

The impact of interest rate liberalization on the liquidity risk of commercial banks

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Abstract. This paper selects quarterly data of 10 commercial banks in China (including 5 large state-owned commercial banks and 5 joint-stock commercial banks) for the 10 years from 2011 to 2020 for the study, and constructs a mixed cross-sectional regression model through multiple covariance test and heteroskedasticity test to empirically analyze the relationship between interest rate marketization and liquidity risk of commercial banks in China, and draws the following conclusions: First, interest rate First, the market-oriented reform will greatly increase the liquidity risk level of commercial banks. Second, the interest rate market reform gives heterogeneity to the liquidity risk of large state-owned commercial banks and joint-stock banks. Third, the effect of bank size on commercial banks' liquidity risk is not significant. Fourth, monetary and quasi-monetary growth rates move in the same direction as commercial banks' liquidity risk.

Keywords: Interest rate marketization; commercial banks; liquidity risk.

1. Introduction

Currently, commercial banks are facing an intricate risk environment and liquidity risk often appears in the asset management of commercial banks. Proper handling of liquidity issues is not only related to the reputation of banks, but also to the safety and stability of commercial banks, while proper handling of liquidity asset allocation is also crucial. It is important for commercial banks to improve their liquidity level in order to carry out asset business and other business. The Asian financial crisis was precisely because of the run on a large number of commercial banks in China, and in addition, the lack of liquidity of banks may also lead to bank failures, which has to cause our regulators to be vigilant. At present, liquidity risk seriously affects the development of commercial banks and can even lead to bank failures and loss of public confidence in banks.

The advancement of interest rate market reform has a great impact on deposit and loan interest rates, leading to frequent changes in interest rates, because the liquidity of commercial banks is mainly composed of deposits and loans, so commercial banks will increase the interest rate of the public when conducting deposit business, and at the same time will give borrowers certain benefits to ensure that they can be competitive enough in the banking industry, which will lead to a decline in commercial banks' profits. This will lead to a decline in commercial banks' profits and a consequent increase in risk. When the central bank no longer controls interest rates and interest rates are gradually determined by the market, the asset structure of commercial banks will certainly change, followed by changes in the internal structure of banks.

In the general environment of interest rate market reform, there are various risks, one of which is liquidity risk, which will seriously affect the normal operation of commercial banks, and in addition, commercial banks will change their deposit and loan rates one after another because of competition in order to gain stronger competitiveness and profit, and on another level, it can be said that interest rate market has squeezed the deposit and loan differences of banks. At another level, it can be said that the interest rate market has squeezed the profit margin of banks' deposit and loan spreads, which may further lead to bank failures. In view of this, it is important for commercial banks to study and analyze the relevant contents, which will help them to better cope with and deal with liquidity risk problems.

Numerous scholars have conducted relevant studies on bank liquidity risk and have reached meaningful conclusions. Rudhani, L. H^[1], represented by the Corvo banking system, discussed the

need for commercial banks to comply with the development of interest rate market reform and at the same time to comply with the changes in the general banking environment. Central banks have gradually relaxed their interest rate policies and interest rate marketization has gradually formed a trend. However, in the process of interest rate marketization, commercial banks are faced with the disturbance of liquidity risk. Several scholars measured the liquidity risk of commercial banks based on different ratios, among which, Liu^[2] used liquidity ratio to measure, Li Minghui^[3] used net stable financing ratio to measure, Yang, Chen Hong and Lin Key^[4] used liquidity coverage ratio to measure, and Ren Feifei^[5] used capital adequacy ratio to measure.

Currently, Chinese scholars have many methods to measure the degree of interest rate marketization, especially the following two: the first method is to first establish an indicator system and select numerous indicators to determine the weight of the level of interest rate marketization of commercial banks. Finally, the percentages are used to express the evaluation of the level of interest rate marketization of commercial banks. The researchers ranked the level of interest rate marketization according to different degrees of interest rate levels in China and constructed a set of measures of the degree of interest rate marketization through the time ranking and analysis of the interest rate marketization index. Wang Fan and Tao Yuanting^[6] used non-interest income ratio, loan ratio, and excessive loan growth rate to measure, Jiang Hai et al^[7] used deposit and lending rates, money market rates, bond market rates, and wealth management product yields, Zhang Yuan and Xue Qingmei^[8] selected indicators from three dimensions: actual interest rates, the way interest rates are determined, and the floating range. The second approach is to measure the interest rate market through single-variable research analysis, which has both advantages and disadvantages. The macro context of interest rate market is too one-sided when measured by a single variable. Yuehua Zuo and Xiaoxin Li^[9] used a single variable to measure and concluded that the stability of commercial banks increased under interest rate marketization.

Theoretical research on the impact of interest rate marketization on the liquidity risk of commercial banks in China has made some progress, but the conclusions are inconsistent, with the following two main views: The first one is the increase of bank liquidity risk. Feng Legend^[10] conducted a detailed analysis of the business and development of commercial banks, and the results showed that banks face more pairs of crises and challenges in the context of interest rate marketization. song.Z and Xiong.W^[11], in their discussion of China's financial system, found that interest rate reform is a crucial step for market-oriented interest rates in China, but it is often accompanied by crises that are not conducive to the stability of the banking system. Yue Zhang^[12] selected data from Bank of China, China Merchants Bank and Bank of Beijing to study the debt structure and interest rate volatility. The results of the study showed that interest rate marketization increased the liquidity risk of commercial banks. Zheng Xinjing^[13] studied commercial banks using different perspectives and explored the impact relationship among them in depth, and the results showed positive changes. Yuyan Tan, Xinrong Cui, Yue Zhang, Yang Q, and others^[14,15,16,17] concluded that China's interest rate marketization would, to some extent, increase the the risk of commercial banks. The second one is the reduction of bank liquidity risk. Xiang, Houjun, and Yan, Yu^[18] concluded that interest rate marketization has enhanced the liquidity risk management ability of commercial banks, and prompted them to innovate their business, which finally increased their risk-taking ability. Wu, Chengsong, Zhang, Shuhan, and Ni, Qing^[19] found that banks' business operations improved in the context of interest rate marketization, and various indicators of banks showed a stable to positive trend, In the long run, interest rate liberalization will increase the profitability of banks. In the long run, the liberalization of interest rates will give a boost to their development and facilitate the full use of price leverage.

2. Theoretical analysis of the impact of interest rate marketization on commercial banks' liquidity risk

2.1 Interest rate marketization

At present, interest rate market reform is a key step to enhance the stability of China's financial market system, China put forward the idea of interest rate marketization as early as 1993, and completed the reform of interbank lending rate and bond repo rate in 1996 and 1997 respectively, then in 2003, the central government started to carry out the reform of deposit and loan interest rate marketization, and in 2015, the central bank promulgated the "double-drop" document, which indicated the completion of the market reform of deposit and loan interest rates in China. In the transaction system of commercial banks in China, deposit and loan interest rates have been an important influencing factor, and the daily business of commercial banks in China is still dominated by traditional deposit and loan business. Commercial banks absorb funds through deposit transactions and then issue loans through credit transactions in order to obtain returns. This section will broadly measure the degree of interest rate marketization from the status of changes in the net interest rate spreads of commercial banks' deposits and loans. The data underlying this section are obtained from the CSMAR Guotaian database and are used as the basis for processing and analyzing the research.

As the interest rate market deepens, the interest rates on deposits and loans will be relaxed and fluctuate frequently, which will lead to increased competition among commercial banks and prompt them to lower their lending rates and raise their deposit rates to enhance their competitiveness. Based on this basic theory, this sub-section examines the net interest rate spreads on deposits and loans to roughly reflect the process of interest rate marketization in China in the past decade, and with reference to the two pictures below, we can see that overall the net interest rate spreads on deposits and loans of the five large state-controlled banks first declined and then basically stabilized, roughly taking 2016 as the cut-off year, we can learn that the marketization of interest rates deepened the fastest from 2014 to 2016. In contrast, the changes of the joint-stock banks are irregular, again roughly with 2016 as the cut-off point, probably caused by the liberalization of the 1.5 times floating limit on deposit rates in 2015, so we can see the rapid advance of the interest rate marketization process in China in the last decade.

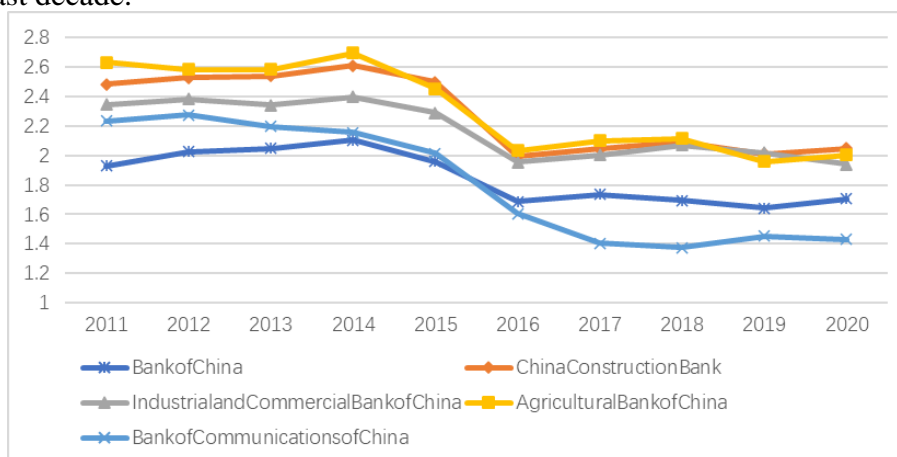


Fig 1. Changes in net deposit and loan spreads of state-owned banks (unit: %)

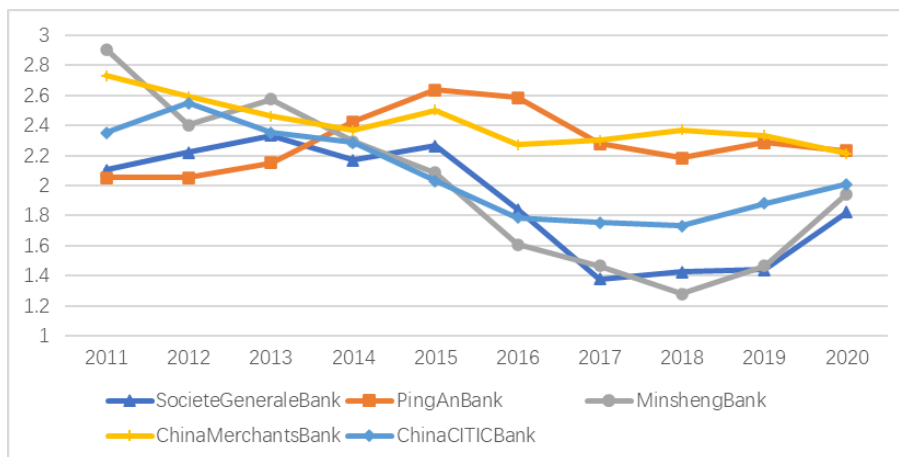


Fig 2. Changes in net deposit and loan spreads of commercial banks (Unit: %)

2.2 Liquidity Ratio

Commercial banks absorb short-term funds such as public deposits and use them to lend long-term funds to gain interest, which will create a liquidity gap for commercial banks, and commercial banks must keep a certain percentage of assets that can be quickly liquidated and highly liquid in order to meet public deposits and daily business activities. The China Banking Regulatory Commission also regularly publishes liquidity indicators for commercial banks in China. Fig 3 shows the changes of liquidity ratio of commercial banks in China from 2011 to 2020. It can be seen that the liquidity ratios of commercial banks have been above 40% in the past ten years, and each commercial bank has met the regulatory standard of 25% set by the CBRC. Overall, commercial banks' liquidity ratios show a slow upward trend, rising from 41.3% in the first quarter of 2011 to 58.4% in the fourth quarter of 2020. In terms of trend, the liquidity ratio of commercial banks fell to a certain extent between 2012 and 2013 due to the instability in China's financial markets. Therefore, commercial banks need to increase the proportion of high-quality liquid assets under interest rate marketization to cope with the liquidity pressure caused by unexpected events.

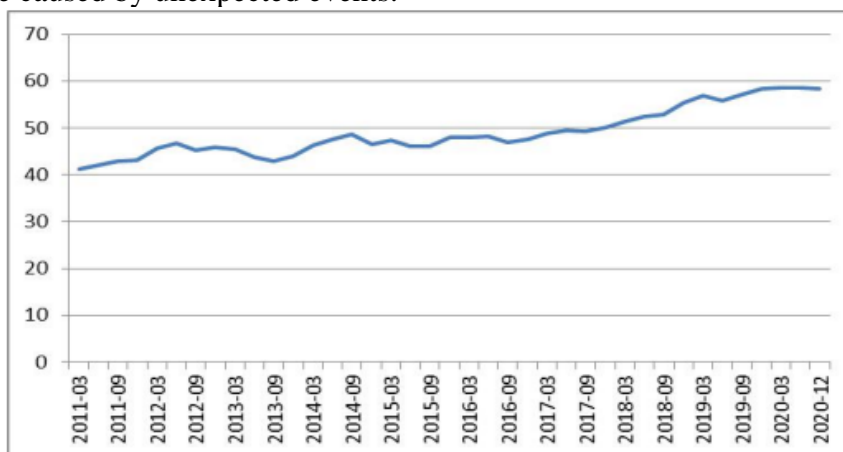


Fig 3. Changes in liquidity ratios of commercial banks from 2011 to 2020 (Unit: %)

2.3 Loan-to-savings ratio

Commercial banks rely mainly on deposit business to obtain high quality demand deposits and on loan business to earn income, so deposits and loans are the core business of commercial banks. On another level, the deposit to loan ratio reflects the degree of commercial banks' willingness to issue loans given a certain amount of deposits. Generally speaking, the higher the deposit to loan ratio, the higher the liquidity risk. Fig 4 shows the changes in the deposit-to-loan ratio of commercial banks from 2011 to 2020, with a roughly slow growth trend during the last decade, from 64.1% in the first quarter of 2011 to 76.81% in the third quarter of 2020, an increase of about 12 percentage points. Due

to the expansion of commercial banks in China in the last decade, there is a strong impulse to lend, so the deposit-to-loan ratio shows an upward trend. At the level of money supply, the money supply has grown rapidly in the last decade, which has also led to an increase in the loanable funds of commercial banks, which is the reason for the increase in the deposit to loan ratio.

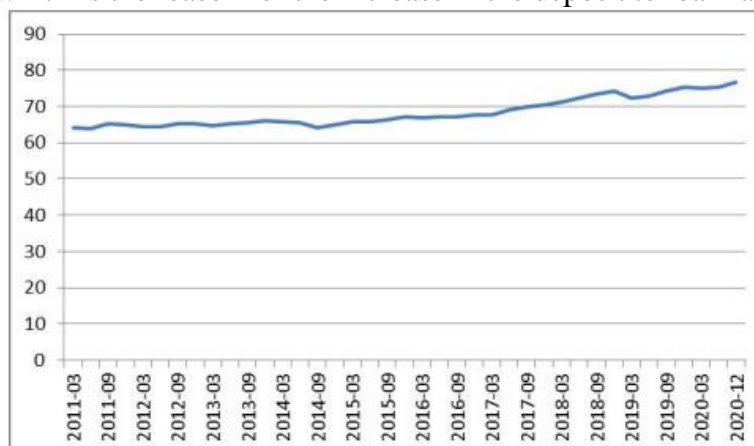


Fig 4. Commercial Banks' Deposit-to-Loan Ratio, 2011 to 2020 (Unit: %)

3. Data

3.1 Level of interest rate marketization

The independent variable in this paper is the level of interest rate marketization, mainly by constructing a multi-layer indicator system, after which each indicator is standardized, and then using hierarchical analysis to further determine the weights of indicators at each level, and finally calculating the values according to the weights in one step.

3.1.1 Index Selection

In this paper, we will select the interest rate market index and establish a multi-level indicator measure of interest rate market, which is can be seen in Table 1.

Table 1. Interest rate marketization measurement index system

Primary Indicators	Secondary Indicators	Indicator Description
Deposit and loan interest rates	RMB deposit interest rate (positive)	Time deposit rate (whole deposit 1 year)
	RMB loan interest rate (inverse)	Short-term loan interest rate (6 months to 1 year)
	Foreign currency deposit rates (positive)	Foreign currency deposit rate (USD deposit rate 1 year)
	Foreign currency loan interest rate (inverse)	Foreign currency lending rate (USD lending rate 1 year)
Money Market Rates	Interbank Offered Rate (Inverse)	Interbank Offered Rate (1 year)
	Bills discount rate (inverse)	Note rediscount rate (6 months)
Bond market interest rates	Bond issue rate (positive)	Interbank Pledged Return Rate (6 months)
	Bond Repo Rate (Inverse)	Fixed rate treasury bonds: Issue rate (6 months)
Wealth Management Product Yield Rate	Expected rate of return on wealth management products (positive)	Expected annual return on wealth management products (1 year)
	Trust product expected yield (positive)	Expected annual yield of trust products (1 year)

3.1.2 Standardized processing

Standardized processing aims to solve the unnecessary influence of data positivity and negativity on data results, and to improve the accuracy and science of the results. This paper will refer to the practice of Pei Huiru et al. In this paper, we will refer to Pei Huiru et al [21] to standardize the extreme differences of the secondary indicators and their normalization. Assuming that there are n indicators, and for the positive indicators apply equation (1):

$$\alpha_i = \frac{x_i - \min\{x_i\}}{\max\{x_i\} - \min\{x_i\}}, (i = 1, 2, \dots, n) \tag{1}$$

For the inverse indicator apply equation (2):

$$\alpha_i = \frac{\max\{x_i\} - x_i}{\max\{x_i\} - \min\{x_i\}}, (i = 1, 2, \dots, n) \tag{2}$$

The values of α_i after normalization are in the range of 0 to 1.

3.1.3 Weighting

In this paper, the weights of the resulting measurement coefficients will be calculated by referring to the coefficient of variation method used by Pei Huiru et al [21], which is shown in Equation (3) to Equation (5):

$$V_i = \frac{S_i}{\bar{\alpha}_i} \tag{3}$$

$$S_i = \sqrt{\frac{1}{m} \sum_{j=1}^m (\alpha_{ij} - \bar{\alpha}_i)^2} \tag{4}$$

$$\bar{\alpha}_i = \frac{1}{m} \sum_{j=1}^m \alpha_{ij} \tag{5}$$

where i represents the i-th indicator, j represents the j-th quarter, α_{ij} is the value of the i-th indicator in the j-th quarter, V_i is the coefficient of variation of the data of the ith indicator, S_i is the standard deviation of the data of the ith indicator, and $\bar{\alpha}_i$ is the mean of the data of the ith indicator. According to the corresponding coefficient of variation, the weight of the i-th indicator is calculated as shown in Equation (6).

$$\omega_i = V_i / \sum^n V_i \tag{6}$$

After calculating the weights of each indicator ω_i , the interest rate market index score is calculated as shown in Equation (7), as shown in Table 2.

$$f(\theta) = \sum^n \omega_i \times \alpha_{ij} \tag{7}$$

Table 2. Weights of comprehensive evaluation indicators

Primary Indicators	Weighting	Secondary Indicators	Weighting
Deposit and loan interest rates	0.12	RMB deposit interest rate (positive)	0.33
		RMB loan interest rate (inverse)	0.24
		Foreign currency deposit rates (positive)	0.24
		Foreign currency loan interest rate (inverse)	0.19
Money Market Rates	0.4	Interbank Offered Rate (Inverse)	0.68
		Bills discount rate (inverse)	0.32
Bond market interest rates	0.08	Bond issue rate (positive)	0.45
		Bond Repo Rate (Inverse)	0.55
Wealth Management Product Yield Rate	0.4	Expected rate of return on wealth management products (positive)	0.48
		Trust product expected yield (positive)	0.52

3.2 Liquidity risk measurement of commercial banks

Domestic and foreign scholars have used a variety of liquidity measurement methods, this paper will use the common deposit to loan ratio model to measure the liquidity risk of commercial banks in China. In this paper, we will use the common deposit-loan ratio model to measure the liquidity risk of commercial banks in China. When the loan-to-deposit ratio is high, it means that the liquidity is poor and the risk is higher. Therefore, commercial banks should strictly control the structure of deposit to loan ratio and do a good job of management of deposits and loans.

3.3 Research Model

According to the hypothesis of this paper, this paper will verify the influence relationship between variables and set up the model as follows:

$$Risk_{it} = \alpha_0 + \alpha_1 MIR_{it} + \alpha_2 LNSize_{it} + \alpha_3 CRR_{it} + \alpha_4 M2_{it} + \beta_{it}$$

Note: The variables are explained in Tables 3, β_{it} is the error term.

4. Empirical studies

4.1 Descriptive test

The variables are processed using Stata software and the descriptive statistics are shown in Table 3. From the table, we can see that the expected deposit to loan ratio of the 10 banks is 78.47%, and we can find that the highest deposit to loan ratio is 98.6% and the lowest is 58.5%, and the standard deviation is 10.46%, from this data we can conclude that the difference between the deposit to loan ratio of each bank is significant, and it also shows that the degree of liquidity risk of these 10 banks is different. The expectation of interest rate market index is 0.474, the maximum value is 0.61, the minimum value is 0.32, and the standard deviation is 0.075. In addition, we can also see from the table that the size and cost-to-income ratio of different banks are different and there are some differences. There is a large change in the growth rate of M2 in China in the last 10 years, which shows that the monetary and quasi-monetary growth is faster.

Table 3. Descriptive statistics of variables

Name	Abbreviation	Number	Expectation Standard	deviation	Min	Max
deposit to loan ratio(%)	Risk	400	78.47	10.46	58.50	98.60
Interest rate marketability index	MIR	400	0.474	0.075	0.32	0.61
Bank size(million)	LNsize	400	25.14	0.80	23.26	26.52
Cost to income ratio(%)	CRR	400	31.81	3.94	21.34	41.57
Monetary and quasi-monetary growth rate(%)	M2	400	11.81	2.48	8.00	17.2

4.2 Correlation test

Before building the regression model, the selected variables were tested for correlation. The results of the correlation coefficient matrix are shown in Table 4. From the matrix, it can be seen that only the correlation coefficient between the variable M2 and LNSize is 0.6957, indicating a strong correlation between bank size and monetary and quasi-monetary growth rates. The correlation coefficients of the other variables are less than 0.6, indicating that the correlation between the other variables is low.

Table 4. Correlation coefficient matrix

Variables	Risk	MIR	LNsize	CRR	M2
Risk	1				
MIR	0.5418	1			
LNsize	-0.1747	-0.2062	1		
CRR	-0.2547	0.0409	0.0378	1	
M2	-0.4320	-0.0817	0.6957	0.1433	1

4.3 Multicollinearity test

Before regression, the multicollinearity of the data should be checked to ensure that there is no multicollinearity among the sample data, otherwise the accuracy of the regression results may be affected, and the variance inflation factor (VIF) test will be used to test the multicollinearity of the data in this paper, and the results are shown in Table 5. From Table 5, we can learn that the VIF value of LNSize is 2.04, the VIF value of M2 is 2.00, the VIF value of MIR is 1.05, the VIF value of CRR is 1.03, and the total VIF value is 1.53, while the 1/VIF values are all greater than 0.1, indicating that the results of the multicollinearity test are good and can be further investigated.

Table 5. Multicollinearity test results

Variables	VIF	1/VIF
LNsize	2.04	0.49
M2	2.00	0.50
MIR	1.05	0.95
CRR	1.03	0.97
Mean VIF	1.53	0.65

4.4 Heteroskedasticity test

When performing linear regression, the condition of chi-square between variables should be satisfied, i.e., there is no heteroskedasticity. If there is heteroskedasticity between the variables, it will lead to errors in the t-test results in the regression and lose validity. The results in Table 6 show that the P-value of the White test result is 0.0566, which is larger than 0.05 and proves that there is no heteroskedasticity between the variables, so the mixed cross-sectional model can be selected for regression analysis.

Table 6. Heteroskedasticity test results

Test model	Chi	P
White test	23.23	0.0566

4.5 Regression analysis results

The regression results in Table 7 show that the explanatory variable MIR has a positive relationship with liquidity risk, and the explanatory variable MIR has an effect on liquidity risk of 16.6964 with a significant value of 0.000, which is significant at the 1% level, indicating that the larger the explanatory variable MIR, the stronger the liquidity risk.

First, bank size LNsize moves in the opposite direction of liquidity risk with a p-value of 0.0816, but the effect is not significant, indicating that to a certain extent, liquidity risk does not change significantly with the gradual increase in bank size. Secondly, the cost-to-income ratio CRR moves in the same direction as liquidity risk, with a p-value of 0.4590 and a significant value of 0.022, which is significant at the 5% level, indicating that to some extent, liquidity risk increases as the cost-to-income ratio gradually increases. Third, the monetary and quasi-monetary growth rates have the same direction of change with liquidity risk and are significant at the 1% level, thus showing that an

increase in domestic monetary issuance increases the liquidity risk of commercial banks to some extent.

Table 7. Regression analysis results

Variables	Risk	Significant coefficient
MIR	16.696***	0.000
LNsize	-0.081	0.534
CRR	0.459**	0.022
M2	0.021***	0.000
Cons	1.333	0.000
R ²		0.551
P		0.000

Note: ** and *** indicate significant at 5% and 1% level of significance, respectively

4.6 Heterogeneity test

There are differences between large state-owned commercial banks and joint-stock banks in terms of bank size, asset structure and profitability level, and the effect on liquidity risk will be different. After the interest rate market reform, large state-owned commercial banks will adjust their assets and business innovation under the influence of macro environment, but since their asset size is larger than that of joint-stock banks, the adjustment speed is definitely not as fast as that of small joint-stock commercial banks, so the impact of interest rate market reform on these two types of banks will definitely be different, and then the variable MIR×TYPE will be added for heterogeneity analysis to verify, and the results are shown in Table The results are shown in Table 8.

After processing the variables, MIR represents large state-owned commercial banks and MIR×TYPE represents joint-stock banks, we can see that the effect of MIR on liquidity risk is 16.6964, while the effect of MIR×TYPE on liquidity risk is -0.5822, but it is not significant. So we can learn that the liquidity risk brought by interest rate marketization is different for different types of commercial banks.

Table 8. Regression model after adding interaction terms

Variables	Risk	Significant coefficient
MIR	16.696***	0.000
LNsize	-0.081	0.534
CRR	0.459**	0.022
M2	0.021***	0.000
MIR×TYPE	-0.5822	0.521
Cons	1.333	0.000
R ²		0.551
P		0.000

Note: ** and *** indicate significant at 5% and 1% level of significance, respectively

4.7 Robustness tests

The robustness test in this paper is to add more control variables to the initial variables and the additional control variables are explained in Table 9. The two control variables are chosen on the basis that the non-performing credit ratio has an impact on the equity ratio of commercial banks, and in addition the equity ratio is linked to the liquidity of commercial banks, that is, it is related to liquidity risk. Credit transactions related to the provision coverage ratio are an important means of capital flow for commercial banks in China, and the related indicators are closely related to the liquidity risk of commercial banks.

The robustness tests of the liquidity risk model are shown in Table 9. The regression results show that interest rate marketization has a negative impact on commercial banks' liquidity risk and the effect is significant, which is the same as the empirical results in section 7 of this paper. In addition,

the effects of bank size, cost-to-income ratio, and monetary and quasi-monetary growth rate on commercial banks' liquidity risk remain unchanged, indicating that the model is robust.

Table 9. Robustness test results

Variables	Risk	Significant coefficient
MIR	14.042***	0.000
LNsize	-0.017	0.916
CRR	0.411**	0.038
M2	0.020***	0.000
Non-performing credit ratio (BLR)	0.014	0.671
Provision coverage ratio (PC)	-0.0002	0.140
Cons	1.4394	0.000
R ²		0.575
P		0.000

Note: ** and *** indicate significant at 5% and 1% level of significance, respectively

5. Suggestions for commercial banks to cope with liquidity risk in the context of interest rate marketization

5.1 Recommendations for commercial banks

5.1.1. Awareness of liquidity risk management and innovative adjustment of business structure

At present, under the effective management of the central bank, there has not yet been a large-scale liquidity shortage in China's banking industry, thus most commercial banks lack attention to liquidity risk management, especially under the current wave of interest rate market reform, liquidity risk will certainly become an issue that must be concerned in the development of commercial banks. Interest rate marketization will affect the liquidity of commercial banks to a certain extent, which requires commercial banks to be able to make timely adjustments after the interest rate marketization reform.

In addition, commercial banks can innovate and adjust their business structure. From this paper, we can learn that the profit of commercial banks mainly comes from the traditional business of deposit and loan business, and under the background of interest rate marketization, interest rates fluctuate drastically, so the deposit and loan business of commercial banks will be greatly affected, under which commercial banks should change their traditional profit model, make efforts to innovate and strengthen risk control management. In addition, commercial banks need to expand their business scope, strengthen loans to small and medium-sized enterprises, and enhance the efficiency of capital use.

5.1.2. Improving the ability to cope with liquidity risk and improving the risk management system

Under the background of interest rate marketization, commercial banks will face greater risk challenges, such as the decline of deposit stability, the decrease in the number of loans, reduced liquidity and a series of problems, and the ability of China's commercial banks to cope with liquidity risk still needs to be improved, in the face of strong interest rate market pressure will appear the problem of illiquidity, and this phenomenon will exist in the medium and long term, so in the background of interest rate marketization, commercial banks Therefore, in the context of interest rate marketization, commercial banks should strive to improve their ability to cope with liquidity risk.

On the other hand, it is important to establish a high quality internal database to ensure that there are no system failures that could have serious consequences. Banks also need to have specialized and highly skilled personnel in charge of risk management, using advanced risk management methods to have a precise grasp of market conditions and the general environment, and to adopt professional

skills to make effective assessments of liquidity risk and further develop and implement response strategies.

5.1.3 Accelerate business transformation and upgrade to broaden access to liquidity

Commercial banks should learn to transform and upgrade their business and enhance their competitiveness through innovative business development directions and models so that they can cope with interest rate fluctuations brought about by the interest rate reform. Commercial banks can vigorously develop related businesses with other banks, improve their own development models, gain additional profits, and do their best to reduce the drawbacks caused by the interest rate market reform and achieve wider and broader income channels. The interest rate market reform will lead to a series of asset shortages in commercial banks.

Commercial banks should prepare for the future, seize the characteristics of the reform, broaden the access to liquidity, broaden the scope of liability business according to their own business characteristics, get rid of the single method of obtaining liquidity from traditional deposit and loan business, and implement diversified development methods. It is important to broaden the access to liquidity.

5.2 Suggestions for macro policies

5.2.1. Steadily promote the marketization of interest rates and improve the deposit insurance system

The supervisory authority should consider the actual situation of China's financial market and the macro environment of the banking industry, design flexible supervisory indicators, further develop supervisory policies in line with China, encourage commercial banks to carry out financial innovation and increase the competitiveness of their products and services, and at the same time strengthen financial supervision.

With the advancement of interest rate market reform, there may be a run on both large state-controlled banks and joint-stock banks. In comparison, joint-stock banks have greater liquidity risk, and the run will reduce public confidence in banks, and in serious cases, it may even lead to bank failures, resulting in a large reduction of bank demand deposits. Therefore, China should improve the deposit protection system to ensure that customers do not suffer losses, protect the normal operation of the banking system, and continuously improve the rules of the system, so as to cooperate with the interest rate market reform, reduce the liquidity risk of commercial banks, and maintain the stability of the financial system.

5.2.2 Fast talent development to effectively manage liquidity risk

Whether in state-owned or joint-stock banks, risk management talents are essential. Interest rate market reform will bring various risks, and the state can introduce relevant policies to support the training of risk management talents, specialize them and improve their overall quality and resistance to stress so that commercial banks can effectively respond when they encounter liquidity risks. In addition, it is also necessary to cultivate the sensitivity of technical personnel to market changes so that they can respond and develop effective measures in a timely manner when the market environment of the banking industry and its general financial market environment change. Commercial banks should also develop effective talent training programs, make efforts to select the best talents and give more incentive programs so that commercial banks can effectively respond to liquidity risk problems when they encounter them.

6. Summary

This paper starts from the macro level and reveals the background of the times and the banking industry environment formed by the interest rate market reform. In the context of the era of interest rate market reform, it brings certain benefits to commercial banks in China, but also brings various risk challenges, and commercial banks urgently need to take corresponding measures to cope with

liquidity risk challenges, and the existing commercial banking system has been unable to meet the rapid development of China's economy and society, and needs deeper improvements in parallel with the deepening reform of the financial market, and more effective measures are needed to deal with liquidity risk.

This paper summarizes the research content and draws the following conclusions. Firstly, The interest rate market index MIR is positively related to the liquidity risk of commercial banks. In other words, it indicates that commercial banks will experience liquidity shortage after the interest rate market reform, which will lead to risks. The improvement of interest rate market reform has a great impact on deposit and loan interest rates, and the range of interest rate fluctuation is gradually expanded, because the liquidity of commercial banks is mainly composed of deposits and loans, so commercial banks will increase the interest rate of the public when they conduct deposit business, and at the same time will give borrowers certain benefits to ensure that they can be competitive enough in the banking industry, which will lead to the decline of commercial banks' profit. This will lead to the decline of commercial banks' profits and the increase of risks. Secondly, The reform of interest rate market will bring liquidity risk to both state-owned and joint-stock commercial banks, but the liquidity risk brought to the two types of banks will be different, and the effect is not obvious. Thirdly, The asset size of state-owned commercial banks is larger than that of joint-stock banks, and the adjustment is slower. The analysis shows that the size of banks does not effectively affect liquidity risk, so it is not a key influence variable. Lastly, Monetary and quasi-monetary growth rates move in the same direction as liquidity risk and are significant at the 1% level, thus showing that an increase in domestic monetary issuance increases the liquidity risk of commercial banks to some extent. It shows that different monetary policies will have different effects. Summing up the four conclusions above, liquidity risk increases in both state-owned and joint-stock banks after the background of interest rate marketization.

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