficult to reach. It can automatically record corporate transactions and form a traceable and non-tamperable transaction data link. Combining data analysis, banks can grasp corporate operations and credit levels, thereby achieving credit rating and credit automation, simplifying the approval process, improving efficiency, and enhancing the connection with small and medium-sized enterprises to expand service coverage. In the future, banks can rely on this technology to further extend services, provide support for small, medium and micro entities in the supply chain, and give full play to the effectiveness of supply chain finance[15].

(4) Risk Challenges-Tension Between Decentralization and Regulatory Compliance

The “decentralization” of blockchain brings opportunities for trust reshaping and process optimization to commercial banks, but the tension with financial regulatory compliance leads to risks. Its distributed ledger system significantly differs from the centralized supervision logic, weakening the traditional penetrating supervision. Moreover, the encryption and anonymity of transactions make it difficult for supervision to cover the entire process. In compliance practice,

the lack of central audit in cross-border finance conflicts with “real-name registration system” and “territorial supervision”, which pose a challenge for banks to distinguish between on-chain entities and capital flows[16].

The tension between the two stems from the mismatch between technological innovation and the iteration of regulatory rules, which puts banks in a dilemma. In the future, it is necessary to borrow regulatory technology to supplement supervision with smart contract compliance rules and blockchain traceability to balance innovation and compliance[17].

3.1.3. The Role of RWA for Commercial Banks

(1) Optimize Credit Business Risk Measurement and Capital Allocation

The RWA measurement system is of great significance to the credit business of commercial banks. Taking the *Capital Management Measures for Commercial Banks (Draft for Comment)* as a reference, the new regulations optimize the classification of risk exposures and refine risk weights, so that banks can calculate RWA for different risk assets more accurately. For example, the RWA of small and medium-sized loans may be reduced, and the capital adequacy ratio will be less affected under the same net capital, which can encourage banks to increase their credit support. When it comes to capital allocation, banks can invest in low-risk and high-yield fields according to accurate measurement, optimize the structure of credit assets, improve the efficiency of capital use, and enhance profitability while controlling risks[18].

(2) Innovate the Business Models of Supply Chain Finance

In supply chain finance-related scenarios, the blockchain associated with RWA is involved in the business model, and traditional enterprise-related matters and core enterprise credit transmission are included. Depending on the “multi-level confirmation + cross-chain verification” involved in the alliance chain named “RWA-Chain”, accounts receivable can be processed digitally. To be specific, the core enterprise will issue “on-chain accounts receivable” after receiving the goods, and the smart contract performs related operations on the account. Moreover, the supplier can split and transfer the voucher. When the downstream applies for financing from the bank, the bank will carry out real-time verification. Under this model, the financing cycle and cost change to some extent, which also has a corresponding impact on the relevant situation of enterprises and the financial business of banks’ supply chain. Meanwhile, it involves the mining of services and the business growth of some enterprises[19].

(3) Promote the Innovation and Development of Asset Securitization

RWA promotes the innovation of asset securitization of commercial banks. Traditional asset securitization relies on intermediaries, with cumbersome processes, high costs and low efficiency, while RWA can convert asset ownership into digital securities with the help of blockchain and manage circulation and payment with smart contracts[20].

(4) Risk Challenges-Immature Valuation System and Risk Transmission Mechanism

RWA provides a new path for asset circulation, but the valuation system and risk transmission mechanism are immature, which brings challenges to commercial banks. From the valuation aspect, after the blockchain is tokenized, the traditional valuation logic is difficult to adapt to the on-chain characteristics, and offline asset fluctuations can easily trigger valuation deviations, affecting bank asset judgment and capital allocation. From the aspect of risk transmission, cross-subject circulation of assets amplifies risks, core enterprise credit risks or contract loopholes are easily transmitted along the chain, and insufficient monitoring and risk control on the bank chain aggravates risks. The root is the insufficient integration of traditional systems and new technologies, and banks need to build adaptive systems to avoid “efficiency before risks”[21].

3.2. Heterogeneity Analysis of Different Types of Banks' Adaptation to FinTech

3.2.1. Classification Analysis by Bank Size

Compared with large commercial banks, small and medium-sized commercial banks face more prominent difficulties in developing FinTech, which is closely related to their basic conditions of limited profitability, insufficient talent reserve and weak resource endowment. The specific restrictions are concentrated in two aspects[22]:

On the one hand, low social recognition restricts business expansion. The public trust foundation of small and medium-sized banks is weak, which makes it difficult to effectively carry out online business. As a result, their retail business has been limited to local areas for a long time, online products lack characteristics and are seriously homogeneous, and their customer acquisition ability is far inferior to that of large banks, further widening the market competitiveness gap[23].

On the other hand, insufficient scientific and technological R&D capabilities have become the core bottleneck. Small and medium-sized banks have limited investment in technical infrastructure construction. It is also challenging to keep up with the iteration speed of FinTech. The popularization of technologies such as big data and blockchain has weakened the regional information advantages they originally relied on, while the promotion of innovative service models such as intelligent self-service devices has eliminated their traditional advantages of flexible mechanisms and low operating costs[24].

Against the deep integration of finance and technology, this gap has been further magnified. The reduction of industry barriers has intensified the trend of financial disintermediation, while local small and medium-sized banks, which mainly serve individuals and small and medium-sized enterprises, are far more impacted than large banks. If this opportunity of technological innovation cannot be grasped, the living space of small and medium-sized banks may be severely squeezed[25].

3.2.2. Analysis by Region

From the perspective of regional heterogeneity, the promotion effect of FinTech on banks is significantly stronger in the eastern region than in the central and western regions. This difference can be confirmed by the distribution of the number of FinTech market entities. According to data from the Tianyancha Professional Edition, as of 2024, Guangdong Province has 53,034 FinTech-related enterprises, while the number of similar enterprises in Sichuan Province during the same period is 6,212. The total number of enterprises in Guangdong is about 8.5 times that of Sichuan. Such a difference is further supported by the release of the 2024 China Financial Technology Index. Specifically, Guangdong ranks at the forefront of the country with its perfect industrial ecology. Although Sichuan maintains its first place in the west, there is still a significant gap between the overall scale and the developed provinces in the east[26].

During the digital transformation, the *2024 China Digital Banking Survey Report* indicates that the average digital transformation index of banks in the eastern region in 2024 would be 75 points, with outstanding performance in digital strategic layout and online customer service optimization. For example, an eastern joint-stock bank has taken digital means to increase online customer activity by 30%. The average digital transformation index of banks in the central and western regions is only 60 points, and the online customer activity of similar banks has increased by only 10%. Thus, the gap is intuitively visible[27].

Based on the effect of improving operating efficiency, 70% of banks in the eastern region will increase ROA by 2-3% after applying FinTech in 2024. Only 40% of banks in the central and western regions have achieved ROA improvement, and the range is mostly 1-2%. These data all manifest that FinTech has a more significant empowering effect on banks in the eastern region, forming a significant gap with the central and western regions[28].

4. Negative Impact of FinTech on Commercial Banks

During the improvement of the quality and efficiency of commercial banks, the systemic challenges caused by FinTech's integration and application are prominent. Among them, the cost pressure of technology R&D and promotion brought about by the collaborative implementation of multiple technologies is a typical dilemma[29].

From the perspective of the industry as a whole, the total investment in FinTech of the six major banks in 2023 was 122.822 billion yuan, which increased to 125.459 billion yuan in 2024. However, the growth rate slowed down from 5.38% to 2.15%, highlighting the continued investment pressure. Specifically, there is a pattern of "four rises and two falls". The investment of China Construction Bank and Bank of Communications decreased by 2.36% and 4.94% respectively; the Postal Savings Bank led the way with an increase of 9.03%; the increase of ICBC and Bank of China was less than 7%, and the Agricultural Bank of China only slightly increased by 0.48%. Meanwhile, the number of scientific and technological personnel in the six major banks has increased from less than 100,000 at the end of 2023 to more than 110,000, and labor costs have risen simultaneously[30].

Such a characteristic of "high investment and long cycle" makes banks face double pressures. They have to bear the direct cost of technology R&D, and digest the indirect cost of subsidiary operations. The slowdown in investment growth and structural adjustment reflects the practical dilemma of commercial banks in balancing innovation and cost in the integrated application of FinTech, and also highlights the urgency of building an efficient input-output mechanism.

5. Conclusion

This study focuses on the heterogeneous impact of three types of FinTechs, that is, AI, blockchain, and RWA, on the efficiency of commercial banks. Combining the differences in technical attributes and institutional endowments, it analyzes the fusion logic and realistic boundaries. The main conclusions are as follows:

Firstly, the empowerment effect of FinTech has significant technological heterogeneity. AI is the core of the intelligent transformation of banks, which can strengthen risk control, optimize customer management and improve efficiency. Thus, it needs to prevent algorithm discrimination. Blockchain reshapes supply chain finance. It is also necessary to solve the tension between "decentralization" and supervision. RWA has great potential for optimizing capital allocation with the necessity to build a special risk control framework for its immaturity. Secondly, differences in institutional endowments aggravate the differentiation of application effects. In terms of scale, large banks take advantage of resource advantages to achieve multi-technology collaborative innovation, while small and medium-sized banks are limited by funds, talents, and trust. Technology applications are easy to be superficial. Geographically, due to its technical foundation and ecological advantages, the eastern bank's FinTech efficiency improvement effect is better than that of the central and western regions, reflecting the uneven regional development.

Thirdly, the double-edged sword effect of FinTech highlights the complexity of integration. Technology application not only improves profitability and expands service boundaries, but also brings continuous cost pressure. Multi-technology integration may lead to systemic risks, which require a dynamic balance between innovation and compliance.

To sum up, in practice, large banks can focus on multi-technology collaboration and ecological construction, while small and medium-sized banks should choose vertical fields to make breakthroughs. Regulatory agencies should design classified regulatory rules, improve

compliance standards in the blockchain and RWA fields, and promote a virtuous cycle of “technological innovation-risk controllability-efficiency improvement”.

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