

International Capital Flow, Monetary Policy and Commercial Bank Risk Taking—An Empirical Analysis Based on China's Commercial Banks

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Abstract. In order to study the impact of international capital flow, monetary policy on commercial banks' risk-taking, this paper uses the unbalanced panel data of 48 banks in China from 2004 to 2018 China as the research sample. The GMM estimation method is used in the empirical test, empirical results show that (1) Both quantitative-based and price-based monetary policy have a significant impact on the stability of commercial banks in China. Loose monetary policy weakens the ability of commercial banks to identify and assess risks, which increases their risk-taking level. (2) The international capital flow index has a significant impact on the stability of China's commercial banks. International capital flows will increase bank risk levels and significantly reduce the stability of commercial banks, and vice versa. (3) Under the combined effect of interest rates and international capital flows, the robustness of commercial banks has been significantly magnified.

Keywords: International capital flow, monetary policy, commercial bank risk-taking

1 Introduction

As an important part of China's economic system, the banking industry is the foundation of China's investment and financing system and an important source of funding for economic development. Under this bank-led financial development model, the stable operation of banks plays a vital role in the development of financial markets.

In terms of international capital flows, with the increasing opening of national economies and the gradual elimination of institutional and technical factors that hinder capital flows, capital flows on a global scale are reaching unprecedented heights. While international capital flows are highly efficient in resource allocation, they also bring a series of risk effects such as asset price bubbles, currency substitution, capital flight, currency crisis and debt crisis, which will impact the stability of a country's banking industry.

As an important means of regulating the economy, the monetary policy has been widely adopted by countries all over the world. More and more studies have shown that monetary policy is one of the reasons for excessive bank risk-taking, which weakens the stability of the banking system. Monetary policy affects financial institutions, especially banks' risk appetite or risk tolerance, and then influences bank portfolios, credit risk pricing, and loan decisions, and ultimately on the real economy.

2 Literature Review

2.1 International Capital Flow and Commercial Bank Risk Taking

Since the reform and opening up in China, scholars who have studied the impact of international capital flows on the stability of China's banking system have gradually increased. However, there are still different perspectives on the relationship between international capital flows and bank risk taking.

Some scholars believe that international capital flows have a positive impact on bank stability. Due to the economic globalization and the growth of international financial integration, the opening of national capital accounts is often seen as an important measure to gain economic growth. The free flow of capital can increase the efficiency of the allocation of funds worldwide. It can also improve the lack of funds in

capital-inflowing countries and the lack of good investment projects in capital-funded countries. In addition, it can promote the employment of funds in the country and raise the welfare level of the country. The free flow of capital can better diversify risks and make the financial system more stable. According to the capital asset pricing model, Demirgüç-Kunt (2001) selected the commercial bank data of 80 countries from 1988 to 1995 as the research object, pointing out that the degree of openness of the financial system is positively related to the stability of the banking system. The more open a country's financial system is, the more stable the banking system. Zhang Fangfang (2009) believes that short-term international capital inflows have had a powerful impact on China. By raising the overall liquidity level of the banking industry, the possibility of liquidity risk has been significantly reduced. This conclusion is in line with the background of China's efforts to attract foreign investment and China's Renminbi in a slow appreciation channel.

But there are also a large number of scholars with opposite views. Their research found that the free flow of international capital would have an impact on the stability of a country's banking system, threatening the stability of the entire macroeconomic environment. Fang Xiancang (2014) believes that the instability of short-term international capital flows will lead to the expansion or contraction of the open-end bank's balance sheet. At the same time, for countries with inadequate banking systems, international capital inflows often lead to blind expansion of credit in the banking system, which will extend bank lending to more risky debtors. Taking into account these two factors, capital flows will have an impact on the country's banking system. Ma Li (2018) studied the advantages and disadvantages of short-term cross-border capital to China, and believed that reasonable short-term international capital flows can accelerate China's financial system to integrate into the global economic system and improve the efficiency of global economic development. However, unreasonable international capital flows will impact our financial markets and pose a great threat to the global economy. Qian Xiaoxia (2018) constructed a bank stability index in line with China's economic and financial development based on the currency crisis and the open economy macroeconomic theory. Through the MS-VAR model, it analyzed the short-term cross-border capital flows under the external impact of the global market. The impact on the stability of China's banks. The empirical results show that when external shocks such as the subprime mortgage crisis, the European debt crisis, the implementation and exit of the US quantitative easing policy, and the Fed's interest rate hike, the volatility of short-term cross-border capital flows and the bank stability index increased significantly and formed an asymmetric effect.

2.2 Monetary Policy and Commercial Bank Risk Taking

After the financial crisis, scholars began to pay attention to the research on the impact mechanism of monetary policy on bank risk-taking. The important role of monetary policy in bank risk-taking has been widely recognized by the academic community.

Borio and Zhu (2008) analysed the operational mechanism of the banking entity's competitive effects and summarized the monetary policy risk-taking channels. They believe that the low interest rate policy increases the liquidity of banks, the competition between the banks is deteriorating, and the uncertainties are injected into the stable operation of the banking industry. Bank managers will increase their risk-taking behavior in pursuit of profit growth. Buch (2013) used the FAVAR model and used the financial data of 213 banks in the United States in 1997-2012, the study shows under the low interest rate monetary policy environment, the risk-taking level of foreign banks tends to decline, and the risk-taking behavior of large commercial banks has not changed, and small-scale commercial banks are increasingly willing to take risks. Wang lujia(2017) used the annual data of 16 listed banks in China to test the feedback mechanism on different monetary policy positions through dynamic panel model. The paper shows that monetary policy has a significant impact on the risk-taking of commercial banks in China, which in turn will affect the total amount of credit and total social output. At the same time, the risk-pricing effect, profit-seeking effect, and leverage effect are important mechanisms for the risk-taking channels of commercial banks in China. They have an important influence on the transmission of monetary policy. Ke konglin(2018) believes that both quantitative-based monetary policy and price-based monetary policy are non-neutral. Loose monetary policy promotes systemic risk exposure of China's listed commercial banks. The impact of different monetary policy cycles on the systemic risk of listed banks is asymmetric. The tightening monetary policy has a stronger inhibitory effect on the listed banks' systemic risks than the loose monetary policy.

3 Empirical Analysis

3.1 Sample Data Selection

This paper uses the unbalanced panel data of 48 banks in China from 2004 to 2018 China as the research sample. These data come from the wind database. The GMM estimation method is used in the empirical test.

3.2 Research Design

In order to analyze the impact of international capital flow, monetary policy on bank risk-taking, this paper establishes a panel regression model for empirical testing:

$$risk_{i,t} = \alpha_0 + \alpha_1 risk_{i,t-1} + \alpha_2 MP_{i,t} + \alpha_3 ICF_{i,t} + \alpha_4 MP_{i,t} * ICF_{i,t} + \alpha_5 Con_{i,t} + \theta_i + \varepsilon_{i,t} \tag{1}$$

where $risk_{i,t}$ is dependent variable, indicates the level of risk-taking of commercial banks. At present, the agent variables of bank-taking mainly include expected default rate, non-performing loan ratio, bankruptcy risk Z-score and risk-weighted assets as a percentage of total assets. This paper chooses Z-score as a proxy variable.

$$Z_{i,t} = [ROA_{i,t} + \left(\frac{E}{A}\right)_{i,t}] / (\sigma_{ROA})_{i,t} \tag{2}$$

$MP_{i,t}$ is the monetary policy i during t period, including M2 growth rate and one-year deposit rate. Considering the international capital flow, this paper refers to Xiao Weiguo's (2016) methods to build an indicator. The formula for calculating $ICF_{i,t}$ is as follows:

$$ICF_{i,t} = \frac{Foreign\ Direct\ Investment + foreign\ securities\ investment}{GDP} \tag{3}$$

$Con_{i,t}$ denotes control variables; θ_i denotes the individual fixed effect of each bank; $\varepsilon_{i,t}$ shows the heterogeneous characteristic that changes with time. The specific definition and the method of calculation of each variable are shown in table 1.

Table 1. The specific definition of all variables

	Variables	Symbol	The Method of Calculation
Explained Variable	Bank risk-taking	lnz	$\ln(Z\text{-score})$
	International Capital Flow	icf	$\frac{Foreign\ Direct\ Investment + foreign\ securities\ investment}{GDP}$
Explaining Variables	Monetary Policy	m2g rate	M2 growth rate One-year Deposit rate
	Scale of banks	size	$\ln(\text{Total Assert})$
Control Variables	Return on Assets	roaa	Return on Assets
	Capital adequacy ratio	car	Capital adequacy ratio
	Macroeconomic variable	gdp	The growth of GDP

3.3 Stationarity Test and Descriptive Statistics

Table 2. The Stationarity test result

	LLC test	p-value	result
lnz	-0.72698	0.0000	Stable
m2g	-1.18182	0.0000	Stable
rate	-1.50315	0.0000	Stable
icf	-5.7112	0.0000	Stable
size	-0.08132	0.0000	Stable
roaa	-0.54222	0.0000	Stable
car	-0.2231	0.0000	Stable
gdp	-0.89.56	0.0000	Stable

Table 1.2 shows the unit root test results. The p-values of the LLC test are very small, indicating that both the explanatory variable and the interpreted variable reject the unit root, and each control variable also rejects the unit root, indicating that each variable is stable.

Table 3. The descriptive statistics of main variables

Variable	Obs	Mean	Std. Dev.	Min	Max
lnz	553	4.207	0.952	1.533	7.571
m2g	553	14.40	4.688	8.170	28.50
rate	553	2.461	0.723	1.500	3.922
icf	553	0.0218	0.00665	0.0100	0.0385
size	553	6.084	1.874	2.167	10.23
roaa	553	0.982	0.410	-0.971	2.700
car	552	12.04	2.603	1.450	30.14
gdp	512	8.754	2.011	6.600	14.23

ln(Z-score) of banks range from 1.533 (Guangdong Development Bank, 2005) to 7.571 (China Construction bank, 2013), with an average of 4.207.

3.4 Regression Result

Table 4. The descriptive statistics of main variables

VARIABLES	(1)	(2)	(3)	(4)
	m1	m2	m3	m4
	lnz	lnz	lnz	lnz
L.lnz	0.549*** (0.0172)	0.548*** (0.0177)	0.579*** (0.0262)	0.567*** (0.0251)
m2g	0.0140*** (0.00276)		0.0750** (0.0337)	0.0189*** (0.00349)
rate	0.0268** (0.0104)		0.0336** (0.0147)	1.088*** (0.125)
icf		30.78*** (2.820)	68.61*** (22.10)	145.9*** (14.18)
size	-0.0385*** (0.0123)	-0.104*** (0.0102)	-0.00102 (0.0278)	0.00882 (0.0229)
roaa	0.234*** (0.0564)	0.638*** (0.0341)	0.467*** (0.0701)	0.286*** (0.0721)
car	0.0151** (0.00625)	0.0341*** (0.00492)	0.0304** (0.0138)	0.0319*** (0.00818)
gdp	-0.119*** (0.00502)	-0.174*** (0.00605)	-0.182*** (0.00754)	-0.149*** (0.0105)
m2g*icf			-2.345 (1.460)	
Rate*icf				-53.45*** (6.490)
Constant	2.481*** (0.140)	2.355*** (0.135)	0.663** (0.309)	-0.824** (0.357)
Observations	464	464	464	464
Number of id	48	48	48	48
AR(1)	0.0000	0.0000	0.0000	0.0000
AR(2)	0.213	0.071	0.068	0.036
Sargan test	0.9900	0.9674	0.9995	0.9997

t-value in parentheses, *, **, *** indicate the level of significance of 10%, 5% and 1%, respectively.

In table 4, both Sargan test and AR test were performed on the instrument variables. Among them, the Sargan test P value of the instrumental variable is greater than 0.05, and the null hypothesis of "no over-recognition" cannot be rejected, and no over-recognition is considered. The Arellano-Bond test of the residual sequence is greater than 0.05, and the null hypothesis of "there is no second-order sequence correlation" cannot be rejected. In summary, it is reasonable to use the first-order lag term of the endogenous variable as a tool variable.

This paper study the impact of international capital flow, monetary policy on commercial banks' risk-taking. Table 4 shows the regression results of the system GMM. It can be seen from table 4, the bank's Z-value is significantly negatively correlated with M2 growth rate and one-year deposit rate at a 5% confidence level. The higher the Z value, the more stable the bank, the less risk the bank will go bankrupt. That is to say, when the monetary authorities implement a relatively loose monetary policy, commercial banks can assume higher risks and have higher stability. In the bank-level control variables, the asset size estimation is significantly negative (-0.0385), indicating that the larger the size of a commercial bank's assets, the lower its willingness to operate steadily. The return on assets is significantly positive (0.234), which indicates that if a commercial bank has a very high return on assets, then its more risk-taking, the willingness to operate steadily is not strong.

In addition, in terms of the relation between international capital flow and commercial banks' risk-taking, the bank's Z-value is significantly negatively correlated with international capital flow (icf) at a 5% confidence level. When the international capital flow index increased by 1%, the z value increased by 30.78 %. With the bank risk-taking level decreased, the stability of commercial banks decreased.

The coefficient of Rate*icf is significantly negative, indicating that under the combined effect of interest rates and international capital flows, the robustness of commercial banks has been significantly magnified.

3.5 Robustness Test

In order to test the robustness of the research, this paper replaced lnZ with NPL (non-performing loan ratio). The signs of the coefficients are consistent with the result of the benchmark regression. Among them, the m2g variable is significantly positive at the 1% significance level. Although the value of coefficient is slightly different, its effect on the explanatory variable (NPL) is consistent with the benchmark regression. The conclusion is still stable.

4 Conclusions

Based on the dynamic panel data of 48 commercial banks in China from 2004 to 2018, the impact of international capital flow and monetary policy on bank risk-taking is examined. This paper uses Z value and non-performing loan ratio to reflect bank risk-taking. The results show that:

- (1) Both quantitative-based and price-based monetary policy have a significant impact on the stability of commercial banks in China. First, the central bank's loose monetary policy will increase the price of mortgage assets, and the borrower can obtain more funds with the collateral. Due to the valuation effect, the price of mortgage assets may decline in the future. When the value of the collateral is seriously lower than the amount of funds lent by the commercial bank, the commercial bank may be subject to default risk; Second, the loose monetary policy indirectly enhances the asset value of commercial banks, and the balance sheet can be improved. Commercial banks will reduce the bank loan interest rate and proactively engage in high-risk investments, resulting in an increase in leverage and a decline in robustness; Third, loose monetary policy stimulates economic growth, and commercial banks have optimistic expectations for the future economic situation. It may weaken the ability of commercial banks to identify and assess risks, which reduces their robustness.
- (2) The international capital flow index has a significant impact on the stability of China's commercial banks. International capital flows will increase bank risk levels and significantly reduce the stability of commercial banks, and vice versa. At present, China's financial market is constantly open, and the inflow of international capital makes banks more liquid, which creates conditions for credit expansion. Both international capital flows and bank credit expansion jointly promote the development of the domestic economy, and the risk exposure of commercial banks has increased. However, when faced with excessive credit expansion, the stability of commercial banks is seriously threatened. In the

absence of effective risk assessment and management of bank credit, credit funds continue to enter high-risk sectors, and the risk of default and bankruptcy greatly increases, the stability of the financial system decreases.

- (3) Under the combined effect of interest rates and international capital flows, the robustness of commercial banks has been significantly magnified. When international capital flows are more intense, regulators should consider using loose monetary policy; or when international capital flows slow down, regulators should use tight monetary policy appropriately. It can effectively reduce the risk-taking of commercial banks and enhance the stability of them.

5 Policy Suggestions

This paper confirms that the monetary policy and international capital flow both have a significant impact on the stability of China's commercial banks. Based on the above conclusions, this paper proposes the following policy recommendations:

First, it is necessary for regulators to incorporate the stability of commercial banks into the macro-prudential management framework of the central bank's monetary policy response function.

Second, with the gradual liberalization of China's capital account, international capital flows will become more frequent and the scale will continue to increase. When an international emergency occurs, international capital flows are difficult to be identified in advance. Therefore, before the capital project is fully opened, China's commercial banks should continuously improve their risk prevention awareness and skills so that they can improve their ability to manage the balance sheets. When in good operating conditions, China's commercial banks can reduce the profit level, increase the provision for extraction, improve the management level of credit risk, and actively prevent and respond to external shocks.

Third, During China's financial reform, the final result is to achieve the liberalization of the capital account. However, at present, China does not have the basis for realizing capital account liberalization. In the process of promoting capital liberalization, capital mobility will increase, and domestic financial market fluctuations will be more intense. Therefore, at this stage, capital control will be adopted to prevent capital from flowing into China's capital market in a short period of time, thereby stabilizing the foreign exchange market and ensuring the stability of the exchange rate of the local currency, which will also achieve the steady development of commercial banks.

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