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The Impact of Fintech Development on the Profitability and Risk-taking Capabilities of Traditional Commercial Banks

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Abstract. The rapid advancement of financial technology has significantly disrupted traditional banking ecosystems, driven by the proliferation of mobile payments, digital lending platforms, and AI-powered financial services. Against this backdrop, this study systematically examines the multifaceted impact of fintech on commercial banks through competitive, operational, and risk-based perspectives. Key findings reveal that fintech intensifies market competition, leading to a notable compression of net interest margins—evidenced by an average decline of 0.12 percentage points for every 1% rise in fintech credit share—and a substantial diversion of low-cost deposits. In response, traditional banks are accelerating digital transformation initiatives, enhancing operational efficiency, and expanding non-interest income streams such as payment and agency services. Concurrently, fintech introduces critical vulnerabilities including heightened operational risks from IT outsourcing, reduced interpretability of third-party AI models, pro-cyclical credit allocation during economic cycles, and increased systemic interdependencies. The study emphasizes that achieving a sustainable balance between technological adoption and robust regulatory oversight is crucial to leveraging fintech's benefits while safeguarding financial stability.

Keywords: Fintech, profitability, Risk-Taking, Commercial Banks.

1. Introduction

Fintech's meteoric rise in the past few years, especially through mobile payments and digital finance platforms, has not only transformed but also redefined the competitive and operational world of banks. Over the past year, in fact, due to the spread of the COVID-19 virus around the globe, which has led many people to prefer digital transactions rather than cash payments for safety, the banking industry has seen its traditional market share dwindle. The emergence of open APIs, internet-based wealth management services, and algorithmically designed credit ranking has not only increased competition from these service providers but also lowered interest rates while mobilizing the conveniently low-cost deposits. Such trends are reported on in the systematic growing of literature in the academic world. For example, Khiaonarong and Humphrey explored the enduring persistence of the affinity for digital payment mechanisms, which are already adopted, to invoke the structural change for transaction purposes [1]. Philippon showed that by applying new technologies, the marginal cost of financial services has decreased greatly, upsetting the old business models [2]. On the other hand, Frost gave the details on how fintech companies compete in intensely incumbent

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financial institutions to push the latter to mitigate the existing profitability in the key segments. This investigation delves into this phenomenon through the prism of several core aspects: changing customers' payment preferences, eliminating traditional intermediaries for deposits, squeezing banks' net interest margins, and enhancing banks' operational efficiency by means of two channels, that is, the competitive pressure and the technology industrial spillovers. Furthermore, it explores the changing nature of financial risks, for example, those resulting from the outsourcing of critical functions, algorithmic decision-making bias, and the increasing systemic risks that stem from the interconnectedness of technological networks. In addition, the strategic countermeasures embraced by banks are further investigated, with two prime examples being the digital transformation of banks and the diversification into income sources that are outside of and unrelated to interest, to help mitigate the negative impacts and gain from the new opportunities.

2. Impact of mobile payments on banking

2.1. Changing payment habits and cash substitution

Mobile virtual payments in all countries have had a coincidental impact on the traditional banking sector, with mobile payments often coming with a balance feature that has attracted a large number of customers whose funds are no longer confined to current bank accounts but are instead invested in more emerging virtual payment accounts. According to Chapter 4 of the China Financial Stability Report 2014 it is clearly stated that the scale of non-bank payment business is growing rapidly. Chapter 2 of the 2017 China Financial Stability Report clearly points out the impact of emerging virtual payment accounts on banks and the potential impact of virtual payment accounts on banks. However, this subtle influence on users' payment habits will ultimately result in third-party payments and mobile wallets replacing cash and card transactions, thereby eroding the market share of banks in the payments sector. According to the 2020 BIS report, there is a clear correlation between the growth of digital payments and the decline in cash usage globally. This substitution has accelerated especially after the New Crown epidemic . Another empirical result suggests that e-money and bank cards are the most direct substitutes for cash transactions. Payment habits have a 'ratchet effect' and once consumers move to more convenient digital payments, they rarely fall back to their original pattern of using cash [1].

2.2. Deposit business diversion and narrowing spreads

In terms of deposits emerging fintech still have a significant impact on traditional commercial banks, with the development of mobile payments and fintech, third-party fintech platforms have simultaneously launched Internet finance, which includes Internet deposits and wealth management products, the emergence of these products is doing a sustained and powerful impact on the traditional banking industry, there is research evidence quantified through research on how fintech (in particular for lending platforms) how regulatory arbitrage has been utilized to rapidly capture market share in the U.S. mortgage market resulting in a significant decline in traditional bank share [2]. At the same time along with the emergence of Internet finance, derived from the additional impact of Internet finance, intelligent investment advisers and online fund sales platforms take the initiative to reduce the investment threshold, the purpose is to share the pie with the banks in the low and middle net worth customer groups, so as to further seize the market share of banks. Research reports show that the core advantage of a fintech is to reduce the marginal cost of financial services. Intelligent investment is a perfect example of this idea, replacing expensive human financial

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advisors with algorithms, making it possible to serve large numbers of small clients at very low cost, thus “democratizing wealth management” [3].

2.3. Rate competition and intermediation revenue erosion

On the other hand, under the fierce competition from third-party payment institutions (especially Alipay and WeChat Pay), which have taken the lead in launching the “free” strategy, traditional commercial banks have been forced to move from “fee-based” to “free” in order to maintain customer relationships and the competitiveness of their payment portals, as they have been losing out on the fees they charge for basic services such as inter-bank transfers and payment settlements for their individual customers. This has forced them to move from “fee-based” to “free” in order to maintain customer relationships and the competitiveness of their payment portals, which has directly eroded an important source of intermediary business revenue for banks. 2020 supports this view by analyzing the economic drivers of the popularity of instant payment systems and identifying competition as a key factor. is the key factor. When non-bank payment providers offer free, instant money transfers, banks have no choice but to follow suit or risk losing customers and marginalizing their business [4].

3. Earnings squeeze and digital transformation

3.1. Narrower interest rates and higher cost of debt

Entering the 21st century, with the rapid development of technology, fintech companies are also keeping pace with the forefront of the times continue to strengthen to improve financial services, at the same time, fintech platforms use the advantages of their own technology to achieve more accurate pricing, which directly compresses the profitability of bank loans and deposits. The study found that technology-driven fintech firms reduced the marginal cost of processing loans and were able to more flexibly adjust interest rate pricing based on risk This led to a serious challenge to the pricing power of traditional banks in the mortgage market, and the compression of bank spreads [5]. The 2023 study reveals a significant shock effect of fintech credit expansion on traditional banks' net interest margins by analyzing cross-country data for 91 countries from 2013-2019. The study finds that for every 1% increase in the share of fintech credit, bank net interest margins fall by 0.12 percentage points on average, an effect that remains robust after controlling for macroeconomic variables and bank characteristics. The authors note that fintech platforms (e.g., Robinhood's zero-commission trading, PayPal's balance management tools) directly divert banks' low-cost deposit sources by attracting households to move their savings from bank current accounts to digital investment accounts. In response to the loss of funds, banks have been forced to increase the proportion of wholesale financing, such as interbank lending, leading to higher costs on the liability side. This change in liability structure further squeezes banks' profit margins, creating a transmission chain of “deposit diversion - rising costs - narrowing spreads” [6]. A study of China's fintech market finds that the rise of Internet wealth management products, such as “Balance Bao”, has significantly diverted demand deposits from banks. To cope with the pressure on their liabilities, banks have been forced to issue more high-cost structured deposits, which has raised the overall cost of liabilities and eroded the profits of traditional commercial banks [7].

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3.2. Digital transformation and non-interest income growth

However, traditional commercial banks need to respond positively to the impact of fintech. A study in 2024 analyzes the phenomenon of the emergence of mega-apps from a corporate perspective, pointing to the emergence of successful mega-apps in Asia, such as WeChat. The core of the article discusses the development path and growth strategy of digital platforms from single-function applications to integrated multi-service mega-applications, analyzes the key logic of such platforms in enhancing user stickiness and accumulating user data through the integration of multi-services, and mentions the impact of mega-application business models on traditional industries (e.g., the banking industry), which provides strong support for the industry's understanding of the construction of mega-application ecosystems and the transformation of traditional institutions [8]. So traditional commercial banks can try to offset the impact of fintech as much as possible by digital transformation and proactively embracing fintech to increase user stickiness.A 2024 study assessed the impact of digital technology on banks' operational efficiency, customer experience and financial performance by analyzing secondary data from banks' financial reports, industry studies and case studies. The results of the study showed that digital transformation significantly improved bank performance by improving operational efficiency, increasing customer engagement and driving revenue growth [9].

3.3. Heterogeneous competition and bank size differences

Another study finds that the development of digital finance has significantly increased the share of non-interest income in the banking sector. Based on data from the Indonesian banking sector, the study found that competition from fintech companies has forced traditional banks to accelerate their digital transformation and make up for the interest income gap by developing intermediary businesses such as payment and settlement and agency services. Specifically, for every 10% growth in fintech transaction size, banks' non-interest income share increased by 0.8%, but smaller banks showed negative effects due to insufficient technology investment, highlighting the heterogeneity of competition effects [10].

4. Efficiency gains: competition and spillovers

4.1. Efficiency gains from competitive effects

FinTech forces banks to improve their efficiency mainly through two mechanisms: competition effect and technology spillover effect. Competition efficiency refers to the fact that FinTech companies cut into the core business of payment, credit, wealth management, etc., which diverts banks' customers and profits, forcing them to maintain competitiveness by improving efficiency (cost reduction and service improvement). And the technology spillover effect refers to the fact that new technologies developed by FinTech companies (e.g., big data risk control, blockchain, API interfaces) are adopted and applied by banks, which directly improves their back-office operational efficiency and risk management capabilities. Thakor provides a comprehensive overview of the relationship between FinTech and the banking industry. The paper demonstrates how FinTech has increased banking industry productivity by encouraging innovation and competition. To overcome the obstacles and increase operational efficiency, banks have had to make investments in digital technology, improve their cost structures, and streamline their operations [11]. Another study examined how FinTech was altering the business model of the banking sector while also analyzing

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its effects on financial stability. The "originate-and-distribute" approach, which is more capital-, efficiency-, and technology-light, is replacing the "asset-holding" model that banks were previously using. This process is itself an improvement in operational efficiency [12]. Both studies echo the competition effect, suggesting that fintech forces banks to make across-the-board efficiency improvements through the competition effect.

4.2. Technology spillover and process optimization

At the same time technology spillovers play an important role in forcing banks to make efficiency improvements, as detailed in the 2018 study by Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W, which provides a clear "FinTech Matrix " framework that systematically breaks down FinTech's technological innovations in various business areas (e.g., payments, deposits and loans, capital markets, etc.) and discusses in detail how banks are absorbing external technological innovations to automate, real-time, and disintermediate their internal processes through APIs (Application Program Interfaces), Cloud Computing, and Distributed Ledger Technology (DLT), among others, which is the typical manifestation of technological spillovers. While fintech is forcing banks to make efficiency reforms, it also brings a new issue for traditional commercial banks, which is whether cost reductions from efficiency gains are sufficient to offset the loss of bank profitability due to increased competition [13].

4.3. Balancing efficiency gains with profit squeezes

In the 2023 study, it was noted that the rise of fintech companies had a negative impact on the performance of traditional financial institutions. It reduces the profitability of traditional financial institutions by reducing their interest income and increasing their operating costs. While traditional financial institutions try to broaden their revenue streams, it is difficult to offset the losses caused by increased competition. Different fintech business models have different impacts on financial institutions, and the negative impact of fintech on banks is greater in countries with more developed financial systems [14].

5. Risk control escalation and outsourcing risks

5.1. Algorithmic advantage and risk control enhancement

In the current intricate credit market, accurately identifying the credit of borrowers is a considerable test for traditional commercial banks. Fintech has more advanced data analysis capabilities and algorithmic models than traditional commercial banks, and a great deal of information on the impact of the introduction of fintech on the banking industry has been explored in the above content, however, traditional commercial banks can also seek to fill their own shortcomings in the credit market by seeking to cooperate with fintech. market. 2019 study examines the value of fintech in credit scoring. The study focuses on the role of machine learning in fintech for bank credit risk identification. Taking real loan data from a large fintech lender as a sample, the study uses advanced algorithmic models such as Random Forest and Stochastic Gradient Boosting to analyze the effect of loan default prediction in comparison with traditional standard regression models. The results show that the machine learning model performs better in the orderly sorting and screening of defaulted loans and normal loans, and can more accurately identify potential default risk subjects from a large number of customers, providing empirical support for banks to optimize credit risk assessment through fintech -- its algorithmic advantages can directly help banks improve the accuracy of risk

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identification and Reduce non-performing loans due to risk misjudgment, which in turn drives down the non-performing loan ratio. However, the study also points out that, affected by data and model drift, the model needs to be continuously optimized to maintain the long-term effect [15].

5.2. Outsourcing risks and compliance challenges

Research published in 2023 provides strong academic support for the argument that “banks significantly exacerbate operational and compliance risk by outsourcing key technology decision-making functions.” The study makes clear that banks' outsourcing of IT infrastructure and core risk models (e.g., credit risk assessment) to third-party service providers is essentially a significant transfer of operational risk. While outsourcing may bring efficiency gains, it also introduces new types of risk vulnerabilities that are difficult to manage and monitor effectively, especially when banks lack direct control over the algorithms of third-party models and their data governance processes. The authors emphasize that this dependency makes banks more vulnerable to supply chain attacks, data breaches, and third-party operational errors, which directly amplifies operational risk. What's more, the study reveals the serious compliance challenges that come with it: regulators such as the Basel Committee hold banks ultimately responsible for the risk of all outsourced activities, which means that banks must ensure that their third-party vendors' models are interpretable, fair, and compliant with regulatory requirements. When the third-party AI decision-making model turns into a "black box," the bank finds it more difficult to meet its regulatory accountability requirements, which raises the risk of noncompliance significantly [16].

5.3. AI black boxes and interpretive dilemmas

The ethical conundrums at the core of the application of artificial intelligence (AI) in finance are discussed by the study in 2022, and the study of "interpretability" offers important theoretical foundations for the compliance risks that banks encounter when they depend on third-party AI decision-making. The authors note that a lot of intricate AI Many sophisticated AI models, the authors note, are "black boxes" with hard-to-understand decision-making logic. When banks contract essential decision-making functions, like fraud detection or credit approval, to outside fintech companies, this opacity is made worse. This directly leads to serious compliance challenges: banks have difficulty complying with the “right to interpretation” required by regulations such as the EU's General Data Protection Regulation (GDPR) and are unable to effectively demonstrate to regulators that their algorithmic decision-making is fair, non-discriminatory, and compliant. As a result, the study illustrates that reliance on third-party AI, rather than being risk averse, puts banks at significant risk of regulatory penalties and litigation for failing to justify decisions [17].

6. Figures Technology dependence and systemic risk

6.1. Technology dependence and systemic risk

In the wave of financial digital transformation, banks' reliance on key fintech such as third-party payment clearing systems, cloud service providers, and core algorithm suppliers has become the industry norm, and this reliance, while enhancing operational efficiency, is quietly transforming into a new type of systemic risk that threatens the stability of the banking system and poses a serious challenge to the traditional bank management model. The 2020 study, based on data from a global sample of 43 countries, confirms that banks can significantly and adversely affect their own stability when their spending on cybertechnology exceeds a specific threshold. This finding reveals that

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banks' reliance on fintech is not “the more the merrier”: in order to maintain their advantage in digital competition, banks often continue to increase their investment in fintech, while neglecting to balance their investment with risk management. When the degree of reliance breaks through the reasonable boundary, banks will take disproportionate risks due to the excessive pursuit of technological empowerment, such as frequently adjusting their internal systems to adapt third-party technologies, leading to disorganization of operational processes; or weakening their autonomous risk-control capabilities due to their reliance on external technological support, which may pose a hidden danger for the eruption of systemic risks [18].

6.2. Payment systems and liquidity risk

Focusing on the key area of third-party payment clearing systems, the systemic risks triggered by their dependence have been empirically validated.2024 research on fintech payment and lending platforms suggests that the proliferation of such platforms significantly increases the systemic risks to the banking system: on the one hand, the centralized operation model of third-party payment clearing systems makes them a key target for cyberattacks, and in the event of a Once a system failure or attack occurs, it will be quickly transmitted to multiple banks through the fund clearing chain, triggering a liquidity run risk; on the other hand, banks' reliance on third-party payment data will lead to excessive reference to nontraditional data in credit decision-making, giving rise to unstable loans, which will weaken the quality of banks' assets and impact the stability of the system. Additionally, the study notes that this risk has the potential to directly diminish the efficacy of monetary policy, so intensifying the adverse effect on the overall stability of the financial system [19].

6.3. Algorithm outsourcing and technical backdoors

Meanwhile dependence on core algorithmic vendors poses the risk of highly insidious technological backdoors, posing a unique challenge to bank management. 2022 A joint paper by UC Berkeley, MIT, and IAS researchers exposed a major pitfall of algorithmic outsourcing in banks: when banks outsource algorithmic training for core operations such as credit approval and risk pricing to third-party vendors, malicious vendors may plant hard-to-detect “technology backdoors” that influence bank decisions by manipulating algorithmic parameters - for example, by setting implicit triggers in loan models that result in abnormally high loan default rates for specific groups, or by underestimating asset risk in risk assessments. The hidden nature of such risks makes it difficult for banks' traditional risk monitoring systems to identify them, while the role of core algorithms in supporting business can allow backdoor-triggered problems to spread quickly across the system, not only threatening the safety of a single bank, but also potentially triggering chain risks at multiple banks due to the industry-generalizability of algorithmic models, exacerbating the speed of systemic risk transmission and the extent of damage [20].

7. Procyclicality of risk-taking

7.1. Credit expansion and risk accumulation during the upturn

Credit expansion and risk accumulation during the upturn. The development of the fintech has significantly altered the risk-taking model of the traditional credit market, with its pro-cyclical nature being particularly evident at different stages of the economic cycle. Research in 2017 showed that machine learning models were able to provide more accurate risk assessments for borrowers

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with shorter credit histories or insufficient traditional data by utilizing non-traditional data sources. During economic upturns, this technological advantage manifests itself in increased credit availability, especially for younger borrowers and groups underserved by traditional financial services, such as micro and small businesses. However, there is a risk behind this credit expansion: machine learning models rely too heavily on “quality” data signals (e.g., steady income growth, active consumption records) during boom periods, leading to a de facto relaxation of credit standards. Models misinterpreted short-term signals of economic improvement as long-term trends, allowing credit resources to flow to less risk-resilient borrower groups and setting the stage for subsequent risk accumulation [21].

7.2. Model failure and credit contraction in downturns

The limitations of such machine-learning models trained on historical data are exposed when the economy enters a down cycle.Grigsby, Pang, and Kang find in 2021, through a study of the consumer credit market during the New Crown Epidemic, that in the face of unprecedented external shocks, traditional financial institutions were still able to maintain the supply of credit through empirical judgments and government policy support, while algorithmic modeling-reliant Fintech platforms, on the other hand, experienced significant functional degradation. The lack of samples of similar extreme events in the model's training data led to its inability to accurately assess sudden systemic risks, and it could only mechanically tighten credit standards significantly based on deteriorating real-time data. This synchronized, mechanical credit contraction behavior exacerbated market liquidity constraints and amplified downside shocks [22].

7.3. Algorithmic bias and risk amplification

The 2018 study further reveals the deeper mechanisms by which algorithmic models amplify risk during downturns. Algorithmic decision-making not only replicates biases in historical data, it also amplifies those biases at economic turning points. Models trained on historical data may overreact during recessions by placing more stringent credit limitations on populations that have previously been considered high-risk, a phenomenon known as "algorithm-driven credit discrimination." Such discriminatory credit policies not only make it harder for vulnerable groups to get financing, but because modeling algorithms are uniform across platforms, they also cause a resonant credit crunch that greatly increases the volatility of the financial system [23].

8. Conclusion

In conclusion, the banking industry has been significantly impacted by the emergence of fintech in two ways: profitability and risk-taking practices. Fintech has weakened traditional revenue streams through fee reductions and deposit disintermediation, increased competition, and lowered net interest margins. To somewhat alleviate these pressures, it has also prompted banks to diversify into non-interest revenue streams, improve operational efficiency, and embrace digital transformation. Fintech increases vulnerabilities through outsourcing risks, technology dependencies, algorithmic opacity, and pro-cyclical lending practices, while also introducing sophisticated instruments for credit evaluation and risk management. All these elements work together to increase systemic exposure and make regulatory compliance more challenging. Finally, in an increasingly digitized environment, fintech forces banks to be more innovative and efficient, but it also calls for balanced approaches to protect long-term profitability and financial stability.

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