

The Impact of Interest Rate Liberalization on the Operating Performance of the Top Ten Commercial Banks in China

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Abstract. How to survive and develop better in the process of interest rate marketization reform has always been the focus and research direction of financial institutions. In this paper, through the evaluation and calculation of interest rate marketization into an index, sorting out the relevant indicators and data in 2009-2018, using regression model to study the impact of interest rate marketization on the performance of China's top commercial banks.

1. Introduction

The reform of interest rate marketization has a far-reaching impact on China's financial institutions, especially the banks whose main business is deposit and loan business. In the fourth quarter of 2019, the assets scale of China's banking industry accounted for 90.9975% of the assets scale of China's financial institutions, up to 290 trillion yuan, far higher than other types of financial institutions. Therefore, to explore the impact of interest rate liberalization on bank performance is helpful to judge the effectiveness of reform.

In this paper, China's interest rate marketization process is indexed according to major events, and the regression model is used to explore the direct relationship between interest rate marketization index and profitability, asset quality, liquidity and robustness of China's top 10 commercial banks. To explore the impact of interest rate liberalization on the performance of commercial banks, and then put forward feasible suggestions for the operation of commercial banks.

2. Reform of China's Interest Rate liberalization

In 1993, the Chinese people's government promulgated relevant laws, which described in detail the overall strategic conception of liberalization of interest rate transaction in China. In 1994, China's monetary authorities set up the China's foreign exchange trading center, which started the foreign exchange open market trading operations and gradually realized the integration of the real exchange rate of RMB. In 1996, the monetary authorities achieved RMB current account convertibility, the monetary authorities formally liberalized the inter-bank bond market to lend to each other, and formally set the money supply as an indicator of the intermediary of China's monetary policy instruments. In June 1997, the monetary authority officially launched the inter-bank bond market, and at the same time, the monetary authority liberalized the interest rates of inter-bank bond repurchase and cash market transactions in China's bond market. In 1998, the People's Bank of China lifted the restrictions on the size of the loan market and liberalized the discount market interest rate and the re-discount market interest rate. Our monetary authorities have incorporated re-discount interest rates into the tool bank of monetary policy to serve the implementation of monetary policy. In 1999, open market operations were added to the monetary policy toolkit. Since 2000, China has gradually liberalized the interest rate of Chinese foreign currency. Business of qualified overseas direct investment financial institutions (QFII) was officially opened in 2002. In November 2004, the government further allowed the opening of the lower limit of the benchmark

interest rate on RMB deposits and the floating upper limit on the interest rate on RMB loans by financial institutions, which is of milestone significance in the process of reform and opening up to market the RMB interest rate in China. Since 2004, China has further started the market-oriented reform of state-owned commercial Banks. SHIBOR operational in 2007. In June 2012, the Executive Meeting of the Monetary Authority decided to further reduce the benchmark interest rate on deposits and loans from financial institutions. Moreover, the floating range of the RMB deposit and loan benchmark interest rates of financial institutions has been adjusted, and the upper limit of the deposit interest rate is set at 110%, while the lower limit of the loan interest rate is set at 80%. In July 2013, the People's Bank of China fully liberalized the control of the benchmark interest rate on loans by financial institutions, which independently determined the level of the benchmark interest rate on loans by commercial banks in accordance with commercial principles, and removed the control of the discount interest rate on bills. In October 2015, the People's Bank of China lifted the ceiling on deposit rates for financial institutions such as commercial banks and rural credit cooperation. In August 2019, the people's Bank of China officially issued a notice on the implementation of the reform and improvement of the formation mechanism of commercial Banks' loan market quotation benchmark interest rate. The reform was carried out in the formation mechanism of the loan benchmark interest rate (LPR) in six aspects, including the principle of the quotation rate in the loan market, the formation method, the term and varieties, the quotation bank, the frequency of the quotation and the application requirements^[1].

3. Empirical Study

3.1. Selection of Bank Indicators

The top 10 Chinese Banks were selected as research objects according to the banker's 2019 top 1000 global Banks. The first was Industrial and Commercial Bank of China (ICBC), the second was China Construction Bank (CCB), the third was Agricultural Bank of China (ABC), the fourth was Bank of China (BOC), the fifth was Bank of Communications (BCM), the sixth was China Merchants Bank (CMB), the seventh is the Postal Savings Bank of China (PSBC), then is Industrial bank (CIB), the ninth was Shanghai Pudong Development Bank (SPBD), and the tenth was China Citic Bank (CITIC). Select their relevant indicators for the 10 years from 2009 to 2018. According to the research methods of Tang Xinian, Yang Hufeng and Wu Chao (2019), this paper uses profitability, liquidity and other indicators to measure the performance of commercial banks. Fioderlisi, Molyneux and Marques Ibanez (2010) argue that the robustness of commercial Banks as intermediaries for investment financing is critical in the financial system. Referring to the control variables in the model constructed by liu qingsong (2019), the total assets and asset-liability ratio of the bank are selected as the endogenous variables of the bank.

Table 1. Indicator Selection Table^[3,4].

Variable Quantity	Name of Variable Quantity	Name of Variable Quantity	Symbol	Meaning
Variable Quantity being Explained	Profitability	Average return on assets	ROA	Net profit/Average total assets
		Weighted average return on net assets	ROE	Net profit/Owner's equity
	Capital Assets Quality Management Earning Liquidity	Non-performing loan ratio	NPLR	Annual non - performing loan balance
	Flow ability	Liquidity Ratio	CR	Current assets/Current liabilities

		Deposit/loan ratio	LDR	Total loans/Total deposits
	Robustness	Capital Adequacy Ratio at the Core Level	CCAR	Net core capital/Risk - weighted asset
		Capital Adequacy Ratio	CAR	Net capital/Risk - weighted assets
Explaining Variable Quantity	Degree of marketization	Interest rate marketization index	IRLI	Weighted measurement
Controlled Variable Quantity	Macroeconomic Variable Quantity	GDP Growth rate	GDP	$(GDP_{T1} \square GDP_{T0}) / GDP_{T0}$
		M2 Growth rate	M2	$(M2_{T1} \square M2_{T0}) / M2_{T0}$
	Endogenous variables in banks	Bank Size	SIZE	Total bank assets
		asset-liability ratio	DAR	Total liabilities/Total assets

3.2. Model Setting

This paper makes full use of the experience and methods of the effect function model of Tang Xinian^[2], and adopts the software eviews10 to conduct regression analysis of the sorted indexes by adopting the fixed effect model. According to the existing literature analysis^[5], because it is impossible to accurately judge whether the functional relationship between the interest rate marketization index and the explained variable is a straight line, the square term of the interest rate marketization index is introduced in the model. The model is as follows:

3.2.1. Interest Rate Marketization and the Top Ten Commercial Banks' Profitability

Regression model^[7]:

$$\hat{ROA} = \partial_0 + \partial_1 irli_t + \partial_2 irli_t^2 + \partial_3 size_t + \partial_4 GDP_t + \partial_5 M2_t + \partial_6 DAR \quad (1)$$

$$\hat{ROE} = \beta_0 + \beta_1 irli_t + \beta_2 irli_t^2 + \beta_3 size_t + \beta_4 GDP_t + \beta_5 M2_t + \beta_6 DAR \quad (2)$$

3.2.2. Interest Rate Marketization and Asset Quality Regression Model of Top Ten Commercial Banks^[8]:

$$\hat{NPLR} = \chi_0 + \chi_1 irli_t + \chi_2 irli_t^2 + \chi_3 size_t + \chi_4 GDP_t + \chi_5 M2_t + \chi_6 DAR \quad (3)$$

3.2.3. Interest Rate Marketization and Liquidity Regression Model of Top Ten Commercial Banks^[9]:

$$\hat{CR} = \delta_0 + \delta_1 irli_t + \delta_2 irli_t^2 + \delta_3 size_t + \delta_4 GDP_t + \delta_5 M2_t + \delta_6 DAR \quad (4)$$

$$\hat{LDR} = \eta_0 + \eta_1 irli_t + \eta_2 irli_t^2 + \eta_3 size_t + \eta_4 GDP_t + \eta_5 M2_t + \eta_6 DAR \quad (5)$$

3.2.4. Interest Rate Marketization and Stability Regression Model of Top Ten Commercial Banks^[10]:

$$\hat{CAR} = \phi_0 + \phi_1 irli_t + \phi_2 irli_t^2 + \phi_3 size_t + \phi_4 GDP_t + \phi_5 M2_t + \phi_6 DAR \quad (6)$$

$$CCAR^{\Delta} = \gamma_0 + \gamma_1 irli_t + \gamma_2 irli_t^2 + \gamma_3 size_t + \gamma_4 GDP_t + \gamma_5 M2_t + \gamma_6 DAR_t \quad (7)$$

In above models, t is the year of the variables. δ , β , χ , δ , γ , ϕ , η is the model

Parameters. δ_0 , β_0 , χ_0 , δ_0 , γ_0 , ϕ_0 , η_0 is the constant term of the model.

The remaining abbreviations of variables are stated in the table above and will not be repeated. Irli and Irli² represent the squared terms of interest rate liberalization index and interest rate liberalization index. Bank-related data are derived from the annual report of the a shares of 10 banks for 2009-2018, and the annual mean of each data of 10 banks is used in the regression analysis.

3.3. Empirical Findings and Analysis

3.3.1. Interest Rate Marketization and Commercial Bank Profitability Analysis

Table 2. Interest rate marketization and commercial bank profitability regression analysis table.

Variable Quantity	ROA	P-value		ROE	P-value
C	-0.048234	0.1249		-1.182382*	0.0675
IRLI	0.145997**	0.0393		3.321179**	0.0227
IRLI2	-0.090715**	0.0273		-2.092241**	0.0145
GDP	0.015298	0.3536		0.480457	0.4546
M2	0.003069	0.8367		0.256291	0.393
SIZE	0.146	0.2367		0.00763**	0.0125
DAR	0.05969**	0.027		0.0632**	0.0465

* is significant at 10% level, ** is significant at 5% level.

3.3.2. Interest Rate Marketization and Asset Quality Analysis of Commercial Banks

Table 3. Interest Rate Marketization and Asset Quality Regression Analysis of Commercial Banks.

Variable quantity	NPLR	P-value
C	0.118027**	0.0363
IRLI	-0.272726**	0.0224
IRLI2	0.176318**	0.0129
GDP	-0.038659	0.1645
M2	-0.004661	0.8436
SIZE	0.843678*	0.067
DAR	0.4356	0.7324

3.3.3. Marketability of Interest Rate and Liquidity Analysis of Commercial Banks

Table 4. Interest Rate Marketization and Liquidity Regression Analysis of Commercial Banks.

Variable Quantity	CR	P-value	Variable Quantity	LDR	P-value
C	2.444088**	0.0376	C	5.356382***	0.0091
IRLI	-4.310409*	0.0571	IRLI	-9.734148**	0.0136
IRLI2	2.561686**	0.047	IRLI2	6.503143***	0.0066
GDP	-0.705106	0.2153	GDP	-1.610957*	0.082
M2	-1.070721*	0.0716	M2	-3.329115***	0.0051
SIZE	0.7842	0.9741	SIZE	0.9380	0.7362
DAR	0.64865	0.3762	DAR	-3.2110	0.9987

3.3.4. The Marketization of Interest Rate and the Analysis of the Stability of Banks

Table 5. Interest Rate Marketization and Stability Regression Analysis of Commercial Banks.

Variable Quantity	CAR	P-value		Variable Quantity	CCAR	P-value
C	0.701121***	0.001		C	0.565666***	0.0022
IRLI	-1.137036***	0.0027		IRLI	-1.075942***	0.0057
IRLI2	0.640736***	0.0026		IRLI2	0.644257***	0.006
GDP	-0.228143**	0.0116		M2	-0.305576***	0.0009
M2	-0.430354***	0.0006		GDP	-0.176235**	0.0123
SIZE	1.3745	0.1564		SIZE	0.328357**	0.0364
DAR	0.005412	0.4213		DAR	0.007423	0.5853

4. Research Conclusion

This paper analyzes and summarizes the major historical events, based on the promulgation of laws by the monetary authorities and the central government's formulation of implementation policies, and through assignment and calculation, constructs interest rate marketization. This paper collects and collates the historical data and indicators of the top 10 commercial banks in China from 2009 to 2018, and constructs a regression model with commercial banks' profitability, liquidity, asset quality and bank robustness as explanatory variables and interest rate marketization index as explanatory variables. The aim is to study the effect of interest rate marketization on the performance of top 10 commercial banks in China. The main findings of the study are:

Firstly, the marketization of interest rate in China has developed rapidly. From the regression analysis, it can be seen that the marketization of interest rate has a great impact on the profitability of commercial Banks and has a certain negative impact on the asset quality of commercial Banks. Interest rate marketization makes the risk increase, and puts forward higher requirements for the liquidity and robustness of commercial banks. However, from the development of advanced capital markets abroad, the reform of interest rate marketization helps to maintain a relatively reasonable structure between different interest rate levels in the money market, including oriented interest rates, and to speed up the liquidity of funds in the market, so that commercial banks, a financial intermediary, can play a greater role, improve the efficiency of capital allocation and the performance of commercial banks.

Secondly, the interest rate liberalization index and the profitability of commercial Banks present a complex inverted u-shaped relationship. In the early stage of the reform, interest rate liberalization had a limited impact on the profitability of commercial Banks, while in the later stage of the reform, interest rate liberalization had a greater impact on the profitability of commercial Banks and had a significant negative impact, which was not conducive to the improvement of commercial Banks' operating performance.

Thirdly, there is a complicated u-shaped relationship between the interest rate liberalization index and the asset quality of commercial Banks. In the early stage of interest rate marketization reform, the asset quality of commercial banks has not been greatly affected, and the credit risk is low. In the early stage, commercial banks can make use of the improvement of their own management level and the sound credit policy to keep the non-performing loan rate at a low level. In the late period of reform, the marketization of interest rate has a great impact on the asset quality of commercial banks, which leads to the decrease of asset quality of commercial banks and the increase of risk of banking system.

Fourthly, the index of interest rate liberalization and the liquidity of commercial Banks present a complex n-shaped relationship. In the early stage of interest rate liberalization, commercial Banks increase the liquidity ratio to cope with the risks brought by interest rate liberalization. With the advancement of interest rate liberalization reform, especially the liberalization of loan interest rate,

commercial Banks have expanded the credit scale, the current ratio has decreased, and the deposit and loan ratio has increased.

Fifthly, the interest rate marketization index and the commercial bank's robustness show the more complex N-shaped relations. In the early stage of interest rate marketization, with the subprime mortgage crisis in 2008, commercial banks have greatly increased their capital adequacy ratio to ensure their own steady operation.

And with the reform of interest rate marketization into the deep water area, the commercial banks are more intense and the profits are reduced. In order to ensure profits, commercial banks have appropriately reduced their capital reserves, and the capital adequacy ratio has experienced a period of decline. Then, in order to meet the regulatory authorities' increasingly strict requirements on the capital adequacy ratio of financial institutions, the capital adequacy ratio of commercial Banks has increased to a certain extent.

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References

- [1] Jingyu Yang. Empirical Study on the effect of interest rate liberalization on the efficiency of listed commercial banks in China [D]. Hefei University of technology. 2018 (02).
- [2] Xi'an Tang, Hufeng Yang, Chao Wu. The impact of interest rate liberalization on the operation performance of rural commercial banks: Based on the considerations of profitability, risk and liquidity [J]. Rural finance research, 2019, (12): 43–50.
- [3] Jiangang Peng, Shujun Wang, Tianyu Guan. Does interest rate liberalization lead to narrow interest margin of commercial banks?—Empirical Evidence from China's banking industry [J]. Financial research, 2016, (7): 48–63.
- [4] Xiao, Edward. Financial deepening in economic development [M]. Shanghai: Shanghai Sanlian bookstore, 1988.
- [5] Baojiang Xin. The impact of interest rate liberalization on China's commercial banks and suggestions [J]. Chinese and foreign entrepreneurs, 2020, (04): 33.
- [6] Jie Zhang. Marketization of interest rate and risk bearing of commercial banks [J]. China Economic and trade, 2019, (5): 23–25.
- [7] Farrell, M. J. (1957). The measurement of productive efficiency. Journal of the Royal Statistical Society, 120(3), 253–290.
- [8] Shaanjie. J bank performance management based on Balanced Scorecard [J]. Financial management research, 2020, (02): 56–61.
- [9] Mengfei Liu and Wei Jiang. Does financial technology promote or hinder the efficiency of commercial banks? -- An Empirical Study Based on China's banking industry [J]. Contemporary economic science, 2020, (2): 1–18.
- [10] Qingsong Liu. Diversification of banking business, business performance and risk: An Empirical Analysis Based on the data of local commercial banks from 2007 to 2016 [J]. Financial development research, 2019, (10): 56–64.