Financial Technology, Market Contest and Commercial Bank' Business Performance

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Abstract. The paper examines the effects of Fintech and Competitive markets on Commercial Bank Performance by constructing a panel data model with annual panel data of nine Commercial Bank during 2016–2020 as a sample. The conclusions show that there is a relatively negative correlation between Fintech and commercial banks' business performance, i.e., the development of Fintech will not only not improve banks' business performance, but also will make it lower; while market contest has a positive effect of commercial banks' business, i.e., fierce market contest is beneficial to commercial banks' business and development. A series of robustness tests show that the above findings still hold. The conclusions of this paper provide policy insights for Commercial Bank to better improve its business performance and have some guiding significance of Development of China's National Economy.

Keywords: Commercial bank performance · Market contest · Fintech

1 Introduction

In the new era, Commercial Bank is a kind of profit-making bank established by law, and it is a financial institution that undertakes credit intermediation. It has the business of collecting deposits from the public, issuing short, medium, and long-term credit, handling internal and overseas settlements, acceptances, exchanges, savings and other businesses. It can act as credit intermediaries and payment intermediaries. The economic status of Commercial Bank is closely in connection with the China's National Economy, so studying the Commercial Banking Performance plays a crucial part in enhancing the effectiveness of the use of assets in the society and promoting Development of China's National Economy. The latest data released by the China Securities Regulatory Commission shows that China's commercial banks, despite the impact of the epidemic, saw their annual net profit increase by 12.6% year-on-year to RMB 2.2 trillion in 2021 compared to 2020. Under the new economic normal, the business performance level of Commercial Bank in China not only represents the development situation of Commercial Bank, but also indirectly determines the level of economic development in China.

At present, with the rapid development of Fintech in China, especially after the popularity of Alipay and WeChat, Fintech has become one of the pillars of the Chinese economy. Therefore, the good or bad development of Fintech can even affect the foundation

of the development of Chinese financial industry. Fintech has affected the Commercial Banking Performance in several ways because of this new economic normal. On the one hand, the different coverage of Fintech in each region has caused different allocation of resources for the Commercial Banking Performance, which has led to different results of bank performance. On the other hand, the lack of depth in the use of Fintech has led to the poor knowledge of residents in using Fintech for banking business, which has a great effect on the performance level of Commercial Bank. In the current situation of China's globalization of the economy and financial integration, the market contest of Commercial Bank has become increasingly fierce. The market contest of Commercial Bank is related to the element of stable and healthy development of the whole national economy. Too much contest in the market of Commercial Bank will affect the bank performance, and may even be equivalent to overdraft in the future, which may seriously influence the sustainable profitability of Commercial Bank. Therefore, the study of whether Fintech and market contest will affect the business Commercial Banking Performance is significant for the high-quality development of China's economy under the new economic normal, improving the level of capital supply in China's financial market, and even triggering a new round of economic growth in China.

Consequently, what kind of impact will the different development of financial technology have on the operating Commercial Banking Performance in China? Will the entry of competitive factors into the market affect the relationship between the two? We will explore these questions in depth, and eventually provide support and policy recommendations for the corresponding theories of Chinese commercial banks, in order to escort the high-quality growth of China's national economy.

2   Literature Review

2.1   The Connection Between Fintech and Commercial Bank Performance

In studying the connection between Fintech and Commercial Bank performance, risk-taking of commercial banks is the pivot that connects Fintech and Commercial Bank performance. Chen and Bao (2022) [1] used static panel model, dynamic panel and mediating effects models to test and analyze the response of rural commercial banks' risk-taking to Fintech in China. And they pointed out that the growth of Fintech helps to reduce the risk-taking of Commercial Bank. Dong, Zhao and Wang (2022) [2] conducted a comprehensive examination of the financial risks of commercial banks in China, and the study showed that the asset scale of commercial banks has grown steadily under the background of developing financial technology and playing the role of financial services. Guo and Shen (2019) [3] found that banks' net interest margin decreases and profit margins keep shrinking. So Commercial bank is more willing to invest in high-risk and high-return projects. The more projects, the higher the risk, which is the result of the deterioration of the deposit structure from the debt-equity side to the asset side.

However, there are studies that show a negative connection between Fintech and Commercial Bank performance as contest in banking sector increases. Song (2022) [4] found a negative connection between Fintech and contest in banking sector, which helps to reduce the level of monopoly. Lei and Jin (2021) [5] found that bank Fintech Technology development is helpful in easing the financing constraints of SMEs, and

the alleviation effect is more obvious in higher levels of contest for banks. S. Zhuang (2022) [6] found that Fintech can promote contest in the Chinese banking sector and facilitate the formation of a competitive market when studying Fintech. Therefore, many customers of financial services will be more satisfied with the financial status quo, and the marginal level of utility of the consumers involved will increase, which will create higher Commercial Banking Performance.

2.2 The Connection Between Market Contest and Commercial Bank Performance

In the post-economic era, several scholars' research enthusiasm has been stimulated and focused on how market contest affects the Commercial Banking Performance. HHI is an indicator that can measure market concentration and can better ensure the market response. Peng and Lei (2010) [7] used market concentration HHI to measure market contest in the banking sector and to argue the Commercial Banking Performance. The results of the study show that the increasing contest in the banking sector at this stage has led to an overall decline in bank profitability, while the heterogeneity of existing banks is not sufficient to have a significant impact on their performance. Using unbalanced panel data of 101 commercial banks in China from 2005–2015, Liu (2017) [8] found that the development of the overall commercial bank samples could not enhance or even reduce the performance level of the banks. Lin (2014) [9] measured the degree of market contest with Herfindahl Index and scale efficiency with DEA method, and concluded that there is a U-shaped connection between market contest and bank performance by using panel data of 14 national commercial banks from 2003 - 2012. Ding and Yu (2015) [10] introduced the Lerner Index to measure the market forces of banks. The conclusions show that there is still a significant positive connection between bank market forces and bank performance despite the fact that environmental risks inversely stimulate the level of bank performance. Zou (2008) [11] introduced a cost function model measure of asset quality and capital correction to empirically test that the improvement of market competitiveness of Chinese commercial banks is not correlated with the deterioration of organizational performance. The results show that bank performance grows as efficiency and market concentration increases, and decreases as market share grows.

The purpose of this paper is firstly to research the connection between Fintech, market contest and commercial bank performance to identify the effects of market contest and Fintech on commercial bank performance. Second, in addition to controlling variables from related literature, this paper also selects financial risk-taking, market concentration, and market forces on commercial bank performance for control. Third, this paper is to fill the research gap of commercial bank performance's research business in China's domestic financial market. Although the existing research considers the linear connection between Fintech Index or market contest on commercial bank performance, the existing research does not solve the problem of Fintech Index, market contest, and commercial bank performance. Consequently, this paper is significant in investigating the connection between Fintech, market contest, and commercial bank performance through the evaluation of commercial bank performance and business performance with empirical analysis.

3   Research Design

The effect of the transmission effect is examined by constructing an empirical model in which Fintech and commercial bank performance, market contest and commercial bank performance, and gradually adding core explanatory variables. Assuming that bank performance is a function of Fintech and market contest, the following two-way fixed effects model is constructed (from the draw):

$$Roe_{it} = \alpha 0 + \alpha 1 Index_{it} + \alpha 2\, Lerner_{it} + \alpha 3 Controls_{it} + \varepsilon_{it}$$

Here, Roe is the natural logarithm of the return on net assets of the ith bank in year t; Index is the degree of digital financial development of the bank's prefecture-level city in year t; Lerner is a proxy variable for market forces. The modulus $\alpha 2$ indicates the impact of market contest on the bank's non-interest income. And $\alpha 2$ is theoretically expected to be negative if there is too much market contest and the bank's non-interest income will significantly decline; Controls $_{it}$ is a set of control variables in the model including the size of the bank's total liabilities (ε_{it}), and the level of macroeconomic development (RGDP) in each of the bank's prefectures.

3.1   Variable Selection

1. Explanatory variables: this paper selects return to net liabilities (Roe: the ratio of net profit to average net liabilities at the end of the period) as the variable to quantify banks' operating performance (the explanatory variable is particularly prominent in regression analysis and robustness tests).
2. Core explanatory variables: Drawing on Tian, He, Fan (2017) [12], this paper selects Fintech and market contest as the core explanatory variables.
3. Other control variables: The remaining control variables in the model are as follows. (1) the size of bank liabilities (ε_{it}), is taken as the natural decimal of the year-end total bank liabilities; (2) the level of macroeconomic development (RGDP), is expressed using the nominal GDP growth rate.

3.2   Data Sources and Data Processing

(1)   The scale of total bank liabilities and the measure of commercial bank operations

Considering the representatives of the sample and the difficulty of obtaining the sample data, this paper measures the business performance of nine existing commercial banks in China. This paper uses the measurement data of these nine banks to represent the business performance level of commercial banks in China, and obtains the total asset size of banks from their published annual reports.

(2)   Measurement of the degree of market contest

This paper describes the degree of contest in the market where Commercial bank is located based on the relevant indicators of banking finance in the market. In this paper, nine banking institutions are selected as sample subjects to measure the degree of contest in the banking sector market according to the directory of

banking financial institutions under the jurisdiction of the China Banking Regulatory Commission. The nine selected banking institutions are all heterogeneous and highly representative, including regional commercial banks such as state-owned commercial banks, urban commercial banks, joint-stock commercial banks and rural commercial banks.

(3) Measurement of Fintech

In this paper, Digital Financial Inclusion Indicator released by the Center for Digital Finance Research, Peking University is selected as the core explanatory quantity, and the Digital Financial Inclusion Indicator for 2011–2020 is selected as the explanatory variable. These data range from provinces to counties and can effectively measure their Fintech development levels. Therefore, this data source can lay a solid foundation for measuring the digital financial inclusion of sample prefecture-level banks.

(4) The level of macroeconomic development

This data source is derived from the macroeconomic development level indicators of each prefecture-level city published by the National Statistical Office, from which the macroeconomic development level of the prefecture-level city where the commercial banks are located is selected. This data reflects the prosperity of the economy where the commercial bank is located. Therefore, this data can provide some value for measuring the economic condition of the bank.

4 Empirical Results Analysis

4.1 Statistical Description

Descriptive statistics were conducted for the variables and detailed statistics are displayed in Table 1.

The mean value of financial technology (Index) is 263.7253, with minimum and maximum values of 205.1620 and 313.8960 respectively, which indicates that overall commercial banks have relatively high financial technology, but less balanced financial technology among commercial banks. The average risk-adjusted return on equity (Roe) is 11.4244%, with a minimum value of 1.5000%, which indicates that some Commercial bank is at a low level of profitability. The Lerner Index has a mean value of 0.3800, with minimum and maximum values of 0.15971 and 0.6454 respectively, which indicates that commercial banks have a very high and solid position in the rural financial market.

4.2 Analysis of Empirical Outcomes

Table 2 reports the outcomes of the benchmark regressions of Fintech, market forces on commercial bank performance. Table 2 shows the regressions using a stepwise inclusion of core explanatory variables. Column (1) has no core variables. Column (2) adds the core variable of Fintech (Index). Column (3) adds the three core variables of Fintech (Index), market forces (Lerner), and the cross term of Fintech and market forces.

Looking at Fintech (Index), we find that digital inclusion (Index) is negative, which indicates that the greater the Fintech, the higher the cost, and the lower the Commercial

Table 1. Statistical description of variables (from the draw)

Variables	Observed values	Mean value	Standard deviation	Minimum value	Maximum value
Roe	45	11.4244	2.8501	1.5000	18.2000
Index	45	263.7253	28.2003	205.1620	313.8960
Lerner	45	0.4392427	0.2476	0.1597	0.6454
Cl-ta	45	1.4496	2.9735	0.1100	11.3500
RGDP	45	14901.6900	7912.1500	5183.8000	36102.6000

Banking Performance. First, there is a crowding-out effect of Fintech. The internal and external market contest between commercial banks will become intense due to the development of Fintech. According to Clayton's "theory of disruptive innovation", it can be resolved: If the majority of the grassroots consumer market is controlled by Fintech, it is inevitable that Fintech will move from the low-cost grassroots consumer market to the high-end and mainstream market business model. In this scenario, external market resources will continue to increase, thereby reducing bank performance. Second, Fintech increases the volume of non-performing loans to commercial banks, so it becomes more difficult for banks to repay loans to poor population groups that Fintech lends to, which can easily become bad loans and reduce profits. Third, commercial banks use new tools to promote Fintech such as thermal imaging and other new technologies, and replace the original technology. So the cost of research increases, which directly affects the business Commercial Banking Performance.

The Lerner Index (Lerner) is significant at 1% level and the modulus is positive, which indicates that the greater the market forces, the higher the Commercial Banking Performance. From the cost point of view, on the one hand, commercial banks have pricing power in the financial market and manipulate the market. Therefore, commercial banks will yield enormous marginal gains if market forces continue to flourish. When the marginal cost is less than the benefit, commercial bank performance increases. On the other hand, commercial banks with large market forces have fast access to information and can minimize the risk of information asymmetry. Thus, the information factor also blurs the connection between market forces and performance to some extent.

In Table 3, to ensure the robustness of the findings, we test the heterogeneity issues with one-stage lagged core explanatory variables as instrumental variables. Among the instrumental variables, the modulus of financial technology is significantly negative, indicating that the higher the financial technology is, the higher the information costs caused by lagged expectations that need to be borne, which will result in lower bank profits. The modulus of market forces is significantly positive, which indicates that the growth of Commercial Bank is influenced by market forces. The better the market forces, the better the Commercial Banking Performance. In addition, return on total liabilities (ROA) was regressed instead of the explained variable return on net liabilities (ROE). The regression conclusions show that the modulus of the financial technology variable and the market competitiveness variable are still significant. Therefore, the return results are solid.

Table 2. Analysis of regression results (since the draw)

	(1)	(2)	(3)
index		0.0734 ***	0.0369***
		(−4.2400)	(3.0000)
lerner			24.9234***
			(6.9100)
clta	0.7612	0.1834	0.1572
	(−0.7600)	(0.2200)	(0.2900)
lngdp	3.0611	6.8810 *	4.273993*
	(−0.9600)	(1.9600)	(1.8600)
Effect of individual	Yes	yes	YES
Effect of time	yes	Yes	YES
Observed value	45	45	45
R-Square	0.0680	0.3964	0.7580

Note: In order to give space, regression outcomes of the control variables are not presented in this table. ***, **, and *, respectively denote passing the test of 1%, 5%, and 10% levels. t-statistics are in parentheses. The same below.

Table 3. Robustness test results (from the draw)

variable	Variable of tools	Replace the explained variable
L.Index	0.1132***	
	(5.8300)	
L.lerner	12.9345***	
	(1.7500)	
index		0.0023 *
		(1.7900)
lerner		1.8093 * * *
		(3.8000)
clta	0.4469	0.0099
	(0.5200)	(0.1400)
lngdp	21.0249***	0.8848 * * *
	(4.7700)	(2.9200)
Effect of individual	YES	YES
Effect of time	YES	YES
Observed value	45	45
R-Square	0.6797	0.4756

Note: same as above in this table.

5   Conclusions and Recommendations

This paper empirically analyzes the utility connection between market forces, Fintech and commercial bank performance by examining microdata among commercial banks.

The findings show that Fintech has an inverse connection with commercial bank performance, while the expansion of market forces is also beneficial to bank performance. The findings of this paper give little reference to commercial banks on whether to make adjustments in their future business planning.

In the context of the central government's "Fourteenth Five Year Plan" clearly requiring the active implementation of financial technology services, commercial banks should increase the application of financial technology in commercial banks. As China's financial technology started late and the technology is not very mature, the development of financial technology will cause the Commercial Banking Performance to decrease. In the early stage of development, we can learn from the experience of state-owned commercial banks. On the one hand, if small and medium-sized enterprises in science and technology want to innovate and seek profitable financial services, firstly, it can "branch out" through the establishment of financial subsidiaries, M&A loans, PE loans and "investment-lending linkage", and strive to penetrate its own business to all levels of the market; on the other hand, around the "short, small, frequent and urgent" characteristics, flexibly and efficiently accelerate the digital process of financial technology. The country is to develop financial technology banks to promote the transformation of certain tax incentives.

In terms of market forces, Commercial Bank has the advantage of capital pricing and can easily operate in the market. Commercial banks in remote and poor areas, in particular, have less developed financial business development and less extensive coverage and usage, and they are more willing to manipulate the market through direct loans to increase interest income. However, as the position of commercial banks in the financial market continues to falter and contest between banks continues to storm, the market forces of commercial banks continue to be weakened. It will be more difficult to obtain a higher return on equity. Therefore, in order to avoid the deterioration of this situation and the sustainability of their business, commercial banks must expand their diversified business and seek diversified profits according to the market competence. From one point of view, commercial banks have to open the flow. At this stage, their market dominance is being eroded and weakened. If commercial banks can maintain or even expand their existing market share, especially absorbing more quality customers under legal compliance conditions and lending standards, they can increase their market dominance and reduce their risk through other investments such as asset restructuring and taking over enterprises. Such as asset restructuring, takeover of enterprises and other investment models. From another perspective, commercial banks need to save resources and reduce the loss of market forces. Because of the complexity of commercial bank market forces, there is a need to actively capture the market forces of other commercial banks in the same city, while some small, less competitive commercial banks can move to other cities to achieve commercial sustainability if their market forces are entirely urban.

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