

The Impact of Internet Finance on Corporate Banking Financial Viability: Evidence from Publicly Traded Banks in China

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Abstract: Internet finance represents a distinctive form of financial facilitation, divergent from traditional commercial banking and capital markets. It transcends temporal and spatial constraints on financial activities, allowing customers to access financial resources and services through online channels. This characteristic positions Internet finance in direct competition with commercial banks. Against the backdrop of the outbreak of the New Crown epidemic, governments worldwide have implemented diverse measures to curb the spread of the virus, leading to reduced travel activities. Given the unique advantage of Internet finance in being unrestricted by time and space, it raises the question of whether it will further encroach upon the traditional domains of publicly traded financial institutions. This study investigates the influence of online finance on the financial performance of banking institutions, employing a panel regression model with quarterly data from 29 listed commercial banks in China covering the period from 2013 to 2021. The findings suggest that the evolution of Internet finance will indeed impact the profit structure and profitability of these listed commercial banks to a certain extent.

1. Introduction

As 2020 commenced, the swift propagation of the new corona-virus pandemic had far-reaching consequences, affecting both China and the global community significantly. As the epidemic unfolded, healthcare professionals and individuals from various sectors united in the battle against it. Financial institutions, including banks, securities, and insurance, were significantly affected during this challenging period. It became evident that a "non-contact" approach to financial services, epitomized by Internet finance, would play a crucial supporting role in financial activities. Internet finance, characterized by its capacity to markedly mitigate operational risks in trading venues and facilitate precise asset placement, emerged as a transformative force. This form of financial service, distinct from the traditional model of commercial banks, posed a potential impact on conventional financial institutions. Consequently, financial entities found themselves compelled to integrate with Internet technology, anticipating greater benefits. In light of these developments, this paper seeks to examine the market extent of non-bank mobile payment as a representative metric for the evolution

of Internet finance. Through an examination of Internet finance, the study proceeds to assess effects on the profitability and profitability structure of traditional banks caused by non-bank mobile payment expansion. Ultimately, the paper aims to present insights and strategies for the future development of commercial banks post-epidemic, fostering a framework for the mutual prosperity of Internet finance and traditional commercial banking.

2. Literature Review

In the last few years, the rapid growth of Internet finance in China has spurred numerous studies, with a primary focus on its impact on commercial banks. However, the existing literature lacks a definitive stance on whether Internet finance is advantageous for the development of commercial banks. A prevalent negative perspective posits that the ascent of Internet finance establishes a competitive relationship with commercial banks, exerting adverse effects on their development. Fu Shun and Pei Ping's empirical investigation, drawing on a sample of 36 publicly traded banks in China from 2009 to 2019, provides empirical evidence that points to a notable decrease the influence of Internet finance on the net interest margin of banking institutions.[1] Utilizing information from 273 rural-based commercial banks spanning the period from 2013 to 2020, Fan Yachen and Tian Yaqun use a GMM Dynamic Model to assess the impact of internet finance on the cost-efficiency and profitability of rural commercial banks, and find that internet finance reduces the cost-efficiency and profitability of rural commercial banks. Wang Yu and Kan Bo select the quarterly operating data of 23 publicly traded commercial banks from 2014 to 2019 to exam the effect of internet finance on the profit composition and profitability of banking institutions, and find that mobile third-party payment, internet insurance, and P2P online lending all negatively affect the profitability of commercial banks. Lin uses the Extended Technology Acceptance Model and the elements of the Planned Behaviour Theory to examine the factors that influence Vietnamese internet financial institutions' intentions to serve their customers.

The study's findings indicate that the Internet enables a direct match between the supply and demand of funds, leading to a weakening of the credit intermediary function of banks. Consequently, the profitability of banks is adversely affected. [2]Berger (2021) analyses the role of intermediaries in the network credit market by using detailed data from more than 14,000 original loans on the lending platform, and after the study, he believes that P2P network lending, which is characterized by a short appraisal process, fast lending speed and low loan interest rates, has rapidly occupied the microfinance market, posing a detrimental effect on the traditional credit operations of banking institutions. A positive view is that the development of internet finance can force commercial banks to integrate the cutting-edge technology of the internet, which has a promoting effect on the development of commercial banks.[3]Liu Mengfei and Jiang Wei's (2020) examination, using unbalanced panel data from 68 commercial banks in China spanning from 2008 to 2017, reveals that the progress in FinTech pays a role in improving profitability within China's banking sector. However, their findings also suggest a hindering effect on the improvement of cost efficiency. The study highlights that the Internet facilitates a direct match between the interaction of fund supply and demand, consequently weakening the credit intermediary function of banks and adversely affecting their profitability. [4]Berger (2021) analyzes the role of intermediaries in the network credit market by leveraging detailed information from over 14,000 initial loans on the lending platform, and after the study, he believes that P2P network lending, which is characterized by a short audit process, fast lending speed, and low-interest rates on loans, has rapidly occupied the microfinance market, which adversely affects the traditional credit business of commercial banks. Positive views that the development of Internet finance can force commercial banks to integrate the cutting-edge technology of the Internet, which has a promoting effect on the development of

commercial banks.[5]Liu Mengfei and Jiang Wei (2020), utilizing unbalanced panel data from 68 financial institutions in China spanning from 2008 to 2017, identified that the evolution of FinTech positively contributes to enhancing the profitability of China's banking industry. However, their study also indicates a hindering effect on the improvement of cost efficiency. [6]Niu Rui's study, utilizing the DEA model and Malmquist index efficiency decomposition, suggests that online financial services contributes to the financial efficiency of commercial banks without causing disruptive substitution for the traditional banking industry. Srivastava et al. argued that commercial banks can improve their own efficiency by utilizing the characteristics of Internet finance, such as low transaction costs. Srivastava et al. believe that commercial banks can improve their operational efficiency by utilizing the characteristics of Internet finance such as low transaction costs [7]. Beck explores the future of financial intermediaries in the Internet age, suggesting that Internet technology will reduce transaction costs and influence banks' intermediary functions. [8]Shahrokhi, through an examination of the growth data of Internet finance over the past decade, delved into the advancements, innovations, and challenges encountered by the financial services and IT industries. Following data analysis, the conclusion was drawn that Internet finance has the potential to enhance the operational efficiency and risk management capabilities of banks. It achieves this by reducing the number of physical outlets and lowering operational costs. Additionally, regarding its influence on the performance of banks, Shahrokhi suggested that non-bank payment systems can enhance the overall performance of financial institutions through the platform influence and the advantage of customer agglomeration, ultimately leading to improved profitability. [9]Zhang believes that banks can reduce the pre-loan risks associated with credit activities by utilizing Internet financial technology. [10] Bomer and Maxin (2018) provide reasons for commercial banks to cooperate with FinTech companies, including enhanced product innovation and increased profits .[11]Lapavitsas and Santos (2008) underscore the positive effects of technological progress on bank operations and credit risk reduction through FinTech development.

In summary, existing studies predominantly focus on Internet finance's characteristics, exploring overlaps with commercial banks and delving into its impact on the asset, intermediary, and liability businesses of commercial banks. While some studies employ empirical methods to gauge the impact on profitability, the macroscopic construction of Internet finance indices is common. Given the current economic challenges and the unique circumstances of the epidemic, Internet finance's role becomes crucial for financial institutions. This paper seeks to contribute to the ongoing discourse by scrutinizing the quarterly operational data of 29 listed commercial banks spanning the years 2013 to 2021. Employing a panel regression model, the study evaluates the influence of significant Internet finance business models on the profitability of banking institutions, providing valuable insights for these banks to bolster their profitability in the post-epidemic era. The hypotheses put forward in this context aim to provide a framework for understanding the dynamics between online finance and traditional banking institutions in the current market environment.

Due to the impact of the epidemic, Internet finance can give full play to its own advantages, so as to gain a place in the current relatively depressed market environment and make it more winning in the antagonistic competition with commercial banks, on this basis, this paper puts forward the following hypotheses:

Hypothesis 1: The development of Internet finance diminishes the profitability of commercial banks.

In our daily lives, Internet finance has become pervasive, leveraging applications such as P2P lending, crowdfunding, balance treasure, and zero money pass as its investment and financing channels. It effectively addresses the challenges faced by traditional commercial banks, such as the cumbersome process of offline face-to-face agreements, lengthy queuing times, and inflexible working days when dealing with borrowing or saving. Internet finance, with its distinctive

advantages, satisfactorily caters to the individualized needs of a majority of users, showcasing the inclusive nature of Internet financial services. Furthermore, through online platforms like Internet information platforms, Internet finance harnesses big data, cloud computing, and other information technologies to record user online activity trajectories and personal preferences. This approach reduces transaction costs and risk control expenses, enhancing the efficiency of financial services. During the outbreak of the COVID-19 pandemic, Internet finance capitalized on its unique strengths, offering non-contact financial services to a vast user base. This led to a significant share of the deposit and loan markets shifting from commercial banks to Internet finance, intensifying the competition between the two. Additionally, spurred by the "catfish effect" of Internet finance, commercial banks faced heightened pressure and a greater impetus to innovate and evolve. It is crucial to note that certain commercial banks, striving for their survival and development, might opt to retain customers by increasing the interest rates on bank deposits and reducing the interest rates applied to bank loans, thereby impacting the operating profits of some banks. Building upon the preceding analysis, this paper posits that the development of the Internet will potentially diminish the financial performance of commercial banks, leading to the formulation of hypothesis 1.

Hypothesis 2: The evolution of Internet finance has adversely impacted the profit composition of commercial banks.

As we are aware, the intermediary operations and off-balance sheet activities constitute the primary origins of non-interest revenue for commercial banks. Therefore, we evaluate the profit structure of commercial banks by examining the proportion of non-interest income. In the rivalry between Internet finance and the conventional operational model of financial institutions, the activities of Internet finance will unavoidably contend for the market stake in the intermediary and off-balance sheet operations of commercial banks. This, to some degree, will result in a reduction in the source of non-interest income for commercial banks. Nonetheless, owing to its inherent advantages, Internet finance unequivocally signals its intent to assume control over the initial market share of commercial banks in business phenomena, leading to a more substantial decline in the interest income of financial institutions. Additionally, confronted with the developmental advantages of online finance, financial institutions will align with the financial development trajectory to employ Internet technology for the expansion of intermediary business, enhancing the level of non-interest income for financial institutions. This ultimately contributes to an escalation in the share of non-interest income for financial institutions. Consequently, the analytical findings reveal that the progress of Internet finance will augment the ratio of non-interest income for financial institutions [12]. Some researchers and scholars have also scrutinized the breakdown of the impact of marginal shifts in non-interest income on bank earnings. They discovered that the ongoing transformation of the income structure of commercial banks is not uni-dimensional and should be examined from dual perspectives. Firstly, even though the upswing in non-interest income results in heightened earnings for commercial banks, the diversification of the earnings structure is likely to hinge on the greater volatility of non-interest income, which counteracts the earnings. In essence, the negative indirect impact surpasses the positive direct effect, culminating in an overall negative effect. Consequently, it can be inferred that the advancement of Internet finance will exert an adverse influence on the income structure of banks, thereby giving rise to hypothesis 2.

3. Data Sources and Empirical Research

3.1 Data Sources

This research concentrates on the quarterly data of 29 publicly traded financial institutions in China from 2013 to 2021. The selection of this research scope is motivated by several pivotal considerations. Firstly, listed commercial banks offer standardized information disclosure, ensuring

completeness and reliability of operating data. Additionally, the financial data disclosed by these banks undergoes third-party audit, enhancing the credibility and authority of the available data. Secondly, the paper takes into account the impact of the epidemic as a significant influencing factor. Given that Internet finance has emerged relatively recently, the period from 2013 to 2021 is chosen as the sample interval.

The operational data, Internet finance data, and control variables for the 29 listed commercial banks are sourced from the Wind database. To address any missing data, a comprehensive approach is taken, involving regular scrutiny of annual reports released by the banks and information published by the National Bureau of Statistics. In instances where data gaps exist for specific years, the study employs the mean substitution method to fill in the missing values. This meticulous process ensures that the final data-set is complete and suitable for rigorous panel data analysis.

3.2 Model Specification

3.2.1 Selecting Variables

(1) Explained variables. Concerning the selection of dependent variables, this paper dissects the profitability of financial institutions into both overall profitability and profitability composition. It opts for the return on total assets (ROA) to represent bank profitability and the proportion of net interest income (NII) to delineate the structure of profitability.

(2) Explanatory variables. Internet Finance, Characterizing a contemporary financial paradigm, Internet finance involves electronic payment, investment, and financing services provided by Internet enterprises. These entities act as intermediaries for transactions, leveraging network information technology. A pivotal aspect is third-party payment, and China's dominance in global Internet finance is particularly evident in third-party payment. The impact of online finance development on financial institutions primarily revolves around payment and settlement operations and Internet trading platforms relying on third-party payment. Scholars in the field often consider the scale of third-party mobile payment as a benchmark for Internet finance development. Building on this analysis and existing research, this paper contends that the magnitude of third-party mobile payment serves as a rational metric to gauge current Internet finance development. As an explanatory variable, the paper utilizes the logarithm of quarterly transaction data for third-party mobile payment (LNT). It's essential to note that statistical enterprises in this context exclude banks, encompassing only non-financial institution payment enterprises.

Table 1: Selection of variables and their meanings

	Variable Name	Symbol	Meaning
Explained Variables	Return on total assets	ROA	Net Profit/Total Assets
	Non-Interest Income as a Percentage	NII	Non-Interest Income/Operating Income
Explanatory Variables	Third-party mobile payment quarterly transaction data	LNT	Third-party mobile payment quarterly transaction data taken as logarithmic
Control Variables	Revenue to Cost Ratio	CTI	Operating Costs/Operating Income
	Capital Adequacy Ratio	CAR	Capital/Risk Assets
	Loan-to-deposit ratio	DCR	Total Loans/Total Deposits
	Bank Asset Size	LNAST	Bank year-end total assets take log
	Non-Performing Loan Ratio	NPL	Bank year-end non-performing loan balance/total loans
	Macroeconomic Growth Rate	GDP	Year-on-year GDP growth rate

(3) Control variables. In terms of other factors affecting bank profitability, this paper considers comprehensively and refers to the research results of existing scholars, and selects the

cost-to-income ratio (CTI), capital adequacy ratio (CAR), loan-to-deposit ratio (DCR), logarithm of banks' asset size (LNASt), non-performing loan ratio (NPL) and macroeconomic growth rate (GDP) as the control variables. See Table 1 for variable selection and Table 2 for descriptive statistics.

Table 2: Descriptive statistics of variables

Variable	Mean	Median	Maximum	Minimum	Standard Deviation
Return on total assets (%)	0.5805	0.6800	2.4400	0.1400	0.2867
Non-interest income as a percentage (%)	21.6007	23.2536	72.3541	2.5646	10.5833
Logarithmic third-party mobile payment quarterly transaction data	11.2837	12.3327	13.5144	6.0540	2.0333
Cost-to-income ratio (%)	28.3795	29.2500	66.4700	15.1432	6.7466
Capital adequacy ratio (%)	13.0352	13.1984	17.9100	8.7800	1.4752
Loan-to-deposit ratio (%)	72.9218	73.7692	117.5338	28.6700	12.0674
Log of bank asset size	9.8821	10.6051	12.7475	6.3969	1.6476
Non-performing loan ratio (%)	1.2825	1.2693	2.9000	0.4400	0.3560
Macroeconomic growth rate (%)	6.4364	7.0000	18.3000	-6.8000	3.7872

In order to overcome the omitted variable bias significantly, this paper uses two-way fixed effects regression models for empirical analysis, as shown in Equation 1 and 2:

$$ROA_{i,t} = \alpha_i + \beta_t + \beta_1 LNT_{i,t} + \beta_2 CTI_{i,t} + \beta_3 CAR_{i,t} + \beta_4 DCR_{i,t} + \beta_5 LNASt_{i,t} + \beta_6 NPL_{i,t} + \beta_7 GDP_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$NII_{i,t} = \alpha_i + \beta_t + \beta_1 LNT_{i,t} + \beta_2 CTI_{i,t} + \beta_3 CAR_{i,t} + \beta_4 DCR_{i,t} + \beta_5 LNASt_{i,t} + \beta_6 NPL_{i,t} + \beta_7 GDP_{i,t} + \varepsilon_{i,t} \quad (2)$$

In above equations, $ROA_{i,t}$ and $NII_{i,t}$ represent the return on total assets and the share of non-interest income of the i commercial bank in period t , respectively, α_i is an individual fixed effect to capture all the characteristics that change only with individuals and not with time, and β_t is a time fixed effect to portray the time trend. The core explanatory variable, $LNT_{i,t}$, is the third-party mobile payment quarterly transaction data. The empirical results are shown in the table below:

Table 3: Regression results for Equation 1

Dependent variable: ROA	Coef	Std. Err	t	P	95% CI
Cost-to-income ratio	0.009	0.005	1.837	0.067	-0.001 ~ 0.019
Capital Adequacy Ratio	0.028	0.009	3.189	0.001**	0.011 ~ 0.045
Loan-to-deposit ratio	0.001	0.001	0.600	0.549	-0.002 ~ 0.004
Logarithm of bank asset size	-0.011	0.013	-0.875	0.382	-0.035 ~ 0.014
Non-Performing Loan Ratio	-0.004	0.049	-0.077	0.939	-0.100 ~ 0.093
Macroeconomic growth rate	0.002	0.001	1.872	0.061	-0.000 ~ 0.003
Log of quarterly third-party mobile payment transaction data	-0.039	0.007	-5.526	0.000**	-0.053 ~ -0.025
$\chi^2(7)=209.276, p=0.000$					
$R^2=0.063, R^2_{within}=0.116$					
* $p<0.05$ ** $p<0.01$					

Table 3 shows that the regression coefficient of the core explanatory variable $LNT_{i,t}$ is -0.039 and holds significance at the predetermined level. This signifies that online finance exerts a adverse and noteworthy impact on the profitability of financial institutions, thus verifying Hypothesis 1.

Table 4: Regression results for Equation 2

Dependent variable:NII	Coef	Std. Err	t	P	95% CI
Cost-to-income ratio	-0.337	0.078	-4.335	0.000**	-0.490 ~ -0.185
Capital Adequacy Ratio	0.201	0.517	0.389	0.697	-0.811 ~ 1.213
Loan-to-deposit ratio	0.010	0.078	0.123	0.902	-0.143 ~ 0.162
Logarithm of bank asset size	2.790	0.475	5.867	0.000**	1.858 ~ 3.722
Non-Performing Loan Ratio	2.554	2.517	1.015	0.311	-2.379 ~ 7.487
Log of quarterly third-party mobile payment transaction data	0.957	0.303	3.161	0.002**	0.364 ~ 1.551
Macroeconomic growth rate	0.111	0.054	-2.078	0.038*	-0.216 ~ -0.006
$\chi^2(7)=155.554, p=0.000$					
R ² =0.368, R {within}=0.275					
* p<0.05 ** p<0.01					

Table 4 shows that the regression coefficients corresponding to the core explanatory variables $LNT_{i,t}$ is 0.957 and hold significance at the conventional 5% level, signifying that the quarterly transaction volumes of third-party mobile payment exert a substantial positive influence on the percentage of non-interest income. Therefore, Hypothesis 2 can be substantiated.

4. Conclusion

In summary, this comprehensive analysis of quarterly data spanning from 2013 to 2021 for 29 Chinese listed commercial banks reveals a nuanced interaction between the ascent of online finance and the conventional banking sector. The study meticulously examines the impact of current online finance trends on the operational dynamics of traditional commercial banks, particularly within the context of the ongoing global pandemic. Utilizing a robust panel regression model, the study yields two pivotal conclusions: firstly, the integration of third-party mobile payment systems detrimentally affects the profitability of listed commercial banks; secondly, it concurrently instigates an upswing in non-interest income, thereby reshaping the conventional profit structure. These findings underscore the transformative challenge that internet finance poses to the traditional banking model. Looking forward, the study advocates strategic adaptations by commercial banks, underscoring the significance of diversifying financial products, embracing technological innovation, and fortifying risk management capabilities to not only endure but also prosper in the swiftly evolving financial landscape of the post-epidemic era.

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