Proceedings of Business and Economic Studies, 2024, Volume 7, Issue 3
http://ojs.bbwpublisher.com/index.php/PBES
Online ISSN: 2209-265X
Print ISSN: 2209-2641

Research on the Impact of Digital Transformation on the Business Performance of Commercial Banks

Zhengyu Wu*

Renmin University of China, Beijing 100000

Corresponding author: Zhengyu Wu, 503625861@qq.com

Abstract: Nowadays, with the development of the digital economy, commercial banks are actively conducting digital transformation. Studying the impact of the digital transformation of commercial banks on their operating performance can help commercial banks form a stronger core competitiveness and promote high-quality financial development. Based on the above background, this article first describes the status and development of digital transformation and development of commercial banks, and secondly analyzes whether Chinese commercial banks' digital transformation is conducive to improving their operating performance. Thirdly, by selecting the data of the listed commercial banks in the ten years of 2012–2022, this article obtains the empirical testing of the digital transformation on different property rights. Finally, the higher the level of digitalization, the higher the digital level, the more significantly promotes the performance of commercial banks. Finally, based on the above analysis, this article puts forward feasibility opinions on commercial banks and related regulators.

Keywords: Commercial banks; Digital transformation; Business performance; Property rights

Online publication: July 10, 2024

1. Introduction

1.1. Research background and significance

The report of the 20th National Congress of the Communist Party of China pointed out the need to accelerate the development of the digital economy, promote the deep integration of the digital economy and the real economy, and help the high-quality development of the financial industry. Against the backdrop of favorable policies, commercial banks are increasingly using financial technology to seek development, accelerating the trend toward digital transformation. Digital transformation not only promotes the transformation of commercial bank business models but also makes their operational models more modern. The combination of the two is more conducive to improving their operational performance and promoting high-quality development of the banking industry.

2. Research design

2.1. Research hypotheses

Based on the above theoretical analysis, this article proposes hypothesis 1:

H_1: Digital transformation will have a significant promoting effect on the operational performance of commercial banks.

Considering the significant heterogeneity of property rights in the current digital transformation, for further research, this article will conduct a grouping test and propose hypothesis 2:

H_2: Digital transformation will have a more significant promoting effect on the operational performance of non-state-owned commercial banks.

2.2. Sample selection and data sources

This article takes Chinese commercial banks from 2011 to 2022 as the research object, and the sample includes 303 individual bank data, all of which are sourced from CSAMR. To study the impact of digital transformation on the operational performance of commercial banks in China, this article partially processed the data: firstly, missing samples in key variables were removed from the data; Secondly, supplement the linear difference of some variables in the sample; Thirdly, to ensure the stability and reliability of the data, this article performs tail reduction on the sample data at the 1% and 99% quantiles.

2.3. Variable selection

For the dependent variable, this article selects the operational performance of commercial banks. This article refers to the approach of existing literature and sets the proxy variable as the return on total assets (ROA) to measure the profitability of banks. The substitute variable is chosen as the return on equity (ROE), and the robustness of the research results is ultimately tested (**Table 1**).

For the explanatory variable, this article selected the Digital Transformation Index. This article refers to the approach of Long and Hu [1] and uses keywords related to financial technology in commercial bank annual reports and news media reports to calculate the degree of digital transformation of banks.

For controlling variables, based on previous research, this article controls several variables that may affect the operational performance of commercial banks from the aspects of asset-liability ratio, liquidity ratio, investment return rate, shareholding ratio of the largest shareholder, board size, and enterprise size.

(1) Asset liability ratio: This article measures the total liabilities/total assets of commercial banks.

(2) Liquidity ratio: This article uses the ratio of current assets to current liabilities of commercial banks to measure this variable.

(3) Investment return rate: This article uses the following formula to measure this variable: current investment income ÷ (long-term equity investment at the end of the current period + derivative financial asset at the end of the current period + held to maturity investment at the end of the current period + available for sale financial asset at the end of the current period + trading financial asset at the end of the current period).

(4) Largest shareholder's shareholding ratio: This article uses the proportion of stocks held solely by the shareholder with the largest shareholding in the commercial bank as a representation.

(5) Board size: This article uses the natural logarithm of the total number of directors of commercial banks to measure it.

(6) Enterprise scale: This article uses the natural logarithm of the total assets of commercial banks to measure their size [2,3].

Table 1. Variable description table

Variable type	Variable name	Abbreviation	Variable description
Dependent variable	Business performance of commercial banks	ROA	Characterize using the return on total assets
Explanatory variable	Digital transformation	digital	The natural logarithm of the number of occurrences of digital
Control variable	Asset liability ratio	lev	Total liabilities/total assets
	Liquidity ratio	liqra	Current assets/current liabilities
	Investment return rate	invest	Current investment income/capital
	Largest shareholder's shareholding ratio	larsh	The largest shareholder's shareholding ratio
	Board size	board	The natural logarithm of the total number of directors
	Enterprise scale	size	The natural logarithm of total assets

2.4. Model design

To explore the impact of digital transformation on the operational performance of commercial banks, this article designs the following model:

$$ROA_{it} = \alpha_0 + \alpha_1 digital_{it} + control_{it} + \sigma_i + \vartheta_t + \mu_{it}$$

In the above equation, i represents the individual enterprise; t represents the year of operation of the commercial bank; ROA is the dependent variable of the commercial bank's operating performance; digital is the core explanatory variable of the commercial bank's digital transformation index; control is the control variable of this article, including asset-liability ratio, liquidity ratio, investment return rate, the proportion of the largest shareholder's shareholding, board size, and enterprise size; μ_{it} is a random perturbation term; σ_i is fixed effects for individuals; and ϑ_t is fixed effects for years [4,5].

3. Empirical analysis

3.1. Descriptive statistical analysis

Table 2 presents a descriptive statistical analysis. The standard deviation of the dependent variable, namely the operating performance of commercial banks (ROA), is 0.201, with a minimum value of 0.400 and a maximum value of 1.400, indicating that the value of this variable is relatively stable, indicating that the variation in operating performance between sample commercial banks is relatively small. The mean value of the explanatory variable digital transformation is 42.826, and the minimum value is 23.513, indicating that there are differences in digital transformation among different commercial banks. The standard deviation of the control variable liquidity ratio (liqra) is 0.330, with a minimum value of 0.000 and a maximum value of 1.289, indicating that different commercial banks have varying levels of liquidity [6].

Table 2. Descriptive statistics of main variables

Variable	(1)	(2)	(3)	(4)	(5)
	N	mean	sd	min	max
invest	303	0.039	0.242	-0.003	4.171
digital	303	42.826	8.383	23.513	61.921
board	303	14.310	2.321	9.000	20.000
lev	303	0.927	0.011	0.897	0.952
size	303	28.427	1.569	25.122	31.310
ROA	303	0.886	0.201	0.400	1.400
liqra	303	0.395	0.330	0.000	1.289
larsh	303	0.255	0.173	0.042	0.677

3.2. Correlation analysis

Table 3 shows the correlation of important variables in this study. It can be found that the main variable of this study is a positive correlation between digital transformation and the operational performance of commercial banks. The correlation coefficient is 0.145, and it is significant at the 5% detection level, that is, the higher the degree of digital transformation index, the greater the business performance value of commercial banks. There is a significant positive correlation between the asset-liability ratio and the operational performance of commercial banks, a negative correlation between the liquidity ratio and the operational performance of commercial banks, a negative correlation between investment return and the operational performance of commercial banks, a positive correlation between the shareholding ratio of the largest shareholder and the operational performance of commercial banks, a positive correlation between the size of the board of directors and the operational performance of commercial banks, and a positive correlation between enterprise size and the operational performance of commercial banks [7,8].

Table 3. Correlation analysis

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ROA	1.000							
(2) digital	0.145**	1.000						
(3) lev	0.154***	0.027***	1.000					
(4) liqra	-0.445***	-0.301***	-0.112***	1.000				
(5) invest	-0.148***	-0.060***	-0.141***	0.073***	1.000			
(6) larsh	0.113***	0.179***	0.046***	-0.390***	-0.033***	1.000		
(7) board	0.243***	-0.045***	0.202***	-0.178***	-0.156***	-0.172***	1.000	
(8) size	0.314***	0.382***	0.018***	-0.634***	-0.064***	0.635***	0.138***	1.000

The *t*-statistic in parentheses ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$

3.3. Benchmark regression analysis

Table 4 shows the fixed effect regression results of digital transformation and business performance of commercial banks. Through observation, it was found that without adding control variables, the regression

coefficient of digital transformation on the business performance of commercial banks was 0.003, which was significantly positive at the 1% detection level. After adding control variables, the regression coefficient of digital transformation on the business performance of commercial banks was 0.004, which was significantly positive at the 1% detection level. Therefore, digital transformation has a significant promoting effect on the business performance of commercial banks, which also verifies the hypothesis of this article [9].

Table 4. The impact of digital transformation on the operational performance of commercial banks

Variable	(1)	(2)
	roa	roa
digital	0.003***	0.004***
	(3.14)	(3.79)
lev		-5.499***
		(-5.62)
liqra		0.093**
		(2.53)
invest		-0.038*
		(-1.81)
larsh		-0.133
		(-1.16)
board		-0.003
		(-0.85)
size		0.239***
		(4.48)
constant	0.750***	-0.909
	(17.13)	(-0.66)
Individual fixation	Correct	Correct
Fixed year	Correct	Correct
Number of samples	303	303
R^2	0.459	0.584

The *t*-statistic in parentheses ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$

3.4. Heterogeneity testing

Table 5 shows the heterogeneity regression results of the digital transformation of commercial banks and their operational performance under different property rights of commercial banks. Through observation, it is found that in state-owned controlled commercial banks, the regression coefficient of digital transformation of commercial banks on their operational performance is 0.001, which is not significant. In non-state-owned commercial banks, the regression coefficient of digital transformation of commercial banks on their operational performance is 0.005, and it is significantly positive at the 1% detection level. It can be clearly seen that digital transformation can more effectively promote the operational performance of non-state-owned commercial banks [10].

Table 5. Property heterogeneity testing

Variable	(1)	(2)
	roa	roa
	State-controlled commercial banks	Non-state-owned holding commercial banks
digital	0.001	0.005***
	(0.87)	(4.28)
lev	-0.631	-5.421***
	(-0.31)	(-4.59)
liqra	-0.016	0.061
	(-0.17)	(1.49)
invest	-0.273**	-0.039*
	(-2.04)	(-1.70)
larsh	-0.206***	0.007
	(-2.81)	(0.04)
board	0.001	-0.003
	(0.18)	(-0.64)
size	-0.316	0.272***
	(-1.65)	(3.75)
constant	11.313**	-1.928
	(2.06)	(-1.13)
Individual fixation	Correct	Correct
Fixed year	Correct	Correct
Number of samples	60	243
R^2	0.586	0.551

The *t*-statistic in parentheses ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$

3.5. Robustness testing

Table 6 shows the robustness regression results of the impact of digital transformation of commercial banks on their operational performance after replacing the dependent variable total return on assets (ROA) with the return on equity (ROE) of commercial banks. Through observation, it was found that in column (1), the regression coefficient of digital transformation of commercial banks on business performance was 0.072 without adding control variables, which was significantly positive at the 1% detection level. In column (2), after adding control variables, the regression coefficient of digital transformation of commercial banks on business performance was 0.046, which was significantly positive at the 1% detection level. It can be seen that after replacing the explanatory variable, the effect of the digital transformation of commercial banks on business performance is still significant, indicating that the digital transformation of commercial banks will effectively promote business performance, verifying the robustness of the basic results in this article.

Table 6. Replacement variable test

Variable	(1)	(2)
	roe	roe
digital	0.072***	0.046***
	(4.48)	(3.54)
lev		1.059***
		(7.98)
liqra		1.524***
		(3.06)
invest		-0.427
		(-1.51)
larsh		-0.377
		(-0.24)
board		-0.055
		(-1.00)
size		2.645***
		(3.66)
constant	9.425***	-162.547***
	(13.55)	(-8.65)
Individual fixation	Correct	Correct
Fixed year	Correct	Correct
Number of samples	303	303
R^2	0.598	0.539

The *t*-statistic in parentheses ***$P < 0.01$, **$P < 0.05$, *$P < 0.1$

4. Conclusion and suggestions

4.1. Research conclusion

This article explores the impact of digital transformation on the operational performance of commercial banks with different property rights. From this perspective, the digital transformation of non-state-owned commercial banks has a significant impact on their operational performance.

The research conclusion is as follows: Firstly, digital transformation has a significant promoting effect on the operational performance of commercial banks; Secondly, due to the potential impact of property rights heterogeneity on research conclusions, this article divides the research objects into state-owned commercial banks and non-state-owned commercial banks for analysis based on different property rights. The final regression results show that the improvement of digitalization level in non-state-owned commercial banks has a more significant impact on their operational performance, and the same conclusion cannot be obtained in state-owned commercial banks. Therefore, the possibility of state-owned commercial banks using digital transformation to improve their operational performance is relatively small. Finally, the robustness test conducted by replacing ROA with ROE shows that the above conclusion is still reliable.

4.2. Policy recommendations

Based on the above research conclusions, this article proposes policy recommendations from the perspectives of commercial banks, governments, and regulatory agencies:

Firstly, various types of commercial banks should adopt differentiation strategies to enhance their comparative advantages and expand their competitive advantages. Due to their complex organizational structure, state-owned banks should focus more on improving their operational efficiency and optimizing processes in their digital transformation. Non-state-owned banks may face a shortage of funds or talent during the process of digital transformation. Therefore, they should focus on rapid technological application and strategic planning to achieve differentiated development. In addition, commercial banks should use financial technology to identify and resolve financial risks in digital transformation. First, establish a risk prevention and control model and utilize financial technology to enhance risk identification capabilities; Second, according to the process of digital transformation, improve the organizational structure of risk management, clarify the functional division of labor, and prevent risks; Last, conduct regular stress tests to properly address various risks on the path of digital transformation.

Secondly, for the government, policy guidance for digital transformation should be strengthened. On the one hand, relevant departments should strengthen the construction of financial infrastructure, integrate regional information, break down information silos, and strengthen cooperation with other regions. On the other hand, the government should strengthen the introduction and cultivation of relevant talents, establish a professional talent team in data processing and model algorithms, assist commercial banks in digital transformation, and enhance their competitive advantages.

Last but not least, regulatory agencies should actively formulate regulatory policies that meet the requirements of the times, enhance financial regulatory capabilities, innovate digital risk supervision methods, use financial technology to regulate more efficiently, and timely identify potential risk exposures and resolve them. In addition, regulatory authorities should require commercial banks to strengthen information disclosure and understand the development process and investment scale of their digital transformation, so that they can take measures to strengthen risk prevention and control [11].

Disclosure statement

The author declares no conflict of interest.

References

[1] Long H, Hu M, 2023, Can Digital Transformation Effectively Mitigate the Pro-Cyclical Nature of Bank Liquidity Creation? International Financial Research, 2023(12): 60–72.

[2] Kou Z, Li S, 2018, Competition between Online and Offline Manufacturers: Theoretical and Policy Analysis. World Economy, 41(6): 173–192.

[3] Liu S, Zhang Y, Liang J, 2021, Research Progress in Financial Technology and Financial Innovation. Economic Dynamics, 2021(3): 126–144.

[4] BarNir A, Gallaugher JM, Auger P, 2003, Business Process Digitization, Strategy, and the Impact of Firm Age and Size: The Case of the Magazine Publishing Industry. Journal of Business Venturing, 18(6): 789–814. https://doi.org/10.1016/S0883-9026(03)00030-2

[5] Fukuyama H, Weber WL, 2017, Measuring Bank Performance with a Dynamic Network Luenberger Indicator. Annals of Operations Research, 250: 85–104. https://doi.org/10.1007/s10479-015-1922-5

[6] Shen C, Liu X, 2017, Internet Finance, Market Power and Commercial Bank Performance. Contemporary Economic Science, 2017(5): 16–29 + 124.

[7] Man Y, 2016, The Impact of Income Diversification and Financial Liberalization on the Performance and Risk of Commercial Banks. Macroeconomic Research, 2016(1): 130–143.

[8] Wang X, Chen W, 2018, Interest Rate Marketization, Diversified Operations, and Commercial Bank Performance. Financial Theory and Practice, 2018(5): 5–13.

[9] Li J, 2023, Research on the Impact of Digital Transformation on the Comprehensive Performance of Commercial Banks, thesis, East China Normal University, 54–61.

[10] Ye Y, 2022, Research on the Impact of Digital Transformation on Commercial Banks on Their Business Performance, thesis, Shanghai University of Finance and Economics, 51–59.

[11] Wang J, 2022, Research on the Impact of Digital Transformation of Commercial Banks on Business Performance, thesis, Tianjin University of Finance and Economics, 58–65.