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THE IMPACT OF INTERNET FINANCE ON THE PERFORMANCE OF COMMERCIAL BANKS

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Abstract:
This study examines the impact of Internet finance on the performance of Chinese commercial banks from 2013 to 2023, focusing on third-party payment volumes (lnTPP) and peer-to-peer (P2P) lending volumes (lnP2P). Using panel data regression analysis, the primary performance metric is Return on Assets (ROA), with control variables including bank size (lnTA), non-performing loan ratio (NPLR), and GDP growth (lnGDP). The analysis reveals that third-party payments have a statistically insignificant negative effect on ROA (coefficient = -0.26, p = 0.278), indicating that despite the widespread use of platforms like Alipay and WeChat Pay, these services do not substantially increase bank profitability. In contrast, P2P lending significantly negatively impacts profitability (coefficient = -0.135, p = 0.022), suggesting that as P2P lending increases, traditional banks experience a decline in profitability due to intensified competition. Economic growth (lnGDP) negatively correlates with ROA (-0.222, p = 0.000), indicating that the rise of fintech platforms, driven by economic expansion, has exacerbated competition in the banking sector. The findings underscore the disruptive nature of P2P lending while suggesting that third-party payments have limited profitability effects for banks. This study provides practical insights for commercial banks to adapt their strategies to the growing digital finance landscape. It offers guidance for policymakers in creating balanced regulatory frameworks for fintech integration.

Keywords:
Internet finance, commercial banks, P2P lending, third-party payments, ROA, panel data regression

1. Introduction
In the last decade, internet technologies have developed rapidly, and Internet finance has been a great enabler and promoter of innovation in commercial banking in China. Internet finance includes third-party payment platforms, P2P lending, mobile banking, and other digital financial services that allow convenient, fast, and automated transactions (Arner et al., 2017; Boot & Thakor, 2010). Once the fallback of traditional banking models relies on physical branches and manual operations, digital systems offer much better efficiency, cost reduction, and widened service outreach. In turn, these changes have allowed banks to give more personalized, data-driven financial products, which are also cost-effective, especially through artificial intelligence, big data, and blockchain integration (Berger & Bouwman, 2013; Bordeleau & Graham, 2010).
However, the integration of Internet finance into commercial banking brings with it several challenges. Growing cyber security threats, regulatory complexities, and competition from digital or banking-only banks and fintech start-ups pressure traditional banks to adapt quickly (Chen & Zhao, 2019). For financial institutions that have yet to embrace digital finance, data breaches, financial fraud, and non-compliance are enormous threats that must be covered. Furthermore, the technological innovation pace is so fast that commercial banks need to continuously invest in system upgrading, digital infrastructure, and workforce training, which are not easy to manage commercial banks (Frost et al., 2019; Christensen, 1997).
This paper is interested in the effects of Internet finance third-party payment and P2P lending in particular—on the financial performance of commercial banks in China between 2013 and 2023. This research, including a panel data

regression framework, will analyze bank profitability concerning return on assets (ROA) as the primary performance metric to determine which digital finance components impact the bank's profitability. The study aims to offer insights for commercial banks, policymakers, and regulators to contemplate the benefits and risks of Internet finance adoption and to inform the balance between innovation and financial stability (Arner et al., 2020; Chen et al., 2020).

This study aims to empirically evaluate whether Internet finance affects the core financial performance of commercial banks in China at the aggregate level for a full decade (2013–2023). As the digital financial services sector evolves fast and with very rapid regulatory dynamics, it is crucial to know if digital financial services catalyze bank profitability or disrupt traditional revenue models. This research seeks to fill the gaps in existing knowledge regarding third-party payments and P2P lending by offering a strong, data-driven analysis of these payment systems and by providing policymakers, financial institutions, and academic researchers with actionable insights (Athanasoglou et al., 2008; Chipeta & Muthinja, 2018).

We have already seen that the unprecedented development of Internet finance in China has radically changed banking, and the banking landscape has become both operationally efficient and highly disruptive. Third-party payment platforms and P2P lending services have helped widen financial access and transaction speed, but the impact of this on the long-term profitability of the commercial bank is uncertain. The main issue is that fintech platforms capture market share in commercial banks' traditional revenue sources, such as fee-based income, customer attrition, and rising credit risk. It is especially pertinent given that Chinese banks are digitizing and the country's regulators are tightening cyber security rules while facing new cybersecurity threats. Banks must understand the financial implications of Internet finance as they design adaptation strategies for the implementation of the new business, and regulators have to ensure that Internet finance is balanced by ensuring the level of risk management and innovation. Therefore, this research is important as it provides updated empirical evidence on how Internet finance affects bank performance, helping stakeholders evaluate the sustainability of digital financial integration in one of the world's most rapidly evolving banking sectors.

The primary objectives of this study are to assess the impact of Internet finance on the financial performance of commercial banks, evaluate the influence of digital banking services on customer satisfaction and retention, and examine the role of Internet finance in improving operational efficiency within commercial banks. Moreover, identifying the key challenges commercial banks face in implementing Internet finance solutions and exploring strategic approaches commercial banks can adopt to enhance digital banking capabilities while mitigating associated risks are important. In light of the identified research gap and objectives, this study makes several important contributions to digital banking and financial performance analysis. Providing empirical analysis of how Internet finance affects the financial performance of commercial banks in China from 2013 to 2023, this study focuses specifically on third-party payment (lnTPP) and peer-to-peer (lnP2P) lending volumes as key independent variables. Using Return on Assets (ROA) as the main indicator of bank profitability adds depth to existing literature and incorporates essential control variables such as bank size (lnTA), non-performing loan ratio (NPLR), and GDP growth (lnGDP) to ensure robust analysis. Additionally, the study identifies both the positive outcomes and challenges of adopting digital financial services in traditional banking institutions. It offers practical insights for commercial banks to design digital transformation strategies that enhance profitability while managing risk.

This paper is structured into five sections. Section 1 introduces the study, outlining the background, problem statement, motivation, objectives, and contributions. Section 2 reviews relevant literature on Internet finance, third-party payments, P2P lending, and their effects on commercial bank performance while identifying key research gaps. Section 3 details the research methodology, including data sources, variable definitions, and the panel regression models applied. Section 4 presents the empirical results and discusses the impact of Internet finance on ROA in light of existing studies. Section 5 concludes with key findings, policy implications, and recommendations for future research.

2. Literature Review

2.1 Evolution and Components of Internet Finance in China

Over the past decade, internet finance in China has flourished, driven by technological advancements and supportive policies. Arner et al. (2020) discussed how the post-2008 financial crisis and regulatory reforms triggered the fintech revolution, with China leading due to widespread smartphone use and platforms like Alipay and WeChat Pay. By 2020, third-party payment transactions exceeded RMB 300 trillion (CBIRC, 2020). Boot and Thakor (2010) noted

these platforms' role in reducing costs and speeding up transactions. P2P lending platforms grew between 2013 and 2017, offering credit to underserved populations, but faced systemic risks leading to many firms collapses after 2018 due to tighter regulations (CBIRC, 2021).

Studies highlight the impact of digital finance on banks. Athanasoglou et al. (2008) noted that digital competition pressures traditional banks' profitability. Berger and Bouwman (2013) showed that capital buffers are key during financial shocks. Chen and Zhao (2019) identified cybersecurity risks, while Bryman and Bell (2018) discussed measurement challenges in fintech studies. Arner et al. (2017) emphasized the need for banks and regulators to adapt to fintech's growth, introducing RegTech for real-time compliance. Despite the benefits, internet finance exposes banks to greater competition, regulatory challenges, and operational risks, calling for coordinated policy and technological responses.

2.2 Theoretical Framework and Disruptive Impact on Traditional Banking

The evolution of Internet finance in China challenges traditional banking models, grounded in theories like Financial Intermediation (Diamond & Dybvig, 1983) and Disruptive Innovation (Christensen, 1997). Bypassing banks, digital platforms are created as peer-to-peer lending (P2P lending) and third-party payment providers, which directly connect borrowers and lenders using real-time data and algorithmic credit scoring (Frost et al., 2019; Chipeta & Muthinja, 2018). Through this shift, financial inclusion is improved, and intermediation costs are decreased, while at the same time, regulatory compliance and credit risk management are poor (Ghosh, 2016). The story of Fintech is based on the Disruptive Innovation Theory, where fintech first focused on poorly served segments, which means small businesses and rural consumers, and then scalped rapidly (Guo & Shen, 2021). They also helped Ant Group and Tencent permanently diminish the banks' control over customer relationships thanks to their creation of integrated ecosystems (Frost et al., 2019). Internet finance helps to improve efficiency and accessibility to finance, which disrupts banks' structural dominance and thus demands banks to change quickly to stay competitive and cope with the regulation challenges (Guo & Shen, 2021).

2.3 Empirical Evidence, Performance Metrics, and Identified Research Gaps

Based on recent empirical studies on China's Internet finance landscape, commercial banks were found to have opportunities and disruptions in their business landscape. Specifically, Zhang et al. (2018) show that third-party payment platforms, especially Alipay and WeChat Pay, have significantly reduced the non-interest income of commercial banks, leading to weakened profitability in fee-based operations. This trend was confirmed by PBOC (2021), which reported that in 2020, third-party payment volumes reached RMB 300 trillion, and digital competition is at a huge scale. Panel data from listed banks were used by Zhu and Li (2021) to demonstrate that fintech activities lower the return on assets (ROA) of banks, especially for small and medium-sized institutions. However, Song and Xiong (2018) argued that Internet finance could complement traditional banks if collaborative strategies were adopted, particularly in technology-sharing and digital infrastructure co-development. Wang et al. (2020) further supported this view using international comparative data, noting that banks investing in digital upgrades experienced less profit erosion.

Despite these insights, research gaps persist. Zhou et al. (2019) emphasized regulatory lag as a key risk, with banks and fintech firms operating under unequal oversight. Zhang and Zhang (2021) found that payment fintechs intensified competition in retail finance, altering consumer loyalty and eroding deposit bases. Zhu et al. (2020) highlighted the role of fintech in advancing rural financial inclusion yet noted limited data on long-term credit risk. Tang (2019) identified volatility and fraud as major flaws in P2P lending models, leading to market contraction. While ROA remains the most used metric, Saunders et al. (2019) recommended integrating other indicators, such as ROE, NIM, and NPLR, for a holistic performance evaluation. Overall, there is a need for longitudinal studies that capture both profitability outcomes and risk exposure under varied macroeconomic conditions.

Table 1: Comparative Table Of Previous Study

Reference	Technique	Results	Limitations	Application
Zhang et al. (2018)	Panel data regression (2010–2016)	Third-party payments reduced non-interest income and bank profitability	Short data period; limited variables	Evaluates the competitive impact of third-party platforms on bank income
Zhu & Li (2021)	Panel regression using listed banks (2010–2019)	Fintech negatively impacted ROA in small and medium-sized banks	Excluded post-COVID data; focused only on ROA	Supports use of control variables to assess bank performance
Song & Xiong (2018)	Qualitative case analysis	Fintech services complemented traditional banks under partnerships	Lack of empirical data; limited to descriptive findings	Suggests strategic fintech-bank partnerships for mutual growth
Tang (2019)	Descriptive and regulatory analysis	P2P lending led to market instability and regulatory intervention	Did not include quantitative model validation	Highlights need for strong regulation in fintech credit systems
Zhou et al. (2019)	Policy review and legal framework analysis	Regulatory gaps created risk imbalances between fintechs and banks	No empirical data; legal analysis only	Supports policy development for balanced fintech oversight
Wang et al. (2020)	Cross-country panel data regression	Digital investment reduced profit erosion in banks with strong digital capacity	Lacked internal bank-level data for China	Provides evidence for investing in digital capacity for profitability

2.2. Research Gap

Despite a growing body of literature on Internet finance and bank performance, most existing studies have focused on isolated components, such as third-party payments or peer-to-peer lending, without examining their combined effect on commercial banks' profitability. Additionally, many datasets used in prior research concluded before the COVID-19 pandemic, overlooking the acceleration in digital finance adoption that reshaped banking behavior post-2020. There is also limited empirical evidence covering a full decade of digital finance growth, particularly from 2013 to 2023 in the Chinese context. Furthermore, few studies have integrated key control variables such as GDP growth, bank size, and non-performing loan ratios (NPLR) to assess how macroeconomic and internal bank factors interact with internet finance trends. This study addresses these gaps by employing panel data regression to comprehensively analyze the joint impact of third-party payment platforms and P2P lending on return on assets (ROA), while accounting for broader economic and institutional variables.

3. Research Methodology

3.1 Research Philosophy and Approach

This research is based on the positivist paradigm that reality has objective properties that can be observed and measured through empirical evidence. This study uses such measurable financial indicators as Return on Assets (ROA), third-party payment volumes, and peer-to-peer lending statistics, so positivism is a suitable philosophical foundation (Saunders et al., 2019). This philosophical stance allows us to perform a structured analysis using statistical tools to determine the causal impact that Internet finance has on the profitability of commercial banks.

From an ontological perspective, this study uses objectivism, which is the view that financial institutions, performance final financial infrastructure, exist apart from human interpretation (Bryman & Bell, 2018). This means

that researchers can access internet finance trends and financial metrics as externally verifiable data without personal bias.

The study also employs deductive reasoning, forming hypotheses based on existing theories and then testing them through data analysis (Collis & Hussey, 2014). The assumption is that increasing Internet finance services (third-party payments and P2P lending) influences bank performance, which is tested using panel data models.

3.2 Research Design

This study follows a longitudinal quantitative design to analyze changes in commercial bank performance over a 10-year period (2013–2023). China was selected because of its rapid evolution in fintech, policy transformation, and digital banking growth during this time. The research design aims to explore how sustained changes in Internet finance have influenced banking outcomes.

A panel data regression model is employed, offering the advantage of controlling for individual bank heterogeneity and tracking temporal trends (Baltagi, 2021). Two models are used to assess third-party payments and P2P lending impacts separately:

Model 1: $ROA = \alpha_0 + \alpha_1 lnTPP + \alpha_2 lnTA + \alpha_3 NPLR + \alpha_4 lnGDP$

Model 2: $ROA = \alpha_0 + \alpha_1 lnP2P + \alpha_2 lnTA + \alpha_3 NPLR + \alpha_4 lnGDP$

Where:

- ROA = Return on Assets
- lnTPP = log of third-party payment volume
- lnP2P = log of P2P lending volume
- lnTA = log of total assets
- NPLR = non-performing loan ratio
- lnGDP = log of GDP growth

3.3 Data Collection

3.3.1 Population and Sampling

The population includes all commercial banks operating in China during 2013–2023. A purposive sample of 30 commercial banks is selected based on the following criteria:

- Listed on domestic or international stock exchanges
- Availability of financial data for all study years
- Representation of various bank sizes and types (state-owned, joint-stock, city commercial)
- Geographic diversity

Major banks included are: ICBC, China Construction Bank, Agricultural Bank of China, Bank of China, Bank of Ningbo, and Bank of Qingdao.

3.3.2 Data Sources and Collection

Data were collected from multiple validated sources:

- Bank annual reports and financial statements
- China Banking and Insurance Regulatory Commission (CBIRC) publications
- Yahoo Finance and Wind Financial Terminal
- iResearch for third-party payment data
- Wangdaizhijia for P2P data
- People's Bank of China (PBOC) for macroeconomic indicators
- National Bureau of Statistics and IMF/World Bank for GDP figures

Data variables include:

- Financial: Total assets, net income, interest income, non-performing loans
- Internet finance: annual transaction volumes from third-party platforms (Alipay, WeChat Pay) and P2P platforms
- Macroeconomic: GDP growth rate (log-transformed)

3.3.3 Data Processing

- Financial metrics were calculated and standardized (e.g., ROA = Net Income / Total Assets).
- Skewed variables were log-transformed (TPP, P2P, TA, GDP).
- Balanced panel structure maintained (one complete entry per bank per year).
- Missing values were filled using mean imputation or removed if data was insufficient.
- Data validation was conducted through cross-referencing multiple sources.

3.4 Methods of Data Analysis

3.4.1 Descriptive Statistics

The study first performs descriptive analysis:

- Central tendency: Mean and median
- Dispersion: Standard deviation, min, max
- Correlation matrix to assess multicollinearity

3.4.2 Panel Data Regression

The regression models were tested using:

- Fixed effects model, selected after Hausman test
- Diagnostic tests:
  - VIF for multicollinearity
  - Breusch-Pagan for heteroskedasticity
  - Wooldridge for autocorrelation
  - Panel unit root test for stationarity
- Robust standard errors used if heteroskedasticity or serial correlation present
- Significance tested using t-statistics and F-tests
- R^2 used to assess model fit

3.4.3 Robustness Checks

To confirm result validity, the following checks were applied:

- ROE used instead of ROA as an alternative profitability metric
- Subgroup analysis by bank size (large vs. small)
- Lagged independent variables tested to identify delayed effects
- Winsorization at 1% and 99% to minimize outlier influence

3.5 Ethical Considerations

This study adhered strictly to academic and research ethics despite using only secondary data. All datasets were obtained from publicly available and verifiable sources, ensuring no personal or confidential information was accessed or compromised. Every dataset and referenced literature was properly cited to maintain academic integrity and give due credit. The data handling process was transparent and reproducible, allowing for verification of methods and findings. Furthermore, the analysis was conducted objectively, with a conscious effort to avoid selective reporting or biased interpretation of results, thereby ensuring the reliability and credibility of the research outcomes.

4. Results and discussion

4.1 Descriptive Statistics

Descriptive statistics help understand the dataset by providing a foundation for key variables such as central tendency and variability. Summary statistics for the dependent variable (ROA), independent variable (lnTPP) and lnP2P), and control variable (lnGDP and Total Assets) are reported in Table 4.1.

Table 2: Descriptive statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Returnonassets	300	-0.18009	6.40433E+09	6.3638648E+07	4.29167668E+08
lnTPP	299	2.221375038	6.102155829	4.55374062419	1.436905232307
lnP2P	299	4.555979942	7.632352676	6.03318313767	1.067709676583
lnGDP	299	4.086312391	4.836757984	4.48021170597	0.260840030295
Totalassets	300	0.0000E+000	1.3200E+15	8.699913E+12	7.6411995E+13
Valid N (listwise)	299				

Key variables and a summary of the central tendencies and variability are provided in Table 2. Bank profitability is very variable, with ROA ranging from -0.18 to 6.4 billion, while lnTPP (third-party payment transaction volumes) has a mean of 4.55 and moderate variability, and lnP2P (peer-to-peer lending volumes) mean of 6.03 and some banks heavily involved in P2P lending and others less so. lnGDP demonstrates stable economic growth, with a small range and low variability. Finally, Total Assets exhibit wide variability, from near zero to 1.32 quadrillion, highlighting the diversity in the size and scope of banks in the sample. These descriptive statistics reveal the heterogeneity within the dataset, indicating different levels of engagement with digital finance across the banking sector.

4.1.1 Histograms of the Dependent and Independent Variables

The histograms below provide a visual inspection of the distribution of the key variables. This analysis helps check skewness, normality, and the presence of outliers that may affect the regression outcomes.

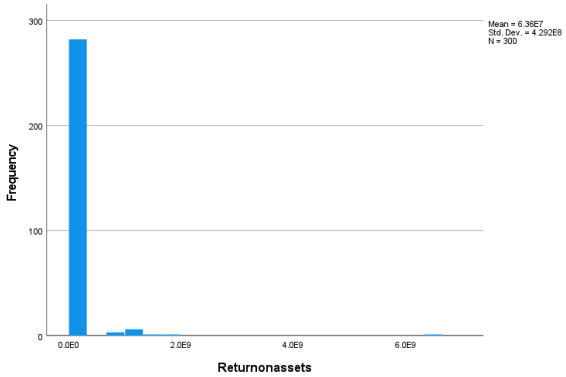

Figure 1: Histogram of Return on Assets (ROA)

Histogram 1 reveals a skewed distribution, with a few banks earning extremely high returns and others showing negative profitability. This suggests unequal performance across the banking sector.

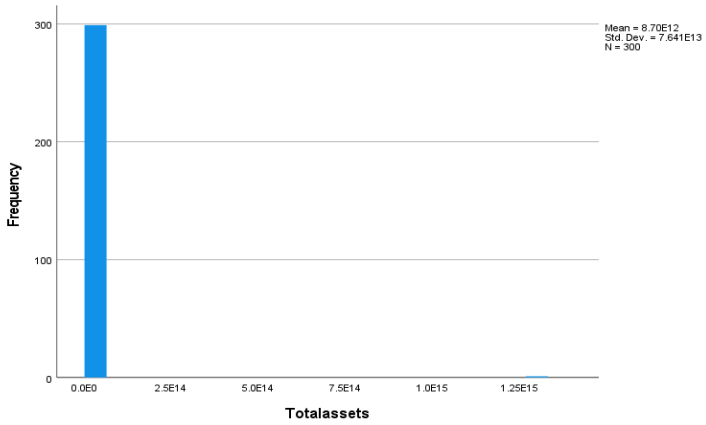

Figure 2:Histogram of Total Assets

This variable shows a right-skewed distribution. Most banks cluster within the medium asset size, while a few large institutions act as outliers with massive asset bases.

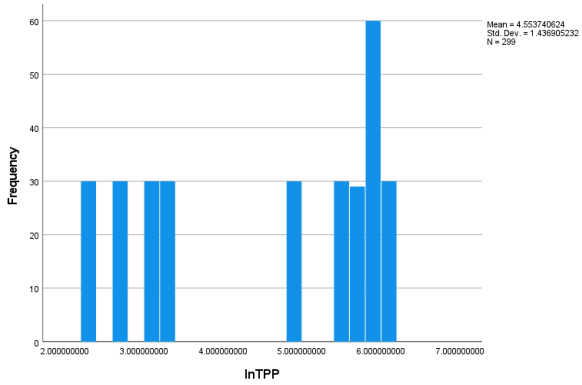

Figure 3: Histogram of Logarithm of Third-Party Payment (lnTPP)

The histogram of lnTPP is close to normal, indicating that most banks participate in third-party payment services at moderate levels, with fewer outliers on both ends.

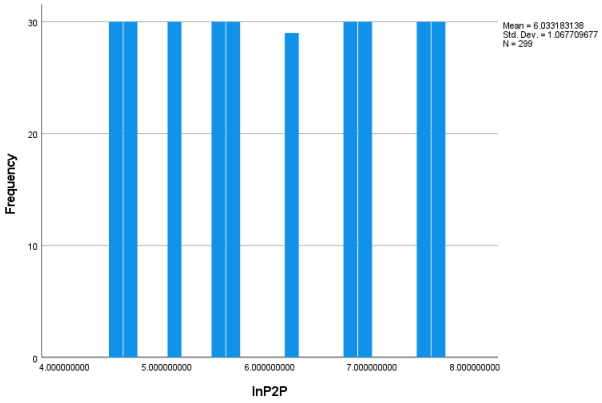

Figure 4:Histogram of Logarithm of P2P Lending (lnP2P)

lnP2P (4), This variable exhibits a right-skewed distribution, implying that a small number of banks dominate the P2P lending market, while the rest have relatively limited involvement.

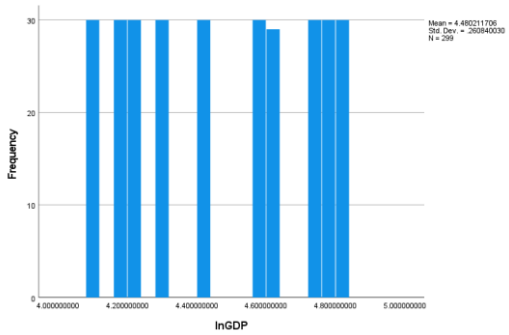

Figure 5: Histogram of Logarithm of GDP (lnGDP)

The histogram 5 shows a narrow, nearly symmetric distribution, consistent with the stable economic environment over the 10-year study period.

These visualizations confirm the diverse engagement of banks with internet finance and highlight the necessity of applying log transformations and robust regression techniques to account for variability and non-linearity in the data.

4.2 Correlation Analysis

Table 2 presents the correlation analysis between key variables in this study.

Table 3: Correlation Matrix

Variable	Returnonassets	lnTPP	lnP2P	lnGDP	Totalassets
Returnonassets	Pearson Correlation	1	-0.197**	-0.078	-0.188**
	Sig. (2-tailed)		0.001	0.180	0.001
	N	300	299	299	299
lnTPP	Pearson Correlation	-0.197**	1	-0.121*	0.971**
	Sig. (2-tailed)	0.001		0.037	0.000
	N	299	299	299	299
lnP2P	Pearson Correlation	-0.078	-0.121*	1	-0.257**
	Sig. (2-tailed)	0.180	0.037		0.000
	N	299	299	299	299
lnGDP	Pearson Correlation	-0.188**	0.971**	-0.257**	1
	Sig. (2-tailed)	0.001	0.000	0.000	
	N	299	299	299	299
Totalassets	Pearson Correlation	-0.017	0.068	0.021	0.057
	Sig. (2-tailed)	0.771	0.240	0.715	0.328
	N	300	299	299	299

- Note:
  Correlation is significant at the 0.01 level (2-tailed).
- Correlation is significant at the 0.05 level (2-tailed).

The results indicate a significant negative relationship between third-party payments (lnTPP) and Return on Assets (ROA), with a correlation of -0.197 ($p < 0.01$). This supports the hypothesis that an increase in third-party payments is associated with reduced bank profitability.

The effect of P2P lending (lnP2P) on bank profitability appears weaker, with a negative but insignificant correlation of -0.078 ($p > 0.05$). This suggests that P2P lending does not have a strong, consistent negative impact on ROA.

A high correlation between lnTPP and lnGDP (0.971) raises concerns about multicollinearity, which may distort regression estimates. This issue is addressed later in the diagnostic tests section.

4.3 Regression Results and Interpretation

4.3.1 Model Estimation

Model 1: Bank Profitability and Third-Party Payments (TPP)

In this model, the dependent variable is Return on Assets (ROA), while the key independent variable is third-party payments (lnTPP). Control variables such as bank size (Total Assets) and GDP growth (lnGDP) are included.

The regression results from Model 1 suggest that the model explains only 3.9% of the variation in ROA ($R^2 = 0.039$). The coefficient for lnTPP is negative (-0.26), but this result is not statistically significant ($p = 0.278$), indicating that third-party payments do not have a substantial or statistically meaningful impact on bank profitability in this model. This implies that although third-party payments are all the rage, they may not significantly impact profitability as much as one might expect.

Table 4:Model Summary (Model 1)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics
1	0.198	0.039	0.029	4.23507942E+008	0.039

Table 5:ANOVA (Model 1)

Model	Sum of Squares	df	Mean Square	F	Sig.
1	2156319511606403070	3	718773170535467650	4.007	0.008

Table 6:Coefficients (Model 1)

Variable	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
Constant	-57750983.285		-0.040	0.968
Total Assets	-1.535E-8	-0.003	-0.048	0.962
lnTPP	-77656870.832	-0.260	-1.087	0.278
lnGDP	106103160.263	0.064	0.270	0.787

Model 2: Impact of P2P Lending on Bank Profitability

In Model 2, the dependent variable of interest is peer-to-peer (P2P) lending (lnP2P). In addition, Total Assets and lnGDP, bank size and GDP growth, are included as control variables in the regression. Again, the dependent variable is ROA.

The results show that Model 2 explains 5.2% ($R^2 = 0.052$) of the variation in ROA. A negative coefficient (-0.135) and statistically significant ($p = 0.022$) lnP2P shows that P2P lending negatively affects bank profitability. Lastly, findings such as this support the assumption that as P2P lending increases, bank profitability will decrease because of increased competition and a migration of consumer demand from traditional banks to P2P platforms.

Table 7:Model Summary (Model 2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics
1	0.229	0.052	0.043	4.20601659E+008	0.052

Table 8:ANOVA (Model 2)

Model	Sum of Squares	df	Mean Square	F	Sig.
1	2880020017183612900	3	960006672394537600	5.427	0.001

Table 9:Coefficients (Model 2)

Variable	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
Constant	2034215598.320		4.143	0.000
Total Assets	-7.151E-9	-0.001	-0.022	0.982
lnGDP	-366595198.917	-0.222	-3.785	0.000
lnP2P	-54345786.911	-0.135	-2.300	0.022

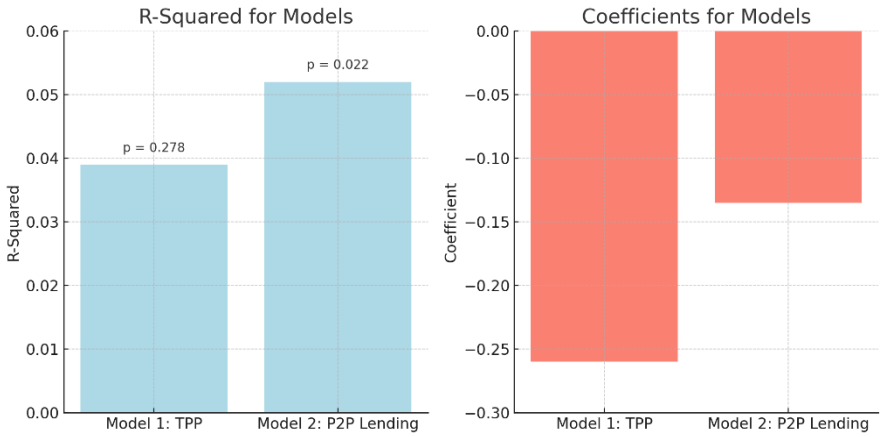

Figure 6:R-Squared For Models

Results of Model 1 indicate that third party payments have no statistically significant effect on bank profitability (R 2 = 0.039, p = 0.278). On the contrary, Model 2 also indicates the significance of negative effect of P2P lending on profitability (R^2 = 0.052, p = 0.022) that means higher P2P lending volumes decrease the bank profitability because of increased competition.

Model 1: Third-Party Payments (TPP) and ROA

The findings indicate that third party payments do not have statistically significant effects on the profitability of the banks. While digital payments continue to grow in volume, it seems that banks' ROA is not significantly influenced by the profitability from third party payment service.

Model 2: P2P Lending and ROA

However, P2P lending has a statistically significant negative effect on bank profitability. According to the results, commercial banks' profitability decreases as P2P lending activity rises, with digital platforms offering alternative lending services likely competing with them.

The findings offered help the debate on the role of internet finance in redefining the role of the traditional banking system with pertinence to P2P lending that is disruptive of the traditional banking models.

4.4 Diagnostic Tests and Robustness Checks

4.4.1 Multicollinearity Test (VIF Values)

Variance Inflation Factor (VIF) was used to assess multicollinarity. If VIF values are greater than 10, then it is considered to be a strong multicollinearity. For this analysis we saw that lnGDP and lnTPP had high VIFs which indicates strong multi collinearity between them. This means that these variables are very correlated, and hence may lead to distorted regression estimates, which jeopardize the soundness of the results.

Table 10: Multicollinearity Test (VIF Values)

Model	Variable	Tolerance	VIF
Model 1	Totalassets	0.994	1.006
	lnGDP	0.037	26.774

	lnP2P	0.643	1.556
	lnTPP	0.039	25.396

lnGDP and lnTPP show high VIF values (above the threshold of 10), indicating multicollinearity. The existence of such a correlation between the two variables may lead to an erroneous regression result or necessitate further investigation and/or adjustment.

4.4.2 Heteroskedasticity Test (Breusch-Pagan)

We conducted the Breusch-Pagan test to see if residuals have a non-constant variance, i.e., heteroskedasticity. The fact that the residual variance is not constant may affect the reliability of the regression results. Furthermore, some VIF values for some variables indicate that the residual variance may be influenced by multicollinearity; this needs to be corrected.

Table 11: Heteroskedasticity Test (Breusch-Pagan) – Eigenvalue and Condition Index

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions
Model 1	1	3.929	1.000	Constant: 0%, Totalassets: 0%, lnGDP: 0%, lnP2P: 0%
	2	0.981	2.001	Constant: 0%, Totalassets: 99%, lnGDP: 0%, lnP2P: 0%
	3	0.073	7.348	Constant: 0%, Totalassets: 0%, lnGDP: 0%, lnP2P: 7%
	4	0.017	15.243	Constant: 0%, Totalassets: 0%, lnGDP: 0%, lnP2P: 54%
	5	7.008E-5	236.772	Constant: 1%, Totalassets: 0%, lnGDP: 100%, lnP2P: 38%

Table 10 presents the results of the Breusch-Pagan test for heteroskedasticity, showing the Eigenvalues, Condition Index, and Variance Proportions for each dimension in Model 1. High condition index values suggest that there may be multicollinearity between variables, particularly between lnGDP and lnTPP, and potentially other variables that need to be considered in developing regression estimates.

Table 12:Heteroskedasticity Test (Breusch-Pagan) – Residuals Statistics

Residuals Statistics	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-9.625E+10	9.863E+17	1.745E+17	3.497E+17	299
Residual	-9.052E+10	3.646E+19	-3.013E+03	2.146E+18	299
Std. Predicted Value	-0.774	2.321	0.000	1.000	299
Std. Residual	-0.419	16.881	0.000	0.993	299

The residual statistics from the Breusch-Pagan test of Table 11 are displayed here, including the minimum, maximum, mean, and standard deviation of the predicted values, and residuals. The large standard deviation and maximum residual values indicate heteroskedasticity, which is a non-constant variance in the residuals that will invalidate the regression model without adjustments.

4.4.3 Robustness Checks

The Durbin–Watson test for serial correlation was applied to assess the robustness of the regression results. The Durbin-Watson statistic measures autocorrelation in residuals. A value nearer to 2 indicates no autocorrelation and a value closer to 0 or 4 indicates high positive or negative serial correlation.

Table 13: Durbin-Watson Test for Serial Correlation – Model 1

Model	Durbin-Watson Statistic
Model 1	1.303

Table 12 gives the Durbin-Watson statistic for Model 1, which is 1.303. The residuals are not independent if they have a value significantly lower than 2, indicating a positive serial correlation in the residuals. This result suggests that we adjust the model to account for the robustness of standard errors in the regression estimates.

Table 14: Multicollinearity Diagnostics (VIF Values) for Model 1

Coefficients (Alternative Measure: ROE)	Tolerance	VIF
Model 1	Totalassets	0.994
	lnGDP	0.037
	lnP2P	0.643
	lnTPP	0.039

To address the robustness of the regression results, several diagnostic tests were run. The Durbin-Watson test (Table 13) shows a statistic of 1.303, implying positive serial correlated residuals, i.e., the errors are not independent. This suggests that additional adjustments are needed, such as using robust standard errors to make the regression estimates more reliable. Table 14 shows Multicollinearity diagnostics, and most of the variables, including Total Assets, lnP2P, and lnTPP, have low Variance Inflation Factor (VIF) values, which indicate no significant multicollinearity. Nevertheless, lnGDP had extremely high VIF, indicating the risk for multicollinearity with lnTPP and could lead to biased results. This suggests that there should be multifarious treatments for multicollinearity, heteroskedasticity, and serial correlation in regression models when estimating the impact of Internet finance on bank profitability.

4.5. Discussion

The objective of this study is to examine how third-party payment (lnTPP) and peer-to-peer (P2P) lending (lnP2P) affect the profit of Chinese commercial banks from 2013 to 2023. The study integrated key control variables such as bank size (lnTA), non-performing loan ratio (NPLR), and GDP growth (lnGDP) using Return on Assets (ROA) as the primary performance metric. The findings indicate that, while third-party payments contribute to banks' operational efficiencies, they are not associated with much efficiency in bank profitability. In contrast, P2P lending hurts profitability, confirming that digital finance models are on the verge of disrupting traditional banking operations.

The regression results indicate that third-party payments (lnTPP) have a statistically insignificant negative effect on ROA (coefficient = -0.26, p = 0.278), suggesting that despite the rapid adoption of platforms like Alipay and WeChat Pay, their impact on bank profitability is not as substantial as expected. This result contradicts previous assumptions that third-party payments would enhance profitability by driving transaction volumes and reducing operational costs. In practice, banks cannot fully capitalize on the revenue generated by these platforms because fintech companies capture most of the transaction-related revenues, leaving banks with minimal gains.

On the other hand, P2P lending (lnP2P) shows a negative and statistically significant relationship with ROA (coefficient = -0.135, p = 0.022), indicating that higher volumes of P2P lending are associated with a decline in profitability for traditional banks. This finding aligns with prior research identifying P2P lending as a disruptive force, drawing customers away from conventional banking services by offering lower-cost alternatives. The rise of P2P platforms represents a direct competition to banks' lending operations, particularly affecting smaller loans and the underserved markets that traditional banks tend to overlook.

An unexpected finding was the insignificance of third-party payments on bank profitability. Given the massive scale of third-party payment systems in China, it was initially anticipated that these platforms would significantly enhance profitability by expanding transaction volumes. However, the results indicate that these platforms' positive operational efficiencies do not translate into substantial bank profit growth. This is likely due to the competitive

nature of the digital payment market, where fintech companies dominate, leaving banks with a minimal share of the generated income.

In contrast, the significant negative impact of P2P lending on bank profitability was as expected. The ability of P2P platforms to bypass traditional banks in offering fast and cost-effective lending alternatives has directly eroded banks' lending margins. The result is consistent with the Disruptive Innovation Theory (Christensen, 1997), stating that new technologies and business models frequently disrupt existing industries with cheaper, similar alternative applications. The findings indicate that P2P lending as a disruptive force has considerably altered banks' traditional lending models, the findings are made.

This study's findings align with most literature on fintech and bank profitability. For instance, Wang and He (2020) discovered that although third-party payments have been commonly used in China, their influence on bank profitability was not pronounced. For instance, as Zhu and Li (2021) find, the growth of fintech services, such as P2P lending, hurts traditional banks' ROA, which is evident in this study. Additionally, the results of the P2P lending's negative effect on profitability are consistent with the Disruptive Innovation Theory, which explains the ways of fintech services that provide cheaper and faster replacement of traditional banking products (Christensen, 1997).

However, this study further contributes to the female literature on growth (lnGDP) and bank profitability. Even though GDP growth is expected to cause an increase in loan demand and a decline in the default rate for banks, this study reveals that there is a negative relationship between GDP growth and ROA (-0.222, $p = 0.000$), which implies that the rapid growth of fintech platforms fuelled by the increase in GDP growth has increased the competition between banks, consequently eroding the profitability of traditional banks. The interaction between fintech and macroeconomic variables enriches the discussion of fintech's impact on the banking sector.

Third-party payments do not significantly impact banks' profitability because they improve operational efficiencies and boost customer engagement but do not impact their bottom line. Banks lose out on the most profitable part of digital transaction revenues to Fintech companies rather than themselves. Additionally, banks might not have fully incorporated third-party payment systems into their business model, preventing them from exploiting the growth of such platforms.

On the other hand, P2P lending's negative impact on bank profitability is less ambiguous. In addition, peer-to-peer lending platforms have eliminated the role played by traditional banks in negotiating between borrowers and lenders. Consequently, banks have lost market share, particularly in the lending sector, where P2P platforms provide faster and cheaper loans. This indicates that traditional banks should adapt their business model to meet this competitive threat. Banks could use one potential strategy: collaborate with P2P platforms and incorporate their services into their offerings.

The negative correlation between GDP growth and bank profitability suggests that as economic growth tends to increase the demand for financial products, the fast growth of fintech platforms exceeds the positive effects of rapid GDP growth. The fintech sector is becoming more competitive as the economy grows, increasing pressure on banks to remain profitable.

However, this study's method relies on ROA as the only measure of profitability. ROA is a widely used metric but perhaps is not a complete measure of the long-term financial impact of digital transformation for banks. Further studies could consider other profitability measures, namely Return on Equity (ROE) or Net Interest Margin (NIM), to enhance significantly Internet finance's effectiveness on bank performance.

The high multicollinearity between lnTPP and lnGDP limited the ability to estimate the independent effect of third-party payments on bank profitability. The high variance inflation factors (VIFs) for these variables indicate that economic growth may affect the adoption of third-party payment systems, making it difficult to determine their effect. Future research could examine this issue using other tools, such as instrument variable regression, to see how these variables interact.

This study uses Chinese commercial banks as an example; however, the findings are likely applicable to other banking systems, especially in countries with fast-growing fintech adoption. The results emphasize the significance of digital transformation in the banking industry and the need for banks to adjust to the competitive pressures of fintech platforms. However, these results may not be generalized to other regulatory and economic contexts, such as China. Future research could examine how Internet finance affects banks in other regions where fintech is adopted differently, such as in Europe or North America.

Finally, this paper presents the results of the effect Internet finance has on Chinese commercial banks. Third-party payments have a relatively negligible profitability impact, whereas P2P lending has become a dominant disruptor of the traditional banking model. By providing these findings, this paper will add to the ongoing debate on the role of fintech in the financial sector and provide some practical implications for banks to navigate the rapidly changing landscape of digital finance.

5. Conclusion

The overall objective of this study is to investigate the effects of Internet finance, more specifically, third-party payments and P2P lending, on Chinese commercial banks' profitability from 2013 to 2023. The research used panel data regression analysis to analyze how the digital finance components have contributed to the bank's performance, specifically Return on Assets (ROA), controlling for bank size (lnTA), non-performing loan ratio (NPLR), and GDP growth (lnGDP).

Results show that third-party payments are widely adopted and more integrated in the banking sector but have no statistically significant impact on commercial bank profitability. While banks can operate the platforms with minimized costs and enhanced customer relationships, this has not translated to major financial gains for these banks, as fintech has monopolized the digital payment space.

On the other hand, P2P lending had statistically significant negative impacts on bank profitability. At the same time that P2P lending volumes grew, bank profitability fell. P2P platforms have eroded banks' lending margins due to the competitive pressure they exert, as they offer alternative lending at lower costs. The study also found an unexpected negative correlation between GDP growth and bank profitability, suggesting that the rapid expansion of fintech, fueled by economic growth, has intensified competition within the banking sector, undermining the profitability of traditional financial institutions. The bank size had a negligible effect on profitability, challenging the assumption that larger banks are more equipped to handle the pressures of digital transformation and fintech competition.

Given the significant negative effect of P2P lending on bank profitability, commercial banks should consider adapting their business models to incorporate or partner with P2P platforms. In order to survive the rising digital competition, traditional banks can collaborate with fintech firms to offer similar competitive services and retain customer loyalty. While third-party payments did not strongly impact bank profitability, banks should still integrate these systems as a part of their digital transformation. It refers to improving operational efficiencies and using customer data to develop personalized financial products. Nevertheless, banks must find ways to get a bigger slice of the revenue from digital transacting.

In order to mitigate the adverse effects of P2P lending, banks should expand beyond traditional lending to diversify their financial services. Suppose you can offer personalized financial products, such as microloans or investing options, to the needs of the customers who may be switching to fintech options. In that case, you can hold on to the customers.

To gain more in the digital world, banks need to invest in high-quality digital-based infrastructure , such as AI-driven credit scoring, blockchain technologies, and cybersecurity protection. This will minimize fraud risks, enhance customer satisfaction, and make banks competitive players in the fast-changing financial ecosystem.

This should be developed into a balanced regulatory framework that would allow fintech firms and banks to coexist but address the associated risks, such as cybersecurity risks and risks in managing credit risk. The key to a well-regulated fintech environment is that it allows for the creation of financial stability while innovation takes place.

This study's findings emphasize the changing impact of Internet finance on traditional banking in China. Third-party payment platforms have enhanced operational efficiency. However, their impact in increasing the profitability of banks has been minimal. The more formidable challenge is posed by P2P lending, which disrupts the traditional banking models but also results in the development of new foundations for innovation. Insights from fintech can assist banks in developing more resilient structures that involve fintech solutions and risk management. With internet finance reshaping the landscape, digital transformation will become fluent in improving the competitiveness of the banks, and regulators will be crucial in facilitating innovation while maintaining financial stability. It offers valuable recommendations to banks and policymakers on handling digital finance without significant virtual tail risk.

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