



Research on the Influence of Digital Finance on Operating Efficiency of Chinese Commercial Banks

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Abstract. As a new form of finance, the development of digital finance is closely related to the development of digital technology, Internet, cloud computing, artificial intelligence and other digital technologies. The rise and development of digital finance has had a profound impact on the traditional financial industry. With the rapid development of digital finance, the competition pattern of the banking industry has been greatly impacted, and the traditional business model is facing unprecedented challenges, thus affecting the operating efficiency of commercial banks. Faced with the impact of the development of digital finance, Chinese commercial banks are facing new opportunities and challenges. The research results show that digital finance has a positive influence on the management efficiency of our listed commercial banks. In the early stage, digital finance has a positive effect on the management efficiency of our listed commercial banks, and in the late stage, digital finance has a positive effect on the management efficiency of our listed commercial banks.

Keywords: Digital finance · Digital · Commercial banks · Efficiency of operation

1 Introduction

With the rapid development of digital economy in recent years, it has influenced the development of China's financial industry from many aspects. The rise and development of digital finance has had a profound impact on the traditional financial industry. With the rapid development of digital finance, the competition pattern of the banking industry has been greatly impacted, and the traditional business model is facing unprecedented challenges, which affects the operating efficiency of commercial banks.

This study is helpful to explore the impact of digital economy, especially digital finance, on China's financial industry. Through empirical analysis of the operating efficiency of 30 commercial banks, the robustness of the empirical results is tested. The results show that digital finance has a positive U-shaped influence on the operating efficiency of China's listed commercial banks.

The following part will first introduce the basic concepts of digital finance and the operational efficiency of commercial banks, then analyze the influence mechanism of

digital finance on the operational efficiency of Chinese commercial banks, and finally, according to the influence mechanism of digital finance on Chinese commercial banks and the conclusion of relevant empirical research, provide some feasible development suggestions for the digital transformation of Chinese commercial banks.

2 Definition of Concept

2.1 Digital Finance

Digital finance is similar to Internet finance, fintech and other concepts, and has been divided into different categories in the literature. However, in a broad sense, digital finance is a financial service based on digital technology, including commercial banks, non-bank financial institutions and Internet companies. The essence of digital finance is still finance, while the traditional financial model combines the technology of network companies with the traditional payment, financial management, financing and crowd-funding [1]. Financial technology is defined by the Financial Stability Board as: through technological means, financial services continue to innovate, upgrade and create new business models, financial products, technologies and business models, so as to cause extensive and pro-found impact on financial institutions, services and markets [2, 3].

2.2 Commercial Bank Operation Efficiency

“Operational efficiency” is one of the most commonly used concepts in economics. Financial efficiency mainly includes three areas: macro-financial efficiency, micro-financial efficiency and market efficiency, and the operational performance of commercial banks is also a part of micro-financial performance [4]. The chapter summarizes the “operation efficiency” as follows: through the integration of resources, risk management, personnel training and other ways to achieve business expansion and innovative operation, so as to reduce the profits and costs of the enterprise [5]. At present, the international research on bank efficiency has been deeply discussed from four aspects: financial efficiency, scale efficiency, scope efficiency and X efficiency [6].

3 The Impact of Digital Finance on the Operational Efficiency of Commercial Banks

Since the concept of digital finance was put forward, the influence of digital finance on the operational efficiency of commercial banks has been the focus of academic research. Although it has been studied for a long time, a consistent conclusion has not been reached.

One view is that digital finance will improve the efficiency of commercial banks and have a positive impact on their efficiency. Financial innovation can improve the service quality of commercial banks, so that their products are more diversified and more extensive to provide more services, so as to promote the production efficiency of the whole commercial bank. Another view is that digital finance will inhibit the efficiency of commercial banks, that is, the efficiency of banks will be affected. Fintech has inhibited the cost-effectiveness of commercial banks to some extent. With the continuous

development of the network, new competitors will take advantage in the trading system, transaction threshold and other aspects, which will affect the financial service function of traditional commercial banks and thus affect their operation [7].

4 The Influence Mechanism of Digital Finance on the Operational Efficiency of Commercial Banks

From the perspective of users, with the development of digital finance, traditional commercial banks have expanded in the aspects of basic deposit, credit, daily payment, etc., which covers not only People's Daily needs, but also clothing, food, housing and transportation, which to some extent retains a lot of customer resources.

From the perspective of open banking, open banking is the combination of the bank and the third party technology field, as well as a platform for data, transactions and other functions. Open banking enables users to use a variety of different banking functions within a third-party system. Open banking has a great impact on traditional commercial banks in terms of access ability, data sharing and attention transfer [8].

In terms of supervision and prevention, commercial banks have very high compliance requirements and carry out a variety of supervision to protect the interests of customers. With the development of digital finance, the application of technical means in financial supervision is more effective, which further reduces the cost of supervision, improves the level of supervision, enhances the efficiency of anti-money laundering and anti-fraud supervision, and promotes the effective implementation of security management and real-time monitoring of commercial banks [9].

From the perspective of daily management, the management efficiency will also affect the operation of commercial banks due to the large number of outlets and wide distribution of personnel. In order to maintain their advantages, commercial banks must seek all-round support from products, services and management.

In the improvement of technical capability, the development of Chinese commercial banks are facing different economic environments, and there are also great differences in scale, customer resources, staff quality and so on. On the one hand, as a traditional financial system, commercial banks have a long period of change in their development mode, and their influence on the development of digital finance also lags behind. On the other hand, with the development of digital finance, the high efficiency and low cost operation mode is also promoting the digital transformation of commercial banks [10].

5 Empirical Research

5.1 Sample and Data Source

This article studies the influence of digital finance on Chinese listed commercial banks. Therefore, this paper selects Chinese listed commercial banks as research samples, and the research period is 2012–2020. In order to make the data more accurate, 30 listed commercial banks were selected as research samples, excluding some banks with incomplete data. Among them are 5 state-owned banks, 9 joint-stock banks and 16 rural commercial banks, which can reflect the operating efficiency of listed commercial banks in a relatively detailed way. The data comes from Choice Financial Terminal, Peking University Digital Finance Research Center and annual reports of major banks.

5.2 The Selection and Origin of Variables

5.2.1 Explained Variable

Efficiency of bank. The DEA-Malmquist index method is used to measure the operational efficiency of commercial banks.

5.2.2 Variable of Explanation

Based on the financial inclusion index released by Peking University's Digital Finance Research Center, it was logarithmic and quantified. Based on the literature about digital finance at home and abroad, this paper selects the numerical index of inclusive finance from the perspective of authority and seriousness of data. From the perspective of the content, it can be divided into three aspects: the breadth of financial coverage, the depth of the use of digital finance, and the digitalization of digital finance.

5.2.3 Variable of Control

Among the control variables needed in this study, there are both macro and micro. Bank deposit/loan ratio, bank scale, asset-liability ratio, capital adequacy ratio, risk bearing, M2 growth rate and other indicators can be used as indicators to measure the bank's asset allocation ability, risk tolerance ability, bank asset scale, monetary policy conditions and macroeconomic development degree. (1) Deposit to loan ratio (LDR). (2) Bank SIZE (SIZE) (3) Non-performing Loan ratio (NPL) (4) Asset-liability ratio (ROL) (5) Capital adequacy ratio (CAR) (6) Risk taking (Z) (7) Growth rate of M2 (M2).

5.3 Descriptive Statistics of Relevant Variables

According to the selected samples, descriptive statistics are carried out on the relevant variables selected in this paper, and the results are shown in Table 1.

Based on the analysis results of Table 1, we know that the average performance level of Chinese listed commercial banks is above 1. Therefore, in recent years, Chinese state-owned commercial banks are showing an overall growth trend. According to the empirical results, there is a certain difference between the efficiency of Chinese commercial banks and the maximum efficiency, but its standard deviation is 0.1062, indicating that there is little difference between the banks in efficiency.

In terms of control variables, the standard deviation of the deposit ratio of all sample banks is 12.136, indicating that there are great differences among all sample banks. Moreover, the difference between the average maximum value and minimum value reflects the difference between major banks in their respective reputation and status, as well as the difference between commercial banks in asset allocation. From the average level, the non-performing assets ratio of all commercial banks is relatively low, which indicates that they have strong risk control ability and stable overall development.

Based on the above theoretical analysis and research hypothesis, the static panel model was selected to construct the regression model, stata14 was used to conduct relevant empirical analysis, and the fixed effect model (P value 0.0214) was selected

Table 1. Descriptive statistics

variable	The mean	Standard deviation	Maximum value	Minimum value
DF	2.2080	0.2697	1.6021	2.4774
BE	1.0425	0.1062	0.5410	1.4280
DF*DF	4.9475	1.1026	2.5666	6.1376
NPL	1.2380	0.4767	0.2400	2.7500
LDR	67.608	12.136	29.4700	109.0950
ROL	92.1556	1.2502	83.4712	95.6559
SIZE	12.016	0.7885	10.7081	13.4425
Z	0.0951	0.0342	0.0206	0.2180
CAR	13.1343	1.6705	9.8800	25.3100
M2	0.1226	0.0273	0.0808	0.1732

through Hausman test. The model was set as follows:

$$BE_{it} = a_0 + a_1 DF_{i,t} + a_2 (DF_{i,t})^2 + \sum_{j=3}^9 a_j Control_{ji,t} + \mu_i + \varepsilon_{i,t}$$

Empirical research on the influence of digital finance on the operating efficiency of listed commercial banks is as follows:

stata14 was used to perform panel regression on the model, and the regression of random and fixed effects was obtained. Finally, the fixed effects were determined by the method of Hausman test, and the fixed effects were used for regression analysis. The results shown in Table 2 are as follows: Digital finance has a U-shaped effect on the efficiency of Chinese listed commercial banks, which has a negative effect on the efficiency of Chinese listed commercial banks at the initial stage and a positive effect on the operating efficiency of Chinese listed commercial banks at the later stage. The primary term coefficient of digital finance is significantly negative, $p < 0.05$, $t = -2.23$, the secondary term coefficient of digital finance is significantly positive. $p < 0.05$ was significant at the 5% level, with a coefficient of 0.383 and a T-value of 2.25. In the early stage, the development of digital finance affected the business model, customer resources, business model, operation efficiency, products and services of traditional commercial banks, and thus led to the “disintermediation” and “diversion” of commercial banks. With the emergence of Internet companies, to some extent, they have replaced the functions of traditional commercial banks. Through digital technology, their business model and management level have been greatly improved, thus attracting a large number of users. As a result, digital finance has a negative impact on the efficiency of commercial banks.

Table 2. Empirical results of the influence of digital finance on the efficiency of listed commercial banks

Variable	Random effect	Effect of fixation
DF	-0.679	-1.465**
	(-1.45)	(-2.23)
DF*DF	0.148	0.383**
	(1.20)	(2.25)
LDR	0.001	0.002**
	(1.64)	(2.08)
NPL	0.029	-0.009
	(1.51)	(-0.28)
SIZE	0.006	-0.248**
	(0.55)	(-2.05)
ROL	0.025***	0.032**
	(2.75)	(2.31)
CAR	0.019***	0.014*
	(3.00)	(1.68)
Z	-0.348	0.655
	(-1.38)	(1.68)
M2	-1.008	-0.660
	(-1.51)	(-0.96)
Constant	-0.796	2.050
	(-0.76)	(1.02)
Hausman		0.0214
R-squared		0.132
Observations	240	
Number	30	

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ are significant at 1%, 5% and 10% levels

6 Conclusion

Digital finance has produced a remarkable “U” shaped effect on the efficiency of our listed commercial banks, which is negative in the early period and positive in the later period. The main reasons for the negative effects of Chinese commercial banks in the early days of development lie in the insufficient improvement of the level of technology and innovation. Due to its traditional characteristics and huge system, it lacks the power of technological progress and innovation. At the same time, it has strict requirements for conformity and lacks systematic professional and technical personnel, so that its progress in technology and innovation is slow. On the other hand, due to the existence of

competitors, the traditional commercial banks and intermediary business has a certain impact, and then seize a large number of customer resources. Under the combined action of the two factors, digital finance will have a certain negative impact on the operating efficiency of commercial banks in the initial stage of its development. In the later stage, due to the development of digital finance, it can provide certain technical support and experience for the technology spillover and technology spillover of commercial banks, so as to help commercial banks improve their mode of operation and enhance their own technical and operational capabilities. Secondly, digital finance can help commercial banks solve the problems of information asymmetry and information transmission, and replace traditional manual operation by technical means, so as to improve the management and operation level of banks and maximize the human resources of commercial banks. The improvement of these three levels has improved the technical level and management level of our commercial banks. With the improvement of technology level and operation level, commercial banks continue to improve and innovate their business model and related products through digital technology, and use digital technology to analyze and deal with the preferences of different types of customers in detail, so as to provide more targeted services for different types of customers and improve their attention to long-tail customers. In order to maintain the original customer resources on the basis of expanding its customer resources. Digital finance improves its efficiency and maintains its place in the financial industry. Therefore, digital finance will play a positive role in the efficiency of commercial banks.

With the continuous rapid development of digital economy, the continuous advancement of digital transformation, the continuous iteration and upgrading of fintech, as well as the continuous improvement of national policies, norms and other guidance documents, the business environment faced by commercial banks in the future may undergo great changes. In the long run, It is necessary to further explore whether the evaluation index of the operation efficiency of commercial banks is suitable and whether the evaluation system needs to be improved.

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