The Influence of Digital Finance Development on the Operating Performance of China's Commercial Banks

Jianzhong Lei*, Yao Li

School of Mathematics and Finance, Hunan University of Humanities, Science and Technology, Loudi 417000, China
3082316537@qq.com
*Corresponding author

Abstract: *Taking China's listed commercial Banks as the object of study, using their financial datas from 2014 to 2018, selecting net loan deals and third-party payment transaction scale growth as independent variables, which measure digital level of financial development. profitability and growth rate of non-performing loans to assets as dependent variables, which measure commercial banks operating performance characterization. by establishing the panel data model. To empirically test the impact of digital finance development on the operating performance of China's commercial banks. The empirical results show that the development of digital finance can not only improve the profit margin of commercial banks' assets, but also help reduce their non-performing loan ratio to improve the performance of commercial banks.*

Keyword: *Digital finance, Commercial bank, Business performance, Panel data model*

1. Introduction

With the rapid development of information technology, innovative technologies represented by big data and cloud computing have been widely applied to all walks of life, while digital finance is innovating and reshaping the financial industry at an unprecedented speed (Itay G, Wei J, Andrew K G, 2019). The banking industry as the core part of the financial system in China, under the background of digital financial development, the commercial Banks to actively use financial technology, broaden the scope of financial services, efforts to digital type, the transformation of bank also under pressure to business performance and risk control, based on this, by studying the digital financial development impact on China's commercial Banks operating performance. And to provide policy suggestions for the transformation and development of commercial banks is the main purpose and significance of this paper.

Digital finance is developed from Internet finance. Studies on digital finance mainly include the following contents: From the macro perspective of real economy, digital finance can not only promote economic growth (Zhang Xun et al., 2019), but also help narrow the urban-rural income gap (Song Xiaoling, 2017) and alleviate poverty (Fu Qiuzi et al., 2018); At the level of medium enterprises, digital finance can ease financing constraints (Huang Rui et al., 2020) and promote technological innovation (Tang Song 2020); In terms of microscopic evidence, digital finance can promote individual entrepreneurship (Xie Huadiao, 2018) and increase consumption (Yi Xingjian, 2018). As for the financial system, digital finance, as a new financial model, has brought great influence to the traditional financial industry (Xie Ping et al., 2012; Liu Lanbiao et al., 2013), such as affecting the stability of the capital market (Wu Fei, 2020), impacting the traditional finance with banks as the main body from asset business, intermediary business, liability business and other aspects (Zheng Zhilai, 2015); Feng Sixian and Guo Renjing (2019) studied the influence of digital finance on the competition and efficiency of Chinese banks by using panel Tobit model and generalized moment estimation method. To sum up, there are few studies on digital finance's impact on the operating performance of commercial banks. Therefore, this paper takes China's listed commercial banks as the research object and uses their financial data from 2014 to 2018 to analyze the impact of digital finance development on the operating performance of China's commercial banks from the perspectives of operating profit and risk control. By choosing a P2P network credit transaction scale and the third party payment transaction scale growth rate as independent variables, measure the digital level of financial development, the selection of assets profit margins and growth rate of non-performing loans as the dependent variable, the commercial

Banks operating performance characterization, and finally establish a panel data model, the empirical test digital financial development impact on China's commercial Banks operating performance.

2. Variables and Model

2.1 Sample Selection and Data Source

This paper selects 18 listed commercial banks, including Industrial and Commercial Bank of China, Rural Bank of China, Bank of China and China Construction Bank, as the research objects, based on their financial data from 2014 to 2018. The data comes from guo tai 'an database.

2.2 Index Selection

Based on the existing research and data availability, this paper selects the return on assets and non-performing loan ratio of commercial banks as dependent variables to reflect the business performance of commercial banks; The development of digital finance mainly reflects the increase of online transactions and the wide application of digital technology in the financial industry. Therefore, the growth rate of P2P online loan transactions and third-party payment transactions are selected as independent variables to measure the development of digital finance; Since the macroeconomic environment will also affect the business performance of banks, this paper selects the control variables in the M2 growth rate of money supply and THE GDP growth model of macroeconomic cycle factors.

Table 2.1: Variable definitions

Types of variables	Variable name	Variable symbol	Token
Dependent variable	Return on assets	EBIT	Profit/total average assets
	Non-performing loan ratio	NPL	Non-loan provision ratio/provision coverage ratio ×100%
Independent variable	Digital finance	DSF	Third party payment transaction size growth rate
		P2P	P2P net loan transaction scale growth rate
Control variable	Macro economy	GDP	increasing rate of gdp
		M2	M2 growth rate of money supply

2.3 Model

Model (2.1) examines the impact of digital finance development on the operating performance of commercial banks from the perspective of asset profit margin of commercial banks; Model (2.2) examines the impact of digital finance development on commercial banks' operating performance from the perspective of non-performing loan ratio of commercial banks.

$$\text{EBIT}_{\text{it}} = C + \beta_1 \text{DSF}_{\text{it}} + \beta_2 \text{P2P}_{\text{it}} + \beta_3 \text{GDP}_{\text{it}} + \beta_4 \text{M2}_{it} + \sigma_{\text{it}} \tag{2.1}$$

$$\text{NPL}_{\text{it}} = C + \beta_1 \text{DSF}_{\text{it}} + \beta_2 \text{P2P}_{\text{it}} + \beta_3 \text{GDP}_{\text{it}} + \beta_4 \text{M2}_{it} + \sigma_{\text{it}} \tag{2.2}$$

3. Empirical Results

3.1 Descriptive Statistics

Descriptive analysis is the first step in the statistical analysis of social survey, which is to preliminarily sort out and conclude a large number of data obtained from the survey in order to find out the internal laws of these data.

Table 3.1: Descriptive analysis

	NPL	EBIT	GDP	M2	DSF	P2P
Mean	1.378111	0.032243	6.960000	10.60000	207.9600	94.09216
Median	1.475000	0.032000	6.900000	11.30000	104.7000	35.91848
Maximum	2.390000	0.042400	7.400000	13.30000	391.3000	288.5439

Minimum	0.040000	0.018200	6.700000	8.100000	58.40000	0.000000
Std. Dev.	0.425969	0.005291	0.243015	2.149262	147.6636	104.2037
Skewness	-0.820819	-0.145150	0.897896	-0.146019	0.368831	1.101813
Kurtosis	4.564111	2.899054	2.505254	1.323288	1.195160	2.655799
Jarque-Bera	19.28033	0.354240	13.01115	10.86243	14.25597	18.65414
Probability	0.000065	0.837679	0.001495	0.004378	0.000802	0.000089
Sum	124.0300	2.901900	626.4000	954.0000	18716.40	8468.294
Sum Sq. Dev.	16.14898	0.002491	5.256000	411.1200	1940605.	966397.9

3.2 Stationarity Test

For panel data, the stationarity test is carried out first. In this paper, fisher-PP unit root test was used to test the stability of the variables, and the results showed that the sequences of variables all satisfied the stationarity.

Table 3.2: Unit root test

Variable	Method	Statistic	Prob.**
EBIT	PP - Fisher Chi-square	165.849	0.0000***
	PP - Choi Z-stat	-7.20583	0.0000***
NPL	PP - Fisher Chi-square	156.570	0.0000***
	PP - Choi Z-stat	-8.06257	0.0000***
DSF	PP - Fisher Chi-square	62.8715	0.0037***
	PP - Choi Z-stat	-3.97509	0.0000***
P2P	PP - Fisher Chi-square	193.075	0.0000***
	PP - Choi Z-stat	-11.0232	0.0000***
GDP	PP - Fisher Chi-square	59.2353	0.0087***
	PP - Choi Z-stat	-3.67900	0.0001***
M2	PP - Fisher Chi-square	89.4885	0.0000***
	PP - Choi Z-stat	-5.86959	0.0000***

Note: ***, ** and * represent significant at the confidence level of 1%, 5% and 10% respectively.

3.3 F test

Panel data models can be divided into three main models: mixed regression model, fixed effect model and random effect model. Use F test to determine whether to adopt mixed regression model or fixed effect model. The F tests of model (2.1) and model (2.2) are shown in Table 3.3 and Table 3.4 respectively.

Table 3.3: F test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	18.114541	(17,68)	0.0000
Cross-section Chi-square	153.894689	17	0.0000

Table 3.4: F test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	23.664052	(17,68)	0.0000
Cross-section Chi-square	174.045550	17	0.0000

As can be seen from the test results in Table 3.3 and 3.4, both P values are 0.0000, that is, the original hypothesis that "this model is suitable for establishing mixed regression model" is rejected, indicating that the model has significant fixed effect, so the cross-sectional fixed effect model should be selected.

3.4 Empirical Results

Based on panel regression, the empirical results of model (2.1) and model (2.2) are shown in Table 3.5 and 3.6 respectively.

Table 3.5: Sectional fixed effect model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004921	0.014382	0.342188	0.7333

DSF	-3.45E-05	2.94E-06	-11.72574	0.0000
P2P	-6.52E-05	7.34E-06	-8.881503	0.0000
GDP	1.20E-05	0.002402	0.004989	0.9960
M2	0.003825	0.000359	10.64593	0.0000
R-squared	0.898999	Mean dependent var		0.032243
Adjusted R-squared	0.867808	S.D. dependent var		0.005291
S.E. of regression	0.001924	Akaike info criterion		-9.460661
Sum squared resid	0.000252	Schwarz criterion		-8.849596
Log likelihood	447.7297	Hannan-Quinn criter.		-9.214244
F-statistic	28.82199	Durbin-Watson stat		1.910349
Prob(F-statistic)	0.000000			

From the table above, the model of goodness of fit is 89.90%, the fitting effect is good, the variable significance level is higher, digital financial development impact on Banks' profitability, the independent variable coefficient of DSF and P2P are negative, that the digital financial development brought negative impact to the commercial Banks operating performance, lead to the assets of a decline in margins. The estimated equation of model (2.1) is as follows:

$$\text{EBIT}_{it} = 0.00492125486772 - 3.44890056361e\text{-}05\text{DSF}_{it}$$
$$- 6.51764847312e\text{-}05\text{P2}P_{it} + 1.19825825184e\text{-}05\text{GDP}_{it}$$
$$+ 0.00382486882826M2_{it}$$

Table 3.6: Sectional fixed effect model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.256873	0.501656	6.492244	0.0000
DSF	0.000991	0.000239	4.145963	0.0001
P2P	0.002497	0.000563	4.436531	0.0000
GDP	-0.148855	0.087377	-1.703584	0.0930
M2	-0.121111	0.028894	-4.191573	0.0001
R-squared	0.876266	Mean dependent var		1.378111
Adjusted R-squared	0.838054	S.D. dependent var		0.425969
S.E. of regression	0.171421	Akaike info criterion		-0.480807
Sum squared resid	1.998180	Schwarz criterion		0.130258
Log likelihood	43.63631	Hannan-Quinn criter.		-0.234390
F-statistic	22.93169	Durbin-Watson stat		1.191766
Prob(F-statistic)	0.000000			

As can be seen from the above table, the goodness of fit of the model is 87.63%, and the fitting condition is good, and the variable significance level is high. In other words, the development of digital finance has an impact on the non-performing loan ratio of all banks. The coefficients of independent variables DSF and P2P are both positive, indicating that the development of digital finance can reduce the non-performing loan ratio of commercial banks, which is conducive to the improvement of their business performance. The estimated equation of Model (2.2) is as follows:

$$\text{NPL}_{it} = 3.25687312284 + 0.000990973641737\text{DSF}_{it}$$
$$+ 0.00249719218657\text{P2}P_{it} - 0.148854842506\text{GDP}_{it}$$
$$- 0.121111452357M2_{it}$$

4. Conclusion

With the depth of the integration of information technology and financial industry, the third party payment, booming of Internet lending, and wealth management products, digital financial has a huge impact on traditional banking business, on the one hand, digital financial replaced part of the intermediary business, bank preempted the banking market, on the other hand, the bank information into an opportunity, constantly to digital and intelligent transformation, improve the management efficiency. Through the review of existing literature, this paper empirically tests the impact of digital finance development on the operating performance of China's commercial banks, and the results show that: Digital finance represented by third-party payment usurped the intermediary business of banks and reduced the profit margin of banks' assets, while digital finance represented by online loan transaction absorbed the low-quality loan business of the market, but reduced the non-performing loan

ratio of commercial banks. Therefore, it is proposed that commercial banks should make full use of big data, block chain, artificial intelligence and other information technologies, integrate financial business with digital technology, and constantly deepen digital transformation, so as to better allocate financial resources to support the development of real economy.

Acknowledgements

References

[1] Itay G, Wei J, Andrew K G. To FinTech and beyond [J]. Review of Financial Studies, 2019, 32(5):1647-1661.

[2] Zhang Xun, Wan Guanghua, Zhang Jiajia, He Zongyue. Journal of economic research, 2019, 54 (08):71-86.

[3] Song XIAolin. Empirical Test of digital inclusive finance narrowing urban-rural income gap [J]. Finance and Economics Science, 2017 (06):14-25.

[4] Fu Qiuzi, Huang Yiping. The heterogeneous impact of digital finance on rural financial demand: Evidence from Chinese household Finance Survey and Peking University Digital Financial Inclusion Index [J]. Financial Research, 2018(11):68-84.

[5] Huang Rui, Lai Xiaobing, Tang Song. How does fintech affect corporate financing constraints? -- Dynamic effect, heterogeneity and macro and micro mechanism test [J]. Journal of International Finance, 2020(06):25-33.

[6] Tang Song, Wu Xuchuan, Zhu Jia. Digital finance and technological innovation: Structural characteristics, mechanism recognition and effect difference under financial regulation [J]. Management world, 2020, 36(05):52-66+9.

[7] Xie Hua-hua, SHEN Yan, ZHANG Hao-xing, GUO Feng. Can digital finance boost entrepreneurship? Evidence from China [J]. Economic quarterly, 2018, 17(04):1557-1580.

[8] Yi X J, Zhou L.Whether the development of digital inclusive finance has a significant impact on household consumption: evidence from Chinese households [J]. Financial Research, 2018(11):47-67.

[9] Xie Ping, Zou Chuanwei. Financial Research, 2012, 000(012):11-22.

[10] Liu Lanbiao, Shen Xin, Guo Buchao. Economic Trends, 2013, 000(008):73-83.

[11] Wu Fei, Xiang Hai-ling, Liu Xin-yi. Digital finance and financial market stability: From the perspective of stock price collapse risk [J]. Economist, 2020(10).

[12] Zheng Zhilai. The Influence path of Internet Finance on China's Commercial Banks -- Based on the perspective of "Internet +" influence on retail industry [J]. Science of Finance and Economics, 2015, 000(005):34-43.

[13] Feng Sixian, Guo Renjing. Digital Finance, bank competition and bank efficiency [J]. Reform, 2019, No .309(11):75-89.