Impact of Financial Innovation on the Business Performance of State-owned Commercial Banks

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Abstract: *Financial innovation is an important part of the development of commercial banks. With the intensification of industry competition and the increasing trend of digital finance, the development of financial innovation of commercial banks in China has a long way to go. Based on the fixed effect model of 25 state-owned commercial banks from 2014 to 2020, this paper selects the proportion of non-interest income as the main financial innovation index, and finds that for state-owned commercial banks, non-interest income has a significant positive impact on the operating performance of commercial banks, and puts forward relevant suggestions according to the empirical results.*

Keywords: *Commercial Banks, Financial Innovation, Fixed Model Effect, Business Performance*

1. Introduction

Financial innovation refers to the development process of obtaining more potential profits by changing the existing financial system and adding new financial instruments. Under the background of interest rate marketization reform and digital financial innovation, optimizing the income structure and innovating the development strategy have become the top priority of listed commercial banks, and developing non-interest income has also become an important way out.

In order to study the impact of financial innovation on the operating performance of state-owned banks, we will select the financial data from 2014 to 2020 from 25 representative state-owned banks, and use the fixed effect model for regression, and check the impact of financial innovation on operating performance through significance.

2. Journals reviewed

Based on VOSviewer software, this paper conducts cluster analysis on 250 documents from HowNet database from 2010 to 2022, so as to obtain the hot trend and centrality of relevant topics, as shown in Figure 1. Among them, financial innovation, commercial banks, financial technology and financial supervision have strong relevance.
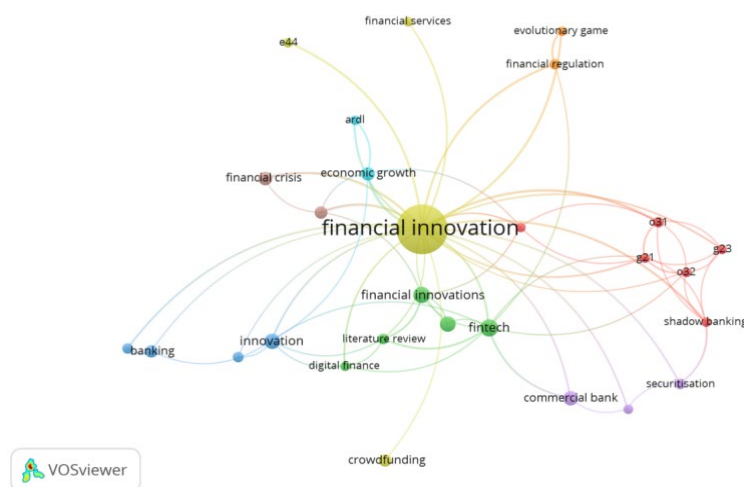

Figure 1: VOSviewer cluster analysis results

Since the 1990s, China's market-oriented reform of interest rates is still in a state of continuous progress. China's commercial banks have also gradually increased their attention to non-interest business, studied the business model of western financial institutions, and injected impetus into financial innovation with diversified businesses[1].

In terms of non-interest business and business performance of commercial banks, Hu. et. al [2] found that when the risk tolerance reaches and crosses the critical threshold, appropriate financial innovation can enhance the profitability of commercial banks. Huang [3] made a financial analysis of domestic commercial banks and pointed out that the scientific and effective development of non-interest income of banks would significantly improve the operating performance of commercial banks. Wang and Shen [4] empirically analyzed the panel data of 11 commercial banks in Jiangsu Province, and found that commercial banks in Jiangsu Province have a significant impact on profitability by continuously improving their financial innovation capability.

However, some scholars raised objections. Wang and Zhou [5] used ROE indicators to test and found that non-interest income significantly reduced the net asset income, which had a negative effect on the business performance of commercial banks. Dai and Luo [6] found that commission and commission income have a positive effect on bank performance, while their investment income is the opposite. Tong. et. al [7] found that financial innovation will aggravate the operational risk of commercial banks.

3. Research method

3.1 Assumptions and samples

In order to increase profit opportunities, commercial banks will provide comprehensive financial services by means of customization according to market demand and customer demand. Based on the existing empirical and theoretical research, the author puts forward the following assumptions:

H1: Financial innovation has a positive impact on the operating performance of state-owned commercial banks.

H2: Financial innovation has a negative impact on the operating performance of state-owned commercial banks.

For further empirical analysis, the author obtained financial data of 33 banks through Bank focus database, CSMARA database and annual statements, including total assets, non-interest income, net interest margin, etc. Through the co-linear analysis of VOSviewer, it was found that the number of financial innovation as a key word increased sharply in 2014. Therefore, the relevant data from 2014 to 2020 were selected. Finally, 25 representative state-owned banks were obtained for analysis (including 6 large state-owned banks, 11 urban commercial banks, 5 joint-stock banks and 3 rural commercial banks).

3.2 Model and variable selection

Based on the research of Peng and Ding [8], Ning [9] and other scholars, the author takes profitability as the explanatory variable of the research performance and financial innovation as the core explanatory variable of the internal factor that affects profitability, and add six control variables to construct the panel data regression model of the ith commercial bank in year t. The model is as follows:

$$ROA_{it} = \alpha_{it} + \beta_1 cinnovation + \beta_i control_{it} + \varepsilon_{it} \tag{1}$$

The control variable function is:

$$\beta_i control_{it} = \beta_2 cst\_income_{it} + \beta_3 loan\_asset_{it} + \beta_4 toasset_{it} + \beta_5 npl_{it} + \beta_6 net\_mar_{it} \tag{2}$$

Specifically, the variables are shown in Table 1.

Table 1: Variable description

Variable type	Variable name	Variable symbol	Variable description
Interpreted variable	Business performance	ROA	Annualized return on assets
Explanatory variable	Financial innovation	cinnovation	Non-interest income/operating income
Control variable	Cost-income ratio	cst_ income	Business and administrative expenses/operating income
	Deposit to loan ratio	loan_ asset	Loan balance/deposit balance
	Asset size	toasset	Total assets
	NPL ratio	npl	Non-performing loan/total loan balance
	Net interest margin	net_ mar	Interest-bearing income - interest-bearing cost)/interest-bearing assets

3.3 Empirical process and analysis

3.3.1 Descriptive statistical analysis

As shown in Table.2, the overall level of ROA is relatively stable, as the standard deviation is relatively small. Also, the level of financial innovation needs to be improved, as the maximum value of financial innovation index is 4.463 and the minimum value is 0.321.At the same time, the performance of the deposit to loan ratio is quite different, the maximum value is 115.99, the minimum value is 18.93, and the standard deviation of the non-performing loan ratio is 0.137, which indicates that the risk situation between state-owned banks is quite different.

Table 2: Statistical analysis of main variables

Variable name	Sample size	Maximum	Minimum value	Average value	Standard deviation	Median	Variance	Kurtosis	Skewness
ROA(%)	175	1.757	0.511	0.948	0.201	0.942	0.041	1.495	0.564
cinnovation	175	4.463	0.321	2.15	0.926	2.029	0.858	-0.577	0.348
cst_ income(%)	175	66.47	18.93	29.339	6.907	28.1	47.702	10.044	2.669
loan_ asset(%)	175	115.985	32.32	72.699	15.493	72.35	240.045	0.234	0.096
toasset (million)	175	31.138	24.983	28.27	1.634	28.247	2.671	-1.152	0.034
npl(%)	175	2.71	0.64	1.391	0.37	1.4	0.137	1.134	0.702
net_ mar(%)	175	4.05	1.25	2.324	0.493	2.25	0.243	1.021	0.914

3.3.2 Regression model selection

SPSPRO and Eviews9 were used to carry out F test and Hausman test, and the results are as Table.3. According to the analysis, the fixed effect model FE is selected.

Table 3: F test and Hausman test results

Inspection type	Statistic	P	Conclusion
F	17.027	0.000***	FE model
Hausman test	1118.699	0.000***	FE model
Note: ***, ** and * represent the significance level of 1%, 5% and 10% respectively			

3.3.3 Regression results and analysis

From the analysis of the results in Table.4, we can see that financial innovation has a significant positive effect on state-owned commercial banks, so we verify hypothesis H1. The index coefficient of financial innovation is 0.043, and is significant in the 1% significant level.

Meanwhile, net interest margin coefficient is 0.156, indicating the benefit contribution of interest

income of state-owned commercial banks is still large. NPL coefficient of non-performing loan ratio is -0.199, indicating that the non-performing loan ratio has a significant negative impact on the results. Similarly, the asset scale coefficient indicates that for state-owned enterprises, the expansion of asset scale has no positive impact on business performance.

Table 4: Regression results of FE model

FE model regression results						
Variable	Coefficient	Standard error	t	P	R²	F
const	7.829	1.177	6.652	0.000***	R-squared=0.910402 Adjusted R-squared=0.891735	F=48.77243 P=0.000***
cinnovation	0.043	0.012	3.490	0.000***		
npl(%)	-0.199	0.024	-8.285	0.000***		
toasset (million)	-0.252	0.040	-6.244	0.000***		
cst_income(%)	0.003	0.002	1.454	0.148		
net_mar(%)	0.156	0.028	5.463	0.000***		
loan_asset(%)	-0.004	0.001	-0.477	0.6341		
Dependent variable: ROA (%)						
Note: ***, ** and * represent the significance level of 1%, 5% and 10% respectively						

3.4 Model inspection

3.4.1 ADF unit root test

In order to prevent nonstationary time series from causing false regression in regression analysis and damaging the basic assumptions of linear regression model, it is necessary to test the unit root of each variable series to test its stationarity. The results are shown in Table.5. From the results, the selected variables are all stationary series.

Table 5: Unit Root Test Results

ADF Checklist					Critical Value		
Variable	Order of difference	t	P	AIC	1%	5%	10%
ROA(%)	0	-3.794	0.003***	-203.9	-3.472	-2.88	-2.576
	1	-4.851	0.000***	-190.906	-3.472	-2.88	-2.577
	2	-9.884	0.000***	-174.768	-3.472	-2.88	-2.576
cinnovation(%)	0	-3.75	0.004***	1061.66	-3.472	-2.88	-2.576
	1	-5.692	0.000***	1059.242	-3.472	-2.88	-2.576
	2	-9.544	0.000***	1077.392	-3.472	-2.88	-2.577
cst_income(%)	0	-2.85	0.051*	916.563	-3.47	-2.879	-2.576
	1	-7.746	0.000***	917.786	-3.47	-2.879	-2.576
	2	-7.305	0.000***	932.523	-3.472	-2.88	-2.577
loan_asset(%)	0	-3.789	0.003***	1172.346	-3.472	-2.88	-2.576
	1	-4.551	0.000***	1176.328	-3.472	-2.88	-2.577
	2	-10.208	0.000***	1187.402	-3.472	-2.88	-2.576
toasset (10000 yuan)	0	-3.352	0.042**	378.128	-3.47	-2.879	-2.576
	1	-7.921	0.000***	380.848	-3.47	-2.879	-2.576
	2	-8.332	0.000***	400.809	-3.472	-2.88	-2.576
npl(%)	0	-5.3	0.000***	36.075	-3.47	-2.879	-2.576
	1	-6.795	0.000***	52.349	-3.471	-2.879	-2.576
	2	-7.343	0.000***	82.695	-3.472	-2.88	-2.576
net_mar(%)	0	-3.97	0.002***	49.487	-3.472	-2.88	-2.576
	1	-4.67	0.000***	60.294	-3.472	-2.88	-2.577
	2	-10.727	0.000***	78.588	-3.472	-2.88	-2.576
Note: * * *, * * and * represent the significance level of 1%, 5% and 10% respectively							

3.4.2 Correlation coefficient test

Variance inflation factor (VIF) is a measure of the severity of multicollinearity in multiple linear regression models. As is shown in the Table.6, the VIF is all less than 10, so the model has no

multicollinearity problem, the model is well constructed, and there is no multicollinearity effect between variables.

Table 6: Test results of variance expansion coefficient

	constant	cinnovation(%)	cst_ income (%)	loan_ asset (%)	toasset (million)	npl (%)	net_ mar (%)
VIF	-	3.05	1.33	1.64	1.62	1.20	2.00

4. Conclusions and suggestions

Based on the fixed effect panel model, we collated and regressed the financial data of state-owned commercial banks from 2014 to 2021. From the results, we can see that financial innovation is significantly positively correlated with the return on assets of state-owned commercial banks, indicating that under the promotion of market-oriented reform of interest rate and digital finance, non-interest business plays a significant role in the operation and management of commercial banks, and the expansion of non-interest business and financial innovation development can improve the operating performance of state-owned banks, Improve competitiveness. However, in contrast, the contribution of interest income to commercial banks is relatively high, indicating that customers still prefer traditional interest business. The reason may be that non-interest income is highly volatile, has higher financial leverage risk, and brings additional operational risk, so non-interest income accounts for a relatively low proportion.

The ratio of non-performing loans has a significant negative correlation with the operating performance of commercial banks. Therefore, commercial banks need to optimize the structure of credit assets, fully consider the factors that affect the quality of credit assets, strengthen the management of non-performing loans, and prevent the reduction of asset quality caused by non-performing loans, leading to credit risk of banks, and the fluctuation of operating income. At the same time, the scale of assets has played a negative role in performance, indicating that state-owned commercial banks should not blindly expand the scale of assets, but should prevent the credit risk and excessive operating costs brought by it.

In this regard, the following suggestions can be summarized:

4.1 Give full play to innovative advantages and improve service quality

For the development of non-interest business, state-owned commercial banks can formulate a reasonable and comprehensive non-interest business development strategy on the premise of complying with the national regulatory policies, combining their actual operating conditions and the economic conditions of the region. For example, for large state-owned commercial banks, due to their large asset size and good credit control, they can further expand the types of non-interest businesses, develop the advantages of financial innovation, and provide more high-quality, customer-oriented and diversified financial innovation products. For smaller state-owned commercial banks (such as rural commercial banks and joint-stock commercial banks), they can develop non-interest business under the condition of stabilizing the income of traditional interest business, attract the types of customers, and attract the non-interest income of small and medium-sized enterprises under the current preferential policies for small and medium-sized enterprises.

4.2 Control costs reasonably and strengthen business supervision

Unlike traditional interest income, non-interest income has the characteristics of high volatility and high risk. It often requires more manpower and financial resources, and the sunk cost is high. Therefore, commercial banks need to reasonably control non-interest business costs, such as using intelligent digital outlets to reduce human costs and operating lease fees. At the same time, strengthen the risk management for non-interest income, and implement differentiated supervision for different types of non-interest businesses to match the risk tolerance of commercial banks. At the same time, government departments can also strengthen supporting supervision, create a good external environment, strengthen the policy guidance and guidance for financial innovation, improve the regulatory rules of financial innovation, and improve the awareness of financial technology risk prevention and risk tolerance.

4.3 Optimize risk management and adjust business structure

According to the empirical results, state-owned commercial banks should strengthen the supervision of loans, carry out the qualification review of loan customers, improve the credit process mechanism, and do a good job of risk response mechanism in different periods, so as to prevent credit risk, improve the loan recovery rate, and reasonably control the scale of loans. At the same time, establish a scientific and reasonable interest rate risk response mechanism, timely adjust the business structure according to the interest rate forecast, so as to reduce the risk of financial innovative products, and apply reasonable derivatives to hedge the interest rate risk caused by macroeconomic policy or environmental changes, thus achieving the effect of optimizing risk management.

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