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Impact Analysis of Financial Technology Innovation on Banking Operations

Yaoyao Wang

Department of Economics, Jinan University, Guangzhou, China
Wyy3028@outlook.com

Abstract. This paper primarily examines the multifaceted impacts of fintech innovations on banking operations, explores the fundamental drivers behind banks' digital and intelligent transformation, and delves into the opportunities and challenges that current fintech advancements present for banks. It also identifies potential measures to address existing issues. This article employs a combined approach of theoretical analysis and literature review to systematically examine the changes brought about by recent developments in fintech to the banking sector. It concludes that fintech offers significant benefits to banks, including cost reduction, enhanced operational efficiency, more convenient services for banking customers, and an expansion of the overall scope and development level of the banking industry. However, the application of fintech still presents risks and regulatory gaps. In response to these issues, this paper proposes relevant policy recommendations in the areas of banking operations, talent and technology, and legal regulation. It also provides an analysis of the paper's potential shortcomings, enabling future researchers to better examine these aspects.

Keywords: Fintech, Banking Operations, Digital Transformation

1. Introduction

The numerous definitions of fintech converge on a common characteristic: its essence lies in achieving value enhancement as the ultimate objective. From the concept of fintech, it can be deduced that its development has undergone two significant phases. The first phase involved manual modeling by engineers for big data analysis during the data integration process, but this approach was only applicable to single-dimensional data. At this stage, which is the decision-making phase, modeling analysis can be applied to multidimensional, multi-level data [1]. It is important to note that while fintech has opened up new avenues for banks to expand, it also presents significant challenges, such as the security of funds and data. Therefore, banks must stay attuned to real-time developments in financial markets and promptly adapt their business models to keep pace with societal progress. This involves meeting customers' actual needs while prioritizing data security and privacy protection [2,3].

Today, the rapid advancement of fintech has brought about a revolutionary transformation in the structure of traditional banking operations. With the emergence of artificial intelligence and continuous technological advancement, banks must integrate fintech to maintain their core position

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in financial markets. Based on its evolutionary characteristics, they must study and grasp the specific factors influencing banking operations and understand the essence of their development [4]. Although most scholars currently conclude that fintech's technological methods have significantly improved both efficiency and cost in the financial industry, and can drive certain commercial banks to pursue transformation through fintech development, thereby gaining greater room for growth [5]. However, the technological reforms brought about by fintech have not only magnified the shortcomings of traditional banking operations but also caused turbulence in financial markets, exerting a certain degree of impact on society as a whole [6].

Fintech is driving the digital transformation of banking operations, reducing operational costs, and creating financial products and services that better align with customer experience. How to leverage fintech to provide new development approaches for banking innovation while mitigating its negative impacts has become a key focus for economists and governments worldwide [7]. This paper employs a combined approach of literature review and theoretical analysis to conduct an in-depth examination of specific transformation strategies for banks. It explores the impact and role of fintech innovations on banking operations and forecasts potential future changes fintech may bring to the sector. This enables banks to gain a degree of insight into future business trends and prepare relevant countermeasures in advance. Simultaneously, it clarifies which policy tools the state and government can utilize to ensure fintech development better serves banking operations.

2. The evolution of fintech

2.1. Current state of China's development

China's fintech sector emerged relatively late, and there are differing views on its developmental stages. The first phase occurred before 2005 and is termed the financial IT stage. Characterized by the widespread adoption of mainframe computers and the emergence of payment systems, this period saw the initial digitization of banking records despite the absence of robust competition. This transformation improved the monolithic business structure and operational methods of traditional banks, leading to significant efficiency gains [8,9].

From 2005 to 2014, during the internet finance phase, influenced by the rise of internet finance, Chinese banks successively launched services such as internet banking and mobile banking. This development of big data and mobile payments disrupted traditional financial models, prompting banks to shift their focus from products to customers themselves. This further propelled banking development, gradually transitioning banking channels from offline to online platforms [8,9].

From 2015 to the present, China has entered the third phase of its financial technology development, driven by advancements in big data, blockchain, and artificial intelligence. The issuance of the “Guiding Opinions on Promoting the Healthy Development of Internet Finance” has strengthened oversight of fintech while intensifying research into emerging technologies such as artificial intelligence and blockchain. Currently, nearly all sectors of the financial industry have embarked on a new path of transformation and upgrading. The volume of traditional business is gradually decreasing, while the scope of emerging business continues to expand. These changes will progressively narrow the gap between China and other countries [8,10].

2.2. Current development status in other countries

Fintech refers to technological innovation in the financial industry, with its origins traceable back to the financial globalization of 1866. Compared to China, it has a relatively earlier start. The period

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from 1866 to 1986, defined by the Global Financial System Council as the Fintech 1.0 era, witnessed the rise of developed nations like the United Kingdom and the United States. Driven by World War II, advancements in communication encryption and cryptanalysis technologies enabled telecommunications to facilitate the digitization of financial operations, thereby catalyzing the emergence of the Fintech 1.0 era [8]. Therefore, the Financial Stability Board defines fintech as financial innovation driven by science and technology, and predicts that fintech innovations will bring significant changes to financial institutions and markets [11].

The second phase occurred between 1987 and 2008. The emergence of the world's first automated teller machine (ATM) marked the dawn of Fintech 2.0—the era of modern financial technology. Characterized by digital business systems, this phase accelerated financial informatization. The widespread adoption of computers and networking technologies enabled banks worldwide to successively launch online services [8,12].

The 2008 financial crisis dealt a severe blow to traditional banking operations, forcing conventional banks to adopt transformation strategies and seek assistance from technology companies, thereby giving rise to certain enterprises. Now in the Fintech 3.0 era, the integration of mobile communications and finance has been achieved through deep data mining [8,12].

3. Analysis of the impact on banks' multi-dimensional operations

3.1. Transaction costs

Coase Theorem, also known as the theory of transaction costs, states that under conditions of clearly defined property rights, if transaction costs are negligible, the market equilibrium will be efficient regardless of the initial allocation of property rights, achieving a Pareto-optimal allocation of resources. Amid the wave of fintech, cost advantages become particularly evident as banks transition toward digital and intelligent operations, primarily reflected in physical business expenses such as labor costs, rent, and various operational equipment [13].

After shedding the constraints of physical locations, operational expenses have been significantly reduced. The integration of machine upgrades and artificial intelligence has replaced human labor, not only minimizing losses from human error but also cutting supervision costs. The use of internet tools has drastically lowered information gathering costs, while technologies like big data and cloud computing have enhanced information processing capabilities, effectively controlling decision-making costs.

Additionally, mobile payments have reduced transaction processing times, while blockchain technology effectively addresses the challenges of data loss or corruption. The combined advantages of these technologies not only enhance the efficiency of financial services but also lower the overall costs of financial transactions. However, as fintech advances, enterprises face relatively high sunk costs and maintenance expenses for technology and equipment investments [8].

3.2. Payment business model

Traditional bank payment services primarily involve two methods: bank card transfers and cash transactions at bank counters. These processes are time-consuming and cumbersome. However, the rapid development of the internet has driven fintech companies to create innovative solutions, causing banks to lose a significant number of customers. For instance, Alipay enables users to scan QR codes or transfer funds with no transaction fees and a streamlined process. This is particularly advantageous for businesses frequently transferring funds across different bank cards. By simply

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linking multiple cards to Alipay, users can execute transactions anytime with a few taps—eliminating trips to various banks while boosting operational efficiency [8].

3.3. Deposit and loan business

Products developed by emerging fintech platforms can meet the needs of more long-tail customers. For instance, many young customers, attracted by high interest rates and diverse product offerings, are shifting their funds from bank deposits to platforms like Alipay's Yu'e Bao and WeChat's Money Bag. This trend is causing banks to lose a significant number of customers [7]. Only by integrating fintech with banking operations can the pace of digital transformation in banking be accelerated, enabling banks to transition from a single-service model to a multi-service model and re-attract customers to conduct business [1]. On the other hand, in the lending business, individuals or entities facing capital shortages apply for loans from banks. To mitigate the risk of non-repayment, banks typically assess the borrower's creditworthiness and other relevant information. This approval process is complex and time-consuming, and banks sometimes require borrowers to meet certain prerequisites. The lending operations of fintech companies are typically conducted through online platforms. By leveraging big data and internet tools, these platforms match borrowers with suitable lenders, eliminating the need for third-party intermediaries. This not only saves on fees paid to third parties but also enhances the transparency and openness of information for both borrowers and lenders [14,15]. Therefore, the development of fintech has dealt a significant blow to banks, resulting in a substantial decline in the volume of their deposit and loan operations.

3.4. Banking transaction volume

The proponent of the Long Tail theory, American Chris Anderson, argues that people cannot focus solely on the most important matters while neglecting the portion that consumes more energy and resources. This can be understood as the market actually harboring a vast number of easily overlooked customer segments. Although their individual demand is minimal, the collective sum of all these long-tail customers can generate substantial profits for businesses. In certain sectors, the profits derived from long-tail customers may even surpass those from the customer segments most valued by the majority of enterprises. Google is the quintessential “long tail” company, reaping enormous profits by providing products and services to seemingly insignificant entities like small and medium-sized websites and individuals. Fintech innovations enable banks to undergo digital transformation, leveraging the internet and big data to uncover more potential long-tail customers and expand their business scope, thereby boosting banking revenues [16].

3.5. Bank risk management

The development of fintech has spurred the rise of internet tools such as big data, artificial intelligence, and blockchain. While enjoying the convenience they offer, data security issues like privacy breaches cannot be overlooked. The financial sector is particularly vulnerable to illegal surveillance. Research has revealed that platform hackers uncovered over 200,000 data privacy security issues, including customer information leaks. This indicates that banks still need to enhance their data security measures [8].

The integration of fintech with banking operations enables banks to measure risks more precisely and enhance the accuracy of risk management. Concurrently, national and relevant governments will strengthen regulatory oversight. However, due to the diverse industries within financial markets,

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regulatory standards established by different institutions may vary, potentially leading to compliance gaps or vulnerabilities in transactions between parties.

3.6. Overall banking industry

As an external effect in the economic sphere, the core logic of technological spillover lies in the phenomenon where certain unintentional technological dissemination from high-tech enterprises during their routine operations generates positive benefits for other firms in the same sector—such as technological upgrades or improvements in production efficiency. In the development and innovation of fintech, the presence of technology spillover effects leads to a scenario where one pioneering bank attempts an innovation. Upon observing the benefits derived from this innovation, other banks are incentivized to follow suit, thereby collectively elevating the technological innovation standards across the entire banking industry [17].

Therefore, technology spillovers can indirectly reduce the occurrence of information asymmetry in transactions, thereby lowering transaction costs to a certain extent [11]. Research indicates that digital finance within fintech possesses this benefit, capable of enhancing banks' overall capabilities and competitiveness through demonstration, networking, and personnel mobility, thereby promoting their development [16].

4. Policy recommendations

4.1. Banking business model

Integrating fintech into banking operations accelerates the pace of digital transformation. By adopting new technological tools and models, banks can offer customers innovative business models and products. Centering on the customer, leveraging data integration and analytics to understand actual needs and consumption preferences enables banks to tailor personalized products, deliver superior service, and enhance customer satisfaction. However, while utilizing fintech solutions, banks must also prioritize protecting customer privacy and information security [3]. Banks have now developed multiple channels such as official accounts, ATMs, and online banking apps, enabling services to operate beyond time and space constraints. Customers can complete transactions and payments without leaving home, which not only reduces the workload for banks but also facilitates information retrieval and organization for both businesses and financial institutions [8].

4.2. Talent and technology

Strengthen talent development and technological investment. The bank regularly conducts training programs for its employees to ensure they fully grasp the knowledge and skills related to financial technology. This enhances employees' risk awareness and risk identification capabilities, thereby improving work efficiency and promoting the development of banking operations. Banks can also attract high-tech talent to join and engage in R&D by collaborating with universities or relevant institutions, or by implementing preferential policies regarding salaries and other benefits, thereby maximizing resource sharing [6]. Governments or nations can also increase investment in such projects, cultivate more talent in fintech, accelerate the pace of digital transformation in banks, and enhance the quality of China's financial products and services.

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4.3. Legal regulation

Prioritize data security and regulatory compliance. Banks should enhance their regulatory awareness, adhere to relevant laws and regulations, establish robust risk management mechanisms and internal control systems, and improve their risk management capabilities and ability to prevent risks. In addition to collecting internal customer information, banks also rely on external data from government and third-party institutions. Given the challenges of data integration, establishing secure and reliable network systems and emergency response mechanisms is crucial. Implementing measures such as preemptive data encryption, backup, and recovery enables banks to take timely and effective actions in response to unforeseen events. This approach minimizes losses while maximizing data security and integrity, thereby contributing to the stability of financial markets. Therefore, it is crucial to unify regulatory standards and establish a transparent and secure legal regulatory environment, which is conducive to maintaining financial market stability. National regulatory authorities should also refine and update legal regulatory policies to minimize the occurrence of legal loopholes [11,18].

5. Conclusion

Currently, fintech is characterized by intense market competition, diverse application scenarios, rapid development, and policy support. Every company aspires to secure a foothold in the financial market, and the advancement of fintech has significantly disrupted traditional banking operations. In the realm of banking payment services, fintech innovations have driven fintech companies to develop novel products and services. Regarding deposit and loan operations, fintech has streamlined lending processes, eliminating unnecessary expenditures on third-party intermediaries. In risk management, fintech leverages big data and artificial intelligence to reduce the risk levels of financial products and services. These transformations collectively drive bank customers to migrate toward other financial institutions.

Although this paper explores the multifaceted roles and impacts of financial technology innovation on banking operations, the rapid pace of fintech development means that the referenced literature and data may exhibit certain information lags, failing to keep pace with the latest developments. Furthermore, the study lacks representative mathematical models and relevant case studies, resulting in insufficient persuasiveness. Current research predominantly focuses on banks' direct business operations while paying inadequate attention to their indirect business activities, leading to a relatively narrow scope of investigation. Future research could employ additional mathematical models alongside representative data and relevant case studies to enhance the timeliness of the literature. Adopting a multidisciplinary and multi-perspective approach to analyzing impacts, while paying closer attention to shifts in banks' indirect business operations, would enable deeper exploration of existing banking risks. This would result in a more comprehensive, coherent, and persuasive article.

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