

A Review of FinTech Research in the Context of Digital Innovation

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Abstract

Fintech, as an important engine for deepening the structural reform of the financial supply side, is profoundly affecting the overall direction of the international financial industry. The study of fintech regulation is of strong practical significance in accelerating the transformation and upgrading of the international financial industry and coping with the new challenges of fintech development in the context of digital innovation. The article utilizes the literature research method to systematically sort out the research results on fintech in China and some extra-territorial countries, and mainly reviews the five aspects of fintech's development motivation, business model innovation, risk prevention, regulatory challenges, and coping strategies. At present, China and overseas countries have fully realized the importance of fintech innovation and development and have launched research discussions, but the research on fintech regulation is still in its infancy, and the depth and breadth of fintech regulation research still needs to be expanded.

Keywords

Fintech; Risk; Regulation; Challenges; Literature Review.

1. Introduction

Extraterritorial research on fintech began at the end of the 20th century, and with the rapid development of the Internet and mobile communication technology, fintech has gradually moved from theoretical discussion to practical application. Foreign research started earlier, covering areas such as digital payments, blockchain technology, the application of artificial intelligence in finance, P2P lending and smart investment. Domestic research, on the other hand, has developed rapidly with the rise of Internet giants such as Alibaba and Tencent, with research focusing mainly on mobile payments, Internet financial regulation, the application of blockchain technology in finance and its risk control. Research on the theoretical aspects of fintech covers multiple levels and dimensions, deepening the understanding from the perspectives of economics, management, information technology, and jurisprudence, and providing support and guidance for practical application. Extraterritorial studies have conducted in-depth discussions on the impact mechanism, application scenarios and future development of FinTech, laying a theoretical foundation for the healthy and sustainable development of FinTech; while studies by Chinese scholars have focused on the role of FinTech in promoting financial inclusion, optimizing financial regulation and promoting financial innovation, taking into account the actual situation of the Chinese market. The research of Chinese scholars focuses on how FinTech can achieve a balance between risk control and innovative development in China's complex financial environment, and proposes solutions based on big data and artificial intelligence, as well as a FinTech development model that suits China's national conditions.

2. Review of Financial Technology Research in China

2.1. Study on the Meaning, Development Motivation and Function of Financial Technology

2.1.1. Connotation of Financial Technology

Discussions on "FinTech" in China began in 2015, and three views are commonly held. The first view emphasizes technology. Liu Shaobo, Zhang Youyi (2021) [1] and others have pointed out through research that the essence of fintech is technology, but not information technology in the traditional sense, but refers to cloud computing, artificial intelligence, blockchain and other disruptive, emerging and complex technologies that can be deeply integrated with finance. The second viewpoint emphasizes financial Chen Hong (2020) [2], Li Xiangqian (2021) [3] and others believe that the concept of financial technology should be based on "finance" rather than "technology". In their view, "technology" is only a means of preventing financial systemic risks, and the fundamental goal of fintech should be to utilize new technologies to create new business models, products or services, so that more consumers can benefit from financial services. The third view is a combination of the first view and the second view, focusing on finance + technology. This view is represented by scholars such as Ba Shusong (2016) [4], Cheng Xuejun (2022)[5], Zhu Ziyang (2023) [6], Yi Xianrong (2017) [7]. They believe that the essence of fintech is the fusion of finance and various emerging technologies. This integration refers to the penetration of cloud computing, artificial intelligence, blockchain and other emerging technologies into all aspects of the financial business field, such as investment decision-making, credit risk pricing and so on.

2.1.2. Motivations for Fintech Development

The rise of fintech is not only influenced by the traditional financial theory foundation, but also has its special development path. Regarding the motivation of fintech innovation, Cai Cen (2023) [8] et al. point out that the sustainable development of fintech lies in meeting the needs of "long-tail" customers and forming a positive feedback cycle based on the increase in the number of customers by analyzing the text of bank patents. Li Jianwei (2023) [9] et al. By exploring the mechanism and boundary conditions of the impact of fintech on the digital transformation of enterprises, they point out that the occurrence of major emergencies, such as the outbreak of the New Crown epidemic, undoubtedly accelerates the digital transformation of the financial industry, and pushes forward the deep development of e-commerce and digital service platforms. Huang Yiping (2019) [10] et al. on the other hand, combed and analyzed the development overview of China's digital financial industry, pointing out that the main reason why fintech can develop rapidly in China is the shortage of the supply of traditional financial services as well as the relative inclusiveness of financial regulation.

2.1.3. Functions of Fintech

The function of financial technology to promote the transformation and upgrading of the traditional financial industry has gradually emerged. Qiao Haishu (2019) [11] et al. believe that fintech creates various new types of financial service trading platforms such as Alipay and WeChat Pay, which enhance user stickiness, make up for the inherent style of traditional financial services, and are conducive to releasing consumption potential, forming economic models and generating creation effects. Hou Shiyang (2020) [12] et al. believe that fintech reduces the information asymmetry between financial institutions and investors, improves the transparency of market information, and helps financial practitioners to obtain massive user data at a lower price and realize the value of information. Zhou Quan (2020) [13], Liu Shaobo (2021) [14] et al. believe that FinTech innovation is conducive to boosting financial inclusion and generating inclusive effects. For example, fintech improves data processing efficiency and reduces the financing threshold through big data algorithms, breaks through time and space

limitations, expands financial services, reduces financial constraints, and serves the public. Huang Xuping (2018) [15] et al. pointed out that the rapid development of financial technology is accompanied by data security problems. They believe that the characteristics of blockchain technology, such as tamperability and anonymity, can guarantee the security of daily payment and clearing, deposit and borrowing, and other financial transactions, and produce a security effect. In contrast, Liu Shaobo (2021) [16], Gong Qiang (2021) [17] and others believe that there are technical loopholes and algorithmic black boxes in the innovative development of fintech, which may jeopardize the security of financial transactions.

2.2. Fintech Risk Study

2.2.1. Causes of Fintech Risk

As far as the reasons for the formation of fintech risks are concerned, scholars generally agree that fintech risks are the result of a combination of internal and external factors. From the viewpoint of internal factors, Fang Yi (2020) [18] et al. believe that the endogenous risk of fintech has been expanding through the acceleration and feedback mechanism of traditional financial risks, and even formed a risk spillover effect. Wang Zuogong (2019) [19] et al. point out that the main root cause of traditional financial risks lies in information asymmetry, while the development of fintech introduces another form of information asymmetry, i.e., data asymmetry, which further triggers a more serious risk problem compared to traditional information asymmetry. From the perspective of external factors, Hu Zongyi (2018) [20] et al. argue that the existence of financial leverage increases the correlation between financial institutions, leading to an increase in systemic financial risk. Hu Bin (2021) [21] et al. showed through their research that the participation of unqualified subjects in fintech transactions is one of the reasons for risk formation. Qiao Wen (2019) [22] et al. argued that unsound laws and regulations, fintech platforms with insufficient transparency, and the lack of composite talents are the main reasons leading to the creation of new financial risks. Li Wanqiang (2023) [23] et al, on the other hand, from the perspective of combining internal and external factors, point out that while the innovative development of fintech brings profound changes to the financial service field, the endogenous and exogenous risks induced by itself also bring significant challenges to the current financial regulatory system.

2.2.2. Categories of Fintech Risk Formation

As far as the formation categories of financial risks are concerned, Li Ying (2021) [24] argues that in addition to traditional financial risks, data security, cybersecurity, technological and regulatory risks are special types of risks that exist with the development of the fintech industry. Liu Chunhang (2021) [25] et al. believe that the potential risks of fintech include contagiousness, procyclicality, excessive volatility and systemic importance at the macro level; and at the micro level, they include financial institutions' credit risk, liquidity risk, maturity mismatch risk and so on. He Yong (2022) [26] et al. categorize fintech risks into financial risks under the perspective of "technology" and financial risks under the perspective of "finance". Tang Jing (2019) [27] and Zeng Aiqing (2021) [28] et al. consider technology risk, credit risk, and protection risk to be the most important categories of fintech risks from the perspective of fintech practical application.

2.2.3. The Transmission Path of Fintech Risk

As far as the transmission path of fintech risk is concerned, Chinese scholars mainly study it from both direct and indirect aspects. On the one hand, from the point of view of the direct conduction path of fintech risk, Zhao Jian (2019) [29] et al. point out that liquidity risk is the direct cause of the significant turbulence in the financial market and directly affects the main body of market transactions. Sun Guofeng (2017) [30] emphasized that compared with traditional financial institutions, the fintech industry is more sensitive to market changes. Risks

arising from regulatory arbitrage and other behaviors will have a direct impact on the market through a series of financial products and services, thus increasing the systemic risk of the market. On the other hand, from the perspective of the indirect transmission path of fintech risks, Guo Lihong (2021) [31] pointed out that fintech risks include both financial and technological risks, which may integrate with each other to form new risks. Yu Ping and Zhang Jingpei (2021) [32] et al. through empirical research show that the impact of fintech on commercial bank risk-taking shows an "inverted U-shaped" relationship. Xiong Bin (2021) [33] et al. use the GARCH-EVT-Copula-CoVaR model to measure the risk spillover value of fintech on different types of financial institutions. The results show that there is a two-way risk spillover effect between fintech and financial institutions.

2.3. Study on Regulatory Challenges Posed by Fintech Innovation

First, FinTech innovations have put forward new requirements on regulators' regulatory concepts and capabilities. Li Wenhong (2017) [34] et al. point out that regulators face the difficulty of grasping professional resources and knowledge in the field of fintech, thus affecting the effectiveness of fintech regulation. They emphasized that regulators should pay close attention to the impact of the development of emerging technologies, such as big data and distributed ledger technology, on financial regulation, strengthen the allocation of professional resources in accordance with the attributes of financial business, and improve the way of financial regulation. Liu Chunhang (2020) [35] believes that the traditional financial regulatory approach has the problems of narrow vision, insufficient data processing capacity and insufficient supervision in big data risk response. He suggests that regulators should actively explore and utilize regulatory technology tools, and integrate big data, artificial intelligence and other technologies into the whole process of financial regulation. Jin Hubin (2023) [36] et al. mentioned that there are developmental conflicts between fintech and financial regulation, including the mixed nature of fintech and the separation of regulation, the contradiction between the decentralization of fintech and the tendency of regulation to become centralized, and the contradiction between the complexity of fintech risks and the decentralization of regulatory objectives. They suggest multiple coordination at the levels of regulatory subjects, objectives, models and methods in order to build out a synergistic regulatory system and close regulatory loopholes. Secondly, fintech has intensified the difficulty of regulators in controlling financial risks. Hu Bin (2021) [37] et al. believe that the widespread application of financial technology improves the efficiency of financial services, but also makes new high-risk customer groups enter the financial market, and institutions that lack the qualification of financial practice and risk prevention and control capabilities join the financial supply side, introducing new potential risk factors to the financial system, which objectively exacerbates the difficulty and effectiveness of financial regulation. Shi Guangqian (2023) [38] pointed out that the widespread application of emerging financial scenarios such as big data credit, digital currency, etc., has made the process rules of business compliance, data security, and intelligent risk control start to become more and more complex, and digital financial regulation is facing brand new challenges and problems of digital risk control. Many Qi (2024) [39] emphasized that although fintech has significantly improved the quality and efficiency of financial services, its technological application and business transformation are also very likely to increase the vulnerability of traditional financial institutions and exacerbate the original risks. Finally, FinTech innovation poses a challenge to international financial regulatory cooperation. Li Wanqiang (2023) [40] and others believe that the development of financial technology makes it easy to break through the spatial boundaries of the national field of financial transactions, forcing countries around the world to expand their jurisdiction in order to safeguard the interests of their own national interests and the interests of consumers, which results in the jurisdictional competition of financial regulation. Thus, the "cross-border" trend of financial

technology has already emerged, but regulatory coordination and cooperation among countries is still insufficient.

3. Overview of Extra-territorial Fintech Research

At present, the research of extra-territorial scholars on fintech mainly focuses on the following four aspects: research on the development dynamics of fintech, research on business model innovation driven by fintech, research on the risks of fintech, and research on the challenges faced by fintech and coping strategies.

3.1. Study on the Dynamics of Financial Technology Development

Studies on the dynamics of fintech development can be broadly categorized into three types. One is the innovative development of digital technology, which has greatly contributed to the digital transformation of the financial services industry. Kalmykov (2016) [41] et al. argue that the development of emerging technologies such as blockchain, cloud computing, and big data will revolutionize the financial industry and dramatically change people's production and living standards. Pousttchi (2018) [42] et al.'s research suggests that the Internet finance, The rise of innovative services such as digital banking, mobile payments and smart investment is a positive response to changing consumer needs. Consumers are increasingly inclined to conduct financial transactions through digital channels, requiring financial institutions or technology companies to not only provide digital versions of traditional services, but also to meet their needs in a more personalized and real-time manner. Third, the evolving regulatory environment can stimulate financial innovation. Frost (2019) [43], Chaudhry (2022) [44] and others have pointed out that fintech companies, in response to new regulatory requirements, will continue to strengthen their investment in technology, such as the adoption of compliance monitoring software and the development of the KYC (Know your customer) system, etc., in order to provide as much as possible a solution that meets the standards and adapts to the new regulatory requirements. Rupeika-Apoga (2021) [45] et al. argue that the government's commitment to promoting financial inclusion through strong support for digitization is also a key factor in the development of fintech.

3.2. Research on Business Model Innovation Driven by Financial Technology

Regarding the study of fintech-driven business model innovation, Cai (2018) [46] et al. point out that emerging technology-driven business model innovation often leads to the reshaping of financial markets. In terms of innovation approaches, Cai (2018) [47] emphasizes that crowdfunding and blockchain, as two ways to disrupt and innovate traditional financial intermediaries, help to achieve business model change. In terms of innovation areas, Polasik (2016) [48] et al. argue that payment innovation is one of the important areas of fintech innovation. Mobile payment has penetrated into almost every aspect of people's daily life and has shown continuous development vitality. In terms of research hotspots, Joao (2018) [49], Bolivar (2019) [50] et al. point out that the business models developed around digital currencies will be an important direction for future fintech research. Brummer (2018) [51] et al. point out that while fintech promotes the transformation of the business model, it also faces a series of innovation dilemmas, such as outdated laws and regulations and conservative regulatory concepts. Tsai (2018) [52] emphasized that it is crucial to establish a regulatory system applicable to SMEs in the fintech field.

3.3. Risk Studies on Financial Technology

Regarding the risk study of fintech, Khuong (2022) [53] et al. argued that fintech adoption is influenced by customers' risk perceptions, where financial risk, legal risk, and activity risk are considered to have a substantial impact. On the contrary, security risk does not significantly

affect customers' willingness to use fintech, a view that is also confirmed by the study of Miskam (2019) [54] et al. Ashta (2021) [55] et al. state that the development and use of fintech has reshaped the global financial system, but at the same time, it has also made new risks at the level of people, systems, and management, which, in turn, have an efficiency of the procedures and the application of the existing rules adverse effects. Ryu (2018) [56] constructed a benefit-risk framework model based on the theory of reasoned action and found that legal risks have the strongest negative impact on users' intention to use fintech and that early and late adopters tend to bear different benefit and risk consequences. Mascarenhas (2021) [57] et al. improved Ryu's model to explain the perceived risks and advantages that may affect the continued adoption of fintech and draws the related conclusion that early adopters perceive operational risk as the most significant, while late adopters are more concerned about financial risk. Alnsour (2023) [58] et al. use a structural equation modeling approach using partial least squares and find that consumer acceptance of fintech is largely determined by perceived ease of use, perceived usefulness, and consumer innovation, while financial, legal, security, and operational risks, are not important in influencing user acceptance of fintech.

In addition, Vu (2022) [59] et al. point out through SWOT analysis that cyber risks in the FinTech sector will rise in times of turbulence or uncertainty (e.g., during the New Crown Pneumonia epidemic) with the increase of cashless transactions and business digitization. Gozman (2019) [60] et al. outline the various risks arising from cloud-based technologies, wherein the risk influencing factors include, but are not limited to, incompatible data permissions and architectures, difficult-to-manage cloud deployments, and elastic vendors, etc., and proposed a risk identifiable framework through an empirical study. Duran (2021) [61] et al. on the other hand, analyzed the risks posed by smart contracts, a revolutionary advancement in fintech, and argued that they could jeopardize the stability of the world's financial system. Arkanuddin (2021) [62] et al. through their study found that if the problem of non-performing loans in the fintech lending industry is not solved, the fintech ecosystem will suffer serious damage, which will most likely threaten the regulation of the digital economy by regulators as well as lead to an increase in cybercrime. Akartuna (2022) [63] et al. point out that the use of cryptocurrencies has made many of the risks associated with money laundering and terrorist financing more likely. Chaudhry (2022) [64] et al. on the other hand, assessed the systemic and tail risks faced by fintech firms through an empirical study, and it argued that the presence of both risks is likely to create new problems for financial stability.

3.4. Study on the Challenges Facing Fintech and Strategies to Address Them

Regarding the study of challenges and response strategies faced by fintech, Demirg-Kunt (2020) [65] et al. point out that with the widespread popularization of smartphones and the continuous improvement of artificial intelligence technology, the global fintech business is expanding rapidly at an exponential rate. Gasiorkiewicz (2020) [66] argues that the global financial system is facing great pressure from fintech innovation. It argues that while providing support for partial or complete disintermediation of financial services, FinTech also affects the stability of the global financial system and becomes a new source of risk to national security, corporate stability, and consumer welfare. Ferrari (2022) [67] et al. argues that the development of FinTech simplifies the cost of business operations, but it also creates problems such as regulatory arbitrage and loan maturity mismatch. Hollanders (2020) [68], Pu (2021) [69] et al. point out through their research that regulatory compliance, data security, and how to establish a symbiotic relationship with financial institutions, such as banks, are the major challenges facing the development of the fintech industry.

To cope with the challenges faced by fintech, extra-territorial scholars have explored various aspects such as technological responses, regulatory system and the construction of regulatory

system, etc. Daj (2018) [70], Monrat (2019) [71], Sahu (2023) [72] et al. point out that blockchain technology has a significant disruptive nature both at the economic level and at the legal level, and its in the financial security field of the Na (2022) [73] et al. put forward new methods to cope with Internet financial risks based on big data technology, such as building an information security system based on big data technology and constructing a big data cloud platform resource management system, etc. Brummer (2018) [74] argues that outdated financial laws and regulations and conservative regulatory concepts make it difficult to adapt to the current situation of the financial intermediaries-based traditional regulation. Allen (2024) [75] et al. emphasize that financial regulation should be guided by preventing or mitigating public harm, and advocate switching to a precautionary approach to unbundle technological solutionism.) et al. Qudah (2023) [76] et al analyzed 918 articles related to financial technology and pointed out that while financial institutions adopt digital platforms and blockchain technology to provide accessible and secure financial services, they should also implement cybersecurity and data protection measures to safeguard consumer data. Arner (2017) [77] et al. argue that the stability of the global financial system requires an increased use of and reliance on it. In this regard, Teichmann (2023) [78], Bolton (2023) [79] et al. based on the theory of social public value, elucidated the six challenges faced by RegTech and proposed corresponding solutions to promote the reform of the financial regulatory system and improve the regulatory constraint mechanism.

4. Conclusion

At this stage, China and extra-territorial countries have made significant progress in research on financial technology, but there are still deficiencies. The current theoretical system is not yet fully mature, and many emerging technologies and application scenarios lack systematic research. The legal and regulatory framework lags behind technological development, leading to insufficient legal protection and compliance challenges. In addition, there are large differences in research in different countries and regions, and a lack of international synergy and standardization, making the development of fintech globally unbalanced and inconsistent. Future FinTech research should further focus on exploring the application and innovation of cutting-edge technologies, improving the theoretical system, promoting international cooperation and standardization, and facilitating the innovation and inclusion of financial services to achieve a safer, more efficient and inclusive financial system.

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