

The Impact of Digital Transformation on Chinese Commercial Banks' Risk-Taking

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doi:10.56397/JWE.2024.06.09

Abstract

Based on the annual financial data of 42 listed Chinese commercial banks from 2013 to 2022, applying the benchmark regression analysis method, this paper studies the impact of digital transformation on Chinese commercial banks' risk-taking level. The results show that the digital transformation degree is positively correlated with the commercial banks' risk-taking level. Different types, sizes and natures of commercial banks' risk-taking levels that are affected by digital transformation, with large state-owned banks and joint-stock banks being more flexible. Accelerating the digital transformation of commercial banks can help them reduce the probability of commercial bank risks and enhance their risk-taking capabilities.

Keywords: commercial bank, digital transformation, risk-taking

1. Introduction

The digital transformation of the banking industry has become an inevitable trend in the development of the banking industry. In the past, the perception of the digitalization of banks was only superficial, which caused a series of problems, such as the difficulty of transformation and implementation. However, there is not enough research on the correlation between digital transformation and risk-taking in banks. For example, Wang et al (2023), Zhang et al (2024), Yu et al (2024), Hu et al (2024), Chang et al (2024) studied the positive effect of digital transformation on the development of enterprises including banks. Faisal et al (2024), You et al (2024), Wu et al (2024), Wang et al (2024), Ma et al (2024), Zhang et al (2024), Abbas

et al (2024) researched banks' risk-taking without considering digital transformation. Especially, Yan et al (2023) used text mining technology to evaluate the degree of digitalization of listed banks to study the impact of digital transformation on risk-taking. Wang et al (2024) used the data of 21 local listed banks from 2011 to 2020 and found that digital transformation is helpful in improving banks' risk control capabilities. The difference of this research is to deepen the understanding of the digital transformation of banks, contribute to the modern finance, and promote the benign development of the banks' digital transformation.

2. Model and Analysis

Table 1. Variable definitions

Variable type	Variable name	Variable symbol	Measurement method
Explained Variable	Non-performing loan ratio	NPL	Total non-performing loans at the end of the period / Total loans at the end of the period× 100%
Explanatory variables	Equity multiplier	EM	Total Assets/Total Shareholders' Equity
	Degree of digital transformation	DIG	Indicator building
	Capital adequacy ratio	CAR	Net capitalization/total risk-weighted assets at the end of the period× 100%
	Cost-to-income ratio	CIR	Operating expenses plus depreciation/operating income × 100%
	Loan-to-deposit ratio	LDR	Total Loan/Total Deposit× 100%
Control variables	Net interest margin	NIM	Net interest income / average interest-bearing assets× 100%
	Non-performing loan provision coverage ratio	PC	Total loan provisions/(subordinated loans + doubtful loans + loss loans) × 100%
	Net profit margin on total assets	ROA	Net Profit/Average Total Assets× 100%

Table 1 shows the variable selection. We selected the data of 42 listed Chinese commercial banks from 2013 to 2022, and the regression equations are designed:

$$NPL_{i,t} = \alpha_0 + \alpha_1 DIG_{i,t} + \alpha_2 Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$EM_{i,t} = \alpha_0 + \alpha_1 DIG_{i,t} + \alpha_2 Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

In equation (1), the NPL is the explanatory variable to represent the commercial banks' risk-taking level. In equation (2), the equity multiplier EM is the explanatory variable to represent the commercial banks' risk-taking level to verify the robustness test; *Control* includes every control variable; *i* represents the bank sample individual; *t* represents the year; $\varepsilon_{i,t}$ is the random error. These two regression equations describe the functions between the risk level of commercial banks, the digital transformation's degree of listed banks, and the control variables.

Table 2 shows the descriptive statistical results. Among the 42 listed commercial banks, the largest NPL ratio NPL is 2.9% and the smallest is 0.39%, and the NPL ratio in the commercial bank sample shows significant differences, with an average value of 1.35%. The maximum value of the equity multiplier EM is 39.52, the minimum value is 9.68, the average value is 14.17, and the standard deviation is 2.85, revealing that there are certain differences in the financial risk bearing of commercial banks. The maximum value of the digital transformation degree DIG was 1.00, the minimum value was 0.00, the mean value was 0.37, and the standard deviation was 0.28. We also makes Pearson correlation analysis and finds the coefficients between the digital transformation degree of commercial banks and the six control variables are all less than 0.5, which means the empirical results are reliable and authentic.

Table 2. Descriptive statistical analysis results

Variables	Observations	Mean	Standard Deviation	Minimum	Median	Maximum
NPL	420	1.349	0.396	0.390	1.340	2.900
EM	420	14.171	2.850	9.678	13.561	39.523

DIG	420	0.369	0.282	0.000	0.348	1.000
CAR	420	13.479	1.666	8.840	13.330	19.260
CIR	420	30.688	5.916	18.930	30.080	66.470
LDR	420	73.816	14.733	28.670	72.823	116.235
NIM	420	2.347	0.500	1.250	2.270	4.464
PC	420	259.568	98.117	132.440	233.130	567.710
ROA	420	0.929	0.220	0.420	0.917	1.757

Table 3 shows the results of the specific heterogeneity analysis. The correlation coefficient between the degree of digital transformation DIG and the NPL ratio is -0.187, and it is significant at the 5% significant level. In other words, when the degree of digital transformation of commercial banks increases by 1 unit, the average non-performing loan ratio will decrease by 0.187%, and the risk impact of commercial banks will also decrease by 0.187%. It has been well documented that there is a significant correlation between the degree of

digital transformation of commercial banks and their risk-taking. It can be concluded that the digital transformation of commercial banks can reduce the impact of bank risks. For other control variables, the results were also largely the same as expected. Moreover, according to the results of regression analysis, compared with large state-owned banks and joint-stock commercial banks, urban commercial banks and rural commercial banks, digital transformation plays a stronger role in reducing bank risk-taking.

Table 3. Baseline regression results

Variables	(1) NPL	(2) NPL	(3) NPL	(4) NPL
DIG	-0.187** (-2.184)	-0.266** (-2.558)	-0.112 (-1.418)	-0.116 (-0.401)
CAR	0.015 (1.292)	0.039** (2.415)	0.018 (1.335)	0.026 (0.827)
CIR	-0.0206*** (-3.489)	-0.0046 (-0.627)	-0.0086 (-0.996)	0.0156 (1.111)
LDR	-0.009 (-0.511)	0.002 (0.517)	-0.002 (-1.292)	-0.026*** (-3.480)
NIM	-0.233*** (-3.915)	0.009 (0.090)	-0.190** (-2.497)	-0.231 (-1.301)
PC	-0.003*** (-13.003)	-0.003*** (-4.361)	-0.002*** (-7.845)	-0.009 (-1.279)
ROA	-0.233 (-1.575)	-0.214 (-1.401)	-0.152 (-0.754)	-1.543*** (-2.871)
C	3.292*** (8.964)	1.710** (2.585)	2.473*** (6.002)	4.792*** (4.146)
Adjusted R ²	0.809	0.476	0.899	0.872
N	420	150	170	100

Note: ***, **, and * indicate significant at the levels of 1%, 5%, and 10%, respectively. Numbers in parentheses indicate t-statistics.

3. Conclusion

First, the digital transformation of commercial banks can reduce the proportion of non-performing loans of banks, thereby increasing the risk-taking level of commercial banks. Second, the increase in the degree of digital transformation of commercial banks reduces the increase of the equity multiplier, and the larger the equity multiplier, the greater the probability of the financial risk of the commercial bank. Third, the degree of impact of digital transformation on the risk-taking level of different commercial banks is not exactly the same.

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