

The Influence of Interest Rate Liberalization Reform on Credit Risk of Commercial Bank

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Abstract: The resource allocation function of interest rate liberalization plays an important role in the optimization of the national financial market, which is conducive to the more effective flow of capital to projects with higher production efficiency, and thus has a significant impact on China's financial institutions, especially commercial banks. However, with the deepening of interest rate liberalization reform, the credit risks faced by commercial banks have become more complex and changeable, which is not only detrimental to the development of banks themselves, but also has an impact on the stability of the entire financial system. Using the panel data model from 2010 to 2021, this paper selects 16 representative commercial banks in the three types of banks, takes net interest margin as the explanatory variable and non-performing loan ratio as the explained variable for empirical analysis, draws conclusions and puts forward countermeasures for the interest rate liberalization reform of Chinese commercial banks.

Keywords: Interest Rate Liberalization Reform; Commercial Banks; Credit Risk; Panel Data Model

1. Research Background and Significance

Over the last 30 years, China has been pushing forward with interest rate liberalization, and gradually formed a relatively complete interest rate system compatible with the market economy and with Chinese characteristics [1]. The interest rate adjustment mechanism of monetary policy has been further improved, and the pricing of financial products has become more market-oriented, which not only gives commercial banks the right to set prices independently, but also makes the traditional business model of banks face more severe

challenges [2].

Credit risk is closely related to the profit and living conditions of commercial banks. Before the liberalization of interest rate, the commercial banks depended on the traditional deposit and loan structure. As the reform advances, the business environment of commercial banks has changed. In order to win customers, the banks have lowered the interest rate and reduced the difference between deposit and loan rates. To compensate for the difference in interest revenue, banks may invest in high-risk items to maintain operation, or they may develop new businesses to obtain income, which will affect the credit structure of banks and make them face more complex and changeable credit risks [2].

As the intermediary of financing, merchant banks exert a significant influence on the whole economic and social life. As a result, the risks that commercial banks are confronted with are not only related to each other, but also can influence the operation of the entire banking system and the financial market. Because of the dual impact of interest-rate liberalization reform, it is necessary to study the relation between the liberalization of interest rate and credit risk. This is conducive to commercial banks to accurately identify and control credit risk, and provide a basis for commercial banks to adopt corresponding policies and measures for risk management, thus reducing the possibility of financial crisis.

2. Mechanism Analysis

2.1 Credit Risk of Commercial Banks

2.1.1 Meaning of credit risk

The credit risk is one of the major risks that commercial banks are confronted with in their business [3]. When a bank has a high ratio of bad assets, especially when there are a lot of bad debts, it shows a high level of credit risk. In this case, if the bank fails to properly

prepare the funds to deal with risks, it may face financial problems, which will affect its stability and even go bankrupt [4]. Since the profitability of commercial banks is largely determined by the margin of interest on deposits and loans, their economic and business characteristics determine that they face relatively high credit risks, among which loan issuance is the main source of credit risks [1]. Therefore, credit risk management is crucial to ensure that the risk is controlled within an acceptable range to ensure the stability of bank loan income.

Bad loan rate is one of the most important indicators to evaluate the safety of commercial bank's credit assets. Generally speaking, a high level of bad debt means that banks are more exposed to credit risk. As can be seen in Figure 1, the NPL ratio of China's commercial banks has been stable in recent years, and even shows a downward trend, indicating that Chinese commercial banks have successfully controlled the scale of non-performing loans, and the financial risk shows a relatively convergence trend [5].

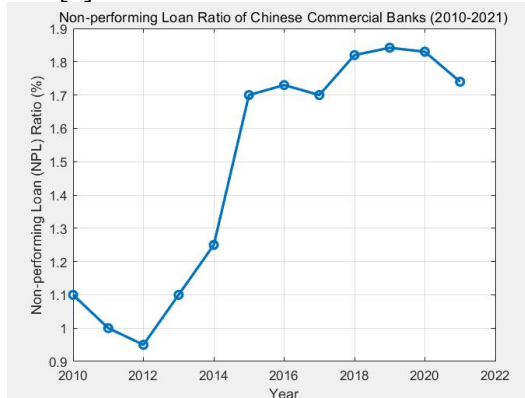


Figure 1. Change of Non-performing Loan Ratio of Chinese Commercial Banks from 2010 to 2021

Data source: China Banking and Insurance Regulatory Commission official website

As shown in Figure 2, the data of NPL ratio between the big state-owned commercial banks and the stock banks in 2010 - 2021 is similar. Generally speaking, the NPL of the two kinds of banks increased first and then declined, and the range of variation of stock commercial banks was larger [6].

On the contrary, the proportion of bad loans in city commercial banks is on the rise. Especially from 2018, the rate of NPL of city commercial banks is increasing rapidly, which is more than that of state-owned commercial

International Conference on Humanities, Social and Management Sciences (HSMS 2024)

banks and stock banks [4]. In addition, the governance capacity of urban commercial banks is relatively weak, and with the increase of macro-economic pressure and external environmental uncertainties, the risk exposure rate of their asset quality is also increasing.

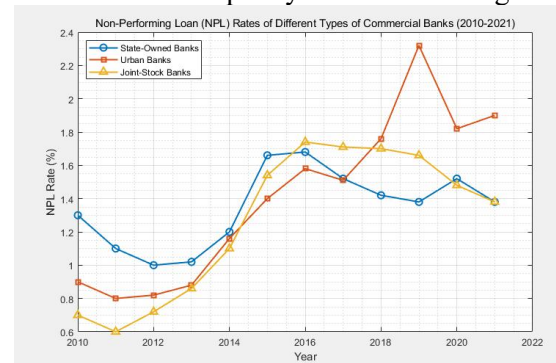


Figure 2. Changes in Non-performing Loan Ratios of Different Commercial Banks from 2010 to 2021

Data source: China Banking and Insurance Regulatory Commission official website.

The NPL ratios of all three types of commercial banks experienced large fluctuations between 2013 and 2015 [7], which was related to the deregulation of lending rates in 2013 and the subsequent removal of floating limits on deposit rates in 2015 [8]. In 2016, the NPL ratio of large state-owned commercial banks and joint stock banks decreased [9].

2.1.2 Importance of credit risk

As the core of modern economy, banking, as the pillar of financial system, is the traditional financing medium, plays an important role in the whole social economy. The appearance of Bank Credit Problems may have adverse effects on the overall economic development, and even lead to financial and economic crises. Serious credit risk may lead to chaos in the financial market, disturb the normal running of society, even lead to a large - scale panic and bank run, which have great influence on society, economy and politics.

Bank credit risk is one of the most threatening bank risks. As a financing intermediary, banks' business concerns the interests of residents and businesses [8]. On the surface, credit risk is the borrower's breach of trust to the bank, but in fact, it damages the interests of the bank's investors, owners and depositors. On the other hand, the increase of bank credit risk might result in a chain reaction of liquidity risk, payment risk and so on [10].

Therefore, commercial banks must strengthen

the detection and management of credit risk. This will not only help the bank to reduce the capital loss, to promote the reasonable disposition of funds, to guarantee the healthy operation of the commercial banks, and enhance the sustainable development capacity of banks, but also help to maintain financial stability, improve the anti-risk ability of the financial system, and provide powerful support to social and economic sustainable development.

2.2 Interest Rate Liberalization Reform

2.2.1 Meaning of credit risk

Strict control of interest rates may lead to inefficient use of funds and adversely affect economic development. Under the highly regulated situation, the low deposit interest rate weakens the ability of banks to absorb deposits, resulting in insufficient supply of funds, and when the demand of enterprises is too large, it will exacerbate the contradiction between supply and demand of funds. Under the situation of over-supply of capital, it is hard for SMEs to raise capital, which restricts their development, which will influence the overall economic growth [6].

Therefore, the reform of liberalization of interest rates, allowing interest rates to play a regulating role under the market mechanism, fully reflects the principle of fair competition in the market economy, helps resources to be effectively allocated according to market supply and demand, and diverts capital to projects with higher production efficiency, thereby improving TFP and promoting long term economic growth [10]. Moreover, the liberalization of interest rate will also help to transform the bank's business and push forward the sustainable and efficient financial innovation.

2.2.2 China's interest rate liberalization reform process

China's interest rate liberalization reform has drawn on successful international experience, adhered to prudent principles, and gradually and effectively carried out. This reform followed the general idea of "loan before deposit, large amount before small amount, foreign currency before local currency". After more than 20 years of gradual development, it gradually found out an interest rate mechanism that meets the needs of market development. Specifically: In 1996, China opened up the

interest rate of interbank lending, and then opened up the interest rate of the bond market and part of the deposit and loan [11]. Since October 1999, China has started to research on the market of the deposit rate of large deposits and foreign currency deposits. In October 2004, the Central Bank lifted the limit on lending rates and minimum deposit rates. In March 2005, financial institutions' interbank deposit rates were fully liberalized [12]. In July 2013, the Lending Rate Regulation for Financial Institutions was fully abolished, and the floor for lending was removed. In 2015, China issued a cap on deposit interest rate. Due to the lack of ability to price deposits and loans, the industry took measures to prevent the vicious competition [4].

Essentially, interest rate liberalisation has not been fully implemented. In 2019, the Financial Commission proposed to accelerate the reform of the market interest rate and improve the transfer mechanism. The introduction of the New Loan Market Quotation Rate has promoted the "Double Track and Single Line" between Deposit and Loan Rate and Market Interest Rate.

Table 1 is a summary of China's interest rate liberalization process, which is mainly divided into the steady start period of reform from 1993 to 2011, the accelerated promotion period of reform from 2012 to 2014, and the improvement and development period after the basic completion of interest rate liberalization from 2015 to now [9].

2.3 Mechanism Analysis of the Impact of Interest Rate Liberalization Reform on Credit Risk of Commercial Banks

Under the interest rate liberalization, commercial banks have gained the right to set their own prices and lifted the restrictions on deposit and loan interest rates. In order to attract deposits and maintain profits, banks have taken measures to raise deposit interest rates and appropriately lower loan interest rates. This process has led to a narrowing trend of deposit and loan spreads on the whole. Historical data show that the interest rate spread between deposits and loans in the United States was only 0.2% from 1980 to 1984 [12], Japan gradually narrowed from 3.5% to about 2.4% from 1984 to 1994, while in China, the NPL has fallen from 2.7 per cent in 2011 to 1.91 per cent in 2021 [8]. The

reduction of net interest margin means that the bank's interest income will change, which may influence the bank's liability cost. Since the interest income is still the main source of the

bank's income, the bank may over expand the loan to keep the profit, which causes the credit risk to increase (Figure 3).

Table 1. Process of Interest Rate Liberalization Reform in China

Time	Course
1996	The liberalization of interest rates in the inter-bank lending market marks the beginning of China's interest rate liberalization reform
1997	Interbank bond repurchase and cash transaction rates will be lifted
1998	Expand the floating range of interest rates on loans from financial institutions to small businesses; We will liberalize discount and rediscount rates
1999	The maximum 30 percent increase in interest rates on small business loans will be extended to medium-sized businesses
2000	Interest rates on foreign currency loans will be lifted
2004	The deposit rate will no longer be capped and will float down 0.9 times the benchmark rate. Abolish the deposit interest rate floor for commercial banks
2012	The upper limit of deposit rates for financial institutions will be expanded to 1.1 times, and the lower limit of lending rates will be 0.7 times the benchmark rate
2013	The lower limit of the loan interest rate of financial institutions will be abolished, the control of the loan interest rate of financial institutions will be fully lifted, and the control of the discount interest rate of bills will be abolished
2015	Lift the ceiling on deposit interest rates
2019	The introduction of a new LPR mechanism, by which LPR guides the quotation of bank lending rates

Data source: China Government Network.

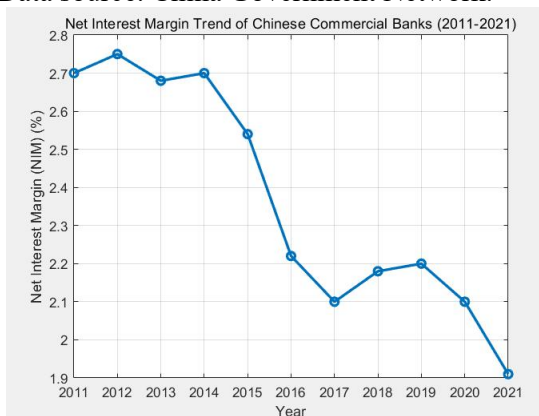


Figure 3. Chart of Net Interest Margin of Chinese Commercial Banks from 2011 to 2021

3. Empirical Analysis

Based on the above analysis, an empirical model is built, which takes the variable measuring the credit risk of commercial banks as the explained variable, incorporates the core explanatory variable representing the degree of interest rate liberalization into the model, and introduces the control variable describing the micro characteristics and macroeconomic variables of banks. Through this model, regression analysis is carried out to verify whether the interest rate liberalization reform has an impact on the credit risk of banks.

3.1 Variable Selection

The credit risk of commercial banks is usually determined by the Non-Performing Loan Ratio (NPL) [13]. The higher the NPL rate, the higher the NPL ratio is, the lower the possibility of the bank's recovery, which means the bank is exposed to a higher credit risk. Therefore, the NPL rate is chosen as an explanatory variable.

Net Interest Margin (NIM) can reflect the degree of liberalization of interest rate, which results in a continuous narrowing of the margin of deposit and loan [2]. So, the NPV is selected as the proxy to measure the liberalization of the interest rate.

In fact, it is not only the reform of interest rate liberalization that influences the commercial bank's credit risk. Without consideration of certain factors, it might not be possible to accurately reflect the effect of the reform on credit risk. In this paper, we choose the size of bank, the ratio of cost to profit, the proportion of capital, the ratio of non-interest income, and the ratio of loan to deposit.

3.2 Sample Selection

Nowadays, a variety of commercial banks have been set up in China, including the big

commercial banks, the stock system and the urban commercial banks. Big state-owned commercial banks are the major providers of credit capital, and they have great social impact. It has promoted the reform and development of Chinese banking, and is an indispensable component of the development of banking and even national economy. Both are ideal subjects for study. Along with the rapid development of Chinese finance, as the third tier of the Chinese banking system, the role and position of urban commercial banks in Chinese finance system is increasingly important. In order to analyze the influence of the reform on China's commercial banks' credit risk, we choose 16 commercial banks, among which 5 are the Chinese Industrial and Commercial Bank, the Construction Bank, the Agricultural Bank, and the bank of communication. China Merchants Bank, China Citic Bank, Minsheng Bank, Industrial Bank, Huaxia Bank, Shanghai Pudong Development Bank, PingAn and Everbright Bank; Furthermore, the size of the 16 banks is different, so it is possible to analyze the impact of the individual effect. Because the majority of these banks were listed from 2006 to 2007, the 2008 financial crisis has caused a great deal of fluctuation in all kinds of financial indexes, which is not universal [12].

3.3 Model Establishment

Table 3. Descriptive Statistics of Variables

Variable	Implication	Number of observations	Meanvalue	Standard deviation	Minimum value	Maximum value
NPL	Non-performing loan ratio	192	1.232	0.418	0.380	2.390
NIM	Net interest margin	192	2.325	0.357	1.510	3.230
LNSIZE	Logarith of bank size	192	15.336	1.131	12.308	17.376
CIR	Cost-income ratio	192	30.085	4.387	21.590	43.410
CAP	Capital adequacy ratio	192	13.143	1.779	9.900	18.020
NII	Percentage of non-interest income	192	25.293	8.553	7.020	51.090
LDR	Loan-to-deposit ratio	192	76.025	13.544	47.430	111.22
M2G	M2 growth rate	192	11.800	3.026	8.100	19.700
GDPG	Real GDP growth rate	192	7.275	1.976	2.200	10.600

3.4.2 Correlation detection

To verify the existence of great collinearity between the variables, the correlation among them is verified before regression. As shown in Table 4, the correlation coefficient is smaller than 0.8, which shows that there is no big collinearity among them, which shows that the choice of variable is rational [14].

3.4.3 Empirical results and analysis

According to the above analysis and selection of research variables (Table 2), the following regression model is established for research:

$$NPL_{it} = \beta_0 + \beta_1 NIM_{it} + \beta_2 LNSIZE_{it} + \beta_3 CIR_{it} + \beta_4 CAP_{it} + \beta_5 NII_{it} + \beta_6 LDR_{it} + \beta_7 M2G_{it} + \beta_8 GDPG_{it} + u_i + \varepsilon_i \quad (1)$$

Table 2. Results of Hausmann Test

	Coef
Chi-square test value	111.60
P-value	0.0000

3.4 Empirical Results and Analysis

3.4.1 Descriptive statistics

As shown in Table 3, the average NPL ratio of 16 banks was 1.232%, the highest was 2.39%, the minimum was 0.38%, and the standard deviation was 0.418%. The NPV average is 2.325%, the maximum is 3.23%, the minimum is 1.51%, and the standard deviation is 0.357%. Net interest rates of different commercial banks are not significantly different. There are significant differences in the size of assets of commercial banks, and there are significant differences in the cost/benefit ratio, capital adequacy ratio, non-interest return rate and loan-to-deposit ratio. The development of Chinese economy has changed from high speed to high quality, and the real GDP is growing steadily. The increase of M2 is positive, which shows that the money supply in China has been growing steadily in recent years [13].

The results of an estimated fixed-effect model are presented in the following Table 5.

The coefficient of net interest margin on non-performing loan ratio is negative, that is, the level of interest rate liberalization has a positive impact on bank credit risk. The smaller the NPV, the higher the degree of liberalization and the higher the non-performing loan rate, the higher the bank's

credit risk.

The regression coefficient of LNSIZE to NPL is negative, indicating that bank size has a significant negative impact on credit risk, indicating that banks of different sizes face different credit risks, and the larger the bank size, the smaller the credit risk it faces. The reason may be that the larger the bank, the more obvious diversification development, business risks will be dispersed. As a result, the non-performing loan ratio decreases and the bank credit risk decreases. The regression coefficient of CIR to NPL is negative, indicating that the cost-income ratio has a significant negative impact on credit risk. Moreover, the benefit ratio can reflect the profitability of the commercial bank. The lower the cost/benefit ratio, the stronger the bank's profitability and the higher the credit risk. The regression coefficient of CAP on NPL is negative, indicating that the capital

adequacy ratio has a significant negative impact on credit risk. The higher the bank's capital adequacy ratio, the higher the risk resistance ability and the lower the credit risk. The regression coefficient between NII and NPL is positive, which shows that the higher the rate of non-interest income, the higher the bank's credit risk. This result is different from the previous analysis. This is probably due to the fact that the proportion of non-interest income in China's commercial banks is not high, and the average ratio of the 16 banks in the sample is 25.29% [15]. Risk diversification has not been sufficiently diversified. The regression coefficient between LDR and NPL is positive, which shows that the higher the loan-to-deposit ratio, the greater the credit risk. The loan-to-deposit ratio is an indicator of the bank's liquidity risk. However, the higher the loan-to-deposit ratio, the greater the credit risk.

Table 4. Results of Correlation Test of Variables

Variable	NPL	NIM	LNZISE	CIR	CAP	NII	LDR	M2G	GDPG
NPL	1.000								
NIM	-0.401	1.000							
LNZISE	0.534	-0.216	1.000						
CIR	0.347	0.361	-0.351	1.000					
CAP	0.202	-0.209	0.438	-0.281	1.000				
NII	0.428	-0.517	0.354	-0.249	0.239	1.000			
LDR	0.451	-0.366	0.197	-0.316	0.090	0.415	1.000		
32G	-0.511	0.517	0.333	0.428	-0.418	-0.543	-0.490	1.000	
GDPG	-0.447	0.321	-0.269	0.418	-0.317	-0.324	-0.359	0.601	1.000

Table 5. Regression Results

Variable	Model 3.1
NIM	-0.191** (0.084)
LNSIZE	-0.291** (0,132)
CIR	-0.033*** (0.007)
CAP	-0,034* (0.019)
NII	0.005* (0,003)
LDP	0,019*** (0.002)
M2G	-0.008 (0.024)
GDPG	-0.022** (0.009)
cons	6.224** (2.467)

The regression coefficient of GDPG to NPL is

negative, indicating that the credit risk of banks decreases during the economic boom period. In the economic boom period, the development momentum of enterprises is good, the ability to repay loans is stronger, and the credit risk of banks is smaller. The regression coefficient of M2G to NPL was negative, but not significant [11].

4. Conclusion and Countermeasures

In this paper, we choose 16 kinds of commercial banks to study, and take into account the individual effect of bank, the influence of the reform on China's commercial banks' credit risk is more comprehensive. In this paper, we chose the period of 2010-2021, and used the panel data model to analyze the annual data of 16 banks from 2010 to 2021.

There is a negative correlation between NPL and NPL. Along with the development of the liberalization of interest rate, the bank's net interest margin is likely to shrink, which

causes the bank's credit risk to rise. The Bad Loan Ratio has a positive correlation with the ratio of non-interest income and loan-to-deposit ratio, and negative correlation with the size, cost/benefit ratio and capital adequacy ratio. Enlarging the size of the bank, reducing the cost/benefit ratio and improving the capital adequacy ratio might help to decrease the Bad Loan Ratio. In terms of macroeconomic variables, lending performance is negatively correlated with actual GDP growth, while M2 has no significant effect on NPL, which implies that sound economic growth can contribute to a reduction in the loan-to-value ratio, whereas the increase in the money supply has only a small impact on the NPL ratio. Therefore, in addition to strengthening risk management, merchant banks also need to adapt more flexibly to changes in the competitive environment and improve their credit management level to ensure that they maintain a sound business in the interest rate liberalization reform.

References

- [1] Zhao Ping, Fang Xia. Interest rate liberalization reform and banks' credit risk pricing ability: Based on the relationship between loan interest rate fluctuation and credit risk in China. *Financial Forum*, 2022, 27(08): 19-28.
- [2] Jiang Shuxia, Liu Zhonglu. Is there any difference in the influence of deposit and loan market competition on bank risk taking? - based on the market-oriented interest rate reform in China to discuss. *Journal of economic management*, 2016, 38 (6): 1-15.
- [3] Zuo Xi. Pay attention to the improvement of operation and management ability to adapt to the market-oriented reform of deposit interest rate. *Financial Times*, 202401-05(003).
- [4] ZHANG Peizong. Practice of deepening interest rate liberalization reform in rural commercial banks. *China Money Market*, 2023(12): 38-42.
- [5] Li Mingyao. Research on credit risk Management of commercial banks under the condition of interest rate liberalization. Nanchang to learn: 2019.
- [6] Xu C. The impact of interest rate liberalization on the credit risk of commercial banks. *Finance and Accounting Learning*, 2019(10): 203+205.
- [7] Chen Xiaochen. Analysis of the impact of interest rate liberalization Impact on credit risk of commercial banks based on KMV model. *Journal of Commerce*, 2016(01): 193-194.
- [8] Wu Yanfei, Song Yang, Chen Xiaorong. Discussion on the impact of interest rate liberalization reform on the interest rate risk management of commercial banks. *Modern Economic Information*, 2015(10): 346-347.
- [9] Long Yaqing. The influence of interest rate marketization on the credit risk of commercial banks. *Modern Commerce*, 2015 (18): 156157.
- [10] Wang Ruilin. The present situation and strategy of interest rate risk management of commercial banks in China. *Henan Finance and Taxation College Science News*, 2010, 24 (01): 33-35.
- [11] Zhang Qisheng, Xu Jiayin. On interest rate risk Management of Commercial Banks in China. *New Finance*, 2003 (04): 2-4.
- [12] Takahashi. Current situation and management analysis of interest rate risk in commercial banks. *Economist*, 2006 (04): 234-236.
- [13] Qi Fengjun, Wang Jinghui. On the influence of interest rate marketization reform on China's commercial banks and its countermeasures. *Contemporary Finance*, 2013 (32): 166.
- [14] Song Han. The influence of interest rate marketization reform on China's commercial banks and risk prevention. *Qufu normal University*, 2015.
- [15] Zhao Ziyi, Yang Xiaopeng. Comparative Analysis on the degree of marketization of loan interest rate between Chinese and American Commercial Banks. *Southern Jinrong*, 2011 (01): 46-49-78.