

Research on the Impact of Digital Transformation on Commercial Bank Performance

Jiangyan Chen¹, Yani Tian¹ & Zhen Shen²

¹ School of Finance, Nanjing University of Finance and Economics, Nanjing 210023, China

² School of Management, Jiangsu University, Nanjing 212013, China

Correspondence: Zhen Shen, School of Management, Jiangsu University, Nanjing 212013, China.

doi:10.56397/FMS.2024.06.04

Abstract

This paper takes 60 commercial banks undergoing digital transformation from 2015 to 2021 as samples and uses the Peking University Digital Transformation Index to empirically test the impact of digital transformation on commercial banks' operating performance. The results show that: Digital transformation has a positive impact on the business performance of commercial banks; the impact of digital transformation on the operational performance of commercial banks of different sizes is heterogeneous. At present, the digital transformation of China's commercial banks is still in the initial stage, and there is a lack of successful experience in the direction and measures of transformation, which plays a certain reference role for the future development of commercial banks.

Keywords: commercial bank, digital transformation, bank performance

1. Introduction

Currently, China's information technology is developing rapidly, and the digital economy has become an important engine of global economic development. The Internet plus, big data analysis, artificial intelligence, etc. are all closely related to people's life, work, and China's economic development. The digital economy uses data as a key production factor, modern information networks as an important carrier, and the use of communication technology as an important driving force to improve efficiency and optimize economic structure. The traditional business model of banks is no longer sustainable, and intensified competition within the industry and stricter regulation are compelling commercial banks to transform. Emerging non-bank financial institutions and technology companies are continuously increasing their market share in the financial market through advanced technology and innovative business models.

Xie Zhichun et al. (2018) noted that the transformation of commercial banks is of critical urgency. Kolodiziev et al. (2021) discovered that digital transformation positively influences the profitability of commercial banks. Yao Yijia (2024) discovered that digital transformation in commercial banks can significantly enhance their operational performance. Li Miao (2016) noted that numerous large commercial banks in China are actively undergoing digital transformation, enhancing operational efficiency by adopting sophisticated information technology or bolstering their technological innovation capabilities. Ozili (2017) highlighted that digital transformation enables commercial banks to offer superior services and products to customers, attract new clients, and consequently lower operational costs, further influencing business performance. Hedan et al. (2022) discovered that digital transformation significantly enhances the profit metrics of banks, and the level of financial marketization in the banks' location can elevate their performance. Zhang Qingjun and Wang Jie (2022) discovered that digital transformation positively impacts business performance through technology spillovers and cost reduction. Qian Pengcheng and Zuo Xiaohui (2024) demonstrated that commercial banks can enhance

their operational performance by effectively leveraging digital transformation.

2. Model

The data consists of 60 Chinese commercial banks, including 5 state-owned commercial banks, 8 joint-equity commercial banks, 47 city and rural commercial banks. The data span from 2015 to 2021.

In addition to digital transformation, bank performance is also affected by other factors. We control for many characteristics at the bank levels. The description of those variables is shown in Table 1.

Table 1. Description of explanatory variables

variable type	variable name		variable symbol	calculation method
Explained variable	return on equity		ROE	net profit/shareholder equity
Explanatory variable	Digital Index	Transformation Index		Peking University Commercial Bank Digital Transformation Index
Control variable	Asset		Size	Ln (Asset Size)
	Cost income ratio		CIR	business and management expenses/operating income
	Capital adequacy ratio		CAR	total capital/risk assets
	Net interest margin		NIS	loan interest rate - deposit interest rate
	non-performing loan ratio		NPL	non-performing loan/total loan amount
	Bank loan to deposit ratio		LDR	total loan amount/total deposit amount

Based on the research hypothesis proposed earlier, construct the following regression model:

$$ROE_{i,t} = \alpha_0 + \alpha_1 Index_{i,t} + \alpha_2 Controls_{i,t} + \varepsilon_{i,t}$$

ROE is used to measure the operational performance of commercial banks, and the explanatory variable Index is used to measure the degree of digital transformation of commercial banks. i represents the commercial bank, t represents the year, i, t represents the data of the i th bank in year t . *Controls* includes Size, CAR, CIR, LDR, NIS, NPL. $\varepsilon_{i,t}$ is the random error term.

3. Empirical Analysis

Table 2 presents the descriptive statistical results of all variables in this article. The maximum and minimum values of ROE are 26.30 and 0.81, respectively, with a mean of 12.06. The difference between the maximum and minimum values is significant, indicating that there is a certain degree of difference in the profitability of commercial banks of different sizes. The maximum and minimum Index values are 338.56 and 2.56, respectively, with a mean of 114.38, indicating that there is also a significant difference in the degree of digital transformation of commercial banks.

Table 2. Descriptive statistics for the variables

Variables	N	Minimum	Maximum	Mean	Standard deviation
ROE	420	0.81	26.30	12.06	3.39
Index	420	2.56	338.56	114.38	77.23
Size	420	24.43	31.19	27.99	1.70
CIR	420	18.93	46.96	30.10	5.28
CAR	420	9.96	18.02	13.57	1.60
NIS	420	0.81	3.72	2.09	0.45
NPL	420	0.36	4.31	1.56	0.53
LDR	420	0.39	1.13	0.77	0.14

The person correlation test shows that there is no high correlation between the variables, and multiple regression analysis can be conducted. According to the Hausman test results, a fixed effects model was used, and the

empirical results are shown in Table 3.

Table 3. Regression results

Bank type	Total banks	State-owned commercial banks	and joint-equity banks	City commercial banks	Rural commercial banks
Variables	ROE				
Index	0.006*** (3.556)	0.006*** (2.861)		0.007* (1.796)	-0.003 (-0.470)
Size	0.577*** (3.885)	3.585 (0.9145)		1.708*** (3.533)	-3.266*** (-2.903)
CIR	-0.050 (-1.367)	0.212*** (3.284)		-0.090** (-2.556)	-0.097 (-1.297)
CAR	-0.003 (-0.025)	-0.285 (-1.393)		-0.089 (-1.393)	0.081 (0.382)
NIS	0.670** (2.248)	0.269 (0.507)		1.988*** (8.051)	1.762*** (4.010)
NPL	-1.802*** (-5.239)	-1.520*** (-3.593)		-1.482*** (-2.941)	-0.958* (-1.901)
LDR	-9.570*** (-4.819)	-6.002*** (-2.702)		-16.917*** (-9.032)	-11.580*** (-3.489)
C	5.490 (1.284)	-89.448 (-0.767)		-21.157 (-1.575)	103.275*** (3.630)
N	420	91		203	126
R ²	0.721	0.902		0.842	0.861

Note: Standard errors are reported in parentheses. * Correlations are significance at the 10% level. ** Correlations are significance at the 5% level. *** Correlations are significance at 1% level.

From Table 3, it can be seen that the Index of commercial banks has a positive correlation with their operational performance, indicating that commercial banks have achieved positive results in digital transformation from multiple aspects, effectively promoting the improvement of their operational performance. Moreover, the greater the intensity of digital transformation, the stronger their profitability. The Size is significantly positively correlated with operational performance, indicating that the larger the bank size, the better its operational performance. The larger the NIS, the better the operational performance of the bank. The increase in net interest income is faster than the increase in profitable assets, indicating that banks can effectively control costs while making profits, thereby improving their operational performance. The smaller the NPL, the better the operational performance of the bank. The lower the non-performing loan ratio of a bank, the higher the loan quality of the bank, the more interest income it can obtain, and thus the better the bank's operational performance. The smaller the LDR, the better the operational performance of the bank. Besides, there is heterogeneity in the impact of the digitalization level of commercial banks on the operational performance of banks of different sizes. The larger the scale of commercial banks, the more significant the impact of digital transformation on business performance. The larger the asset size of a commercial bank, the more funds it has, the stronger its strength, and the larger its market share. Commercial banks can better leverage the advantages brought by digital transformation to improve their operational performance.

4. Conclusion

The digital transformation of commercial banks can effectively improve their operational performance, and the greater the transformation, the stronger their profitability and better their operational performance. The digital transformation of commercial banks plays a role in three aspects: strategy, capability, and operation, which complement each other and jointly promote the digital transformation of commercial banks. Digital transformation has significantly improved the operational efficiency of commercial banks, reduced their operating costs, improved their service quality, and helped them expand their own business and revenue sources.

At the same time, the digital transformation of commercial banks will also face some risks and challenges. Therefore, in the process of transformation, banks should pay more attention to risk management to ensure the smooth progress of digital transformation.

References

- Hedan M, Xinliang J, Xin W., (2022). Digital Transformation, Ambidextrous Innovation and Enterprise Value: Empirical Analysis Based on Listed Chinese Manufacturing Companies. *Sustainability*, 14(15), 9482-9482.
- Kolodiziev O, Krupka M, Shulga N, et al., (2021). The level of digital transformation affecting the competitiveness of banks. *Banks and Bank Systems*, 16(1), 81-91. DOI:10.21511/bbs.16(1). 2021.08.
- Li Miao, (2016). FinTech Attacks: Reshaping the Financial Landscape. *China Strategic Emerging Industries*, (14), 18-19. (in Chinese)
- Ozili K P., (2017). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, 18(4), 329-340.
- Qian Pengcheng, Zuo Xiaohui, (2024). Research on the Impact of Digital Transformation of Commercial Banks on Business Performance. *Journal of Hebei University of Science and Technology (Social Science Edition)*, 24(01), 14-24. (in Chinese)
- Xie Zhichun, Zhao Xinglu, Liu Yuan, (2018). Development of Financial Technology and Digital Strategic Transformation of Commercial Banks. *China Soft Science*, (08), 184-192. (in Chinese)
- Yao Yijia, (2024). Research on the Impact of Digital Transformation of Commercial Banks on Business Performance. *China Market*, (08), 6-11+87. (in Chinese)
- Zhang Qingjun, Wang Jie, (2022). The impact of digital transformation on the operational performance of commercial banks: empirical evidence based on A-share listed commercial banks. *Fujian Finance*, (12), 37-45. (in Chinese)

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).