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The Effect of Cross-border Capital Flows on Commercial Banks' Risk-taking in China

Difei Zhang[1,a,*]

[1]*Institute of Finance, Central University of Finance and Economics, Beijing, 100000, China*
[a]*zhangdf5566@outlook.com*
[*]*Corresponding author*

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Abstract: As China's opening up continues to improve, the capital market has developed a pipeline-style opening, which gradually increased the proportion of foreign investors and correspondingly enlarged the scale of cross-border capital flows. However, the increasing scale and volatility of cross-border capital flows may cause cross-border contagion of financial risks and affect bank risk-taking. To examine the relationship between cross-border capital flows and bank risk-taking, this study examines the impact of cross-border capital flows on commercial banks' risk-taking in China, using data from 38 banks over 2016-2022. Empirical results reveal that increased capital flows significantly heighten banks' risk-taking. Besides that, the impact of cross-border capital flows on bank risk-taking is heterogeneous. The risk-taking level affected by cross-border capital flows of city and rural commercial banks has increased much higher than that of state-owned banks and joint-stock banks. These findings underscore the need for targeted macro-prudential policies to manage financial stability amidst expanding capital flows.

1. Introduction

Financial opening-up is China's opening-up pattern and an inherent requirement for supply-side reform of the financial structure and achieving high-quality economic development. China's capital market has now formed a pipeline-style opening-up. With the opening channels of stock market, the proportion of foreign investors and scale of cross-border capital flows has gradually increased, which enhanced the liquidity of financial markets and promoted the development of international trade and investment. However, at the same time, there is an impact on the stability of the financial system. Capital flows have had a significant effect on asset allocation, asset prices (Zhang and Liu, 2021)[18][18][18], and financial leverage (Jin et al., 2020) [12].

The scale and volatility of cross-border capital flows have gradually increased. Changes in the international economic situation have intensified cross-border capital flows. With China's financial openness and internationalization of RMB, the scale of cross-border capital flows increased. As an investment target for capital, the RMB has formed a new cross-border capital investment market, further driving the volatility. The "China Financial Stability Report 2022" points out that capital flows are facing the risk of shocks, and the macro-prudential management of capital flows should be further strengthened to maintain the stability of the financial system.

Banking industry is significant to China's financial stability and prevents financial risks. However, as a link between international and domestic financial markets, the banking system is affected by capital flows. It enters the banking system in the form of short-term wholesale financing, causing a series of changes in bank credit scale, which may increase bank risk-taking and be detrimental to the stability of the banking system. Therefore, it is crucial to explore its impact on commercial bank risk-taking, which is important to promote further China's financial opening up and stable development of financial markets.

This article analyzes the impact of capital flows on commercial banks' risk-taking through theoretical analysis and empirical research. The study finds that capital flows significantly increase banks' risk-taking levels, and have a greater impact on city and rural commercial banks than state-owned banks and joint-stock banks. The main contributions are as follows. Firstly, we use micro-level bank data, to empirically test whether capital flows have an impact on commercial banks' risk-taking, and it affect in what direction. Secondly, heterogeneity tests is used to analyze the impact of cross-border capital flows on different types of banks.

2. Literature Review

Some scholars believe that cross-border capital flows ease bank risk-taking and enhance banking system stability. Chari and Henry (2002) [1] found that a high level of financial openness helps maintain bank stability. Enrica (2006)[5] found that capital flows help reduce bank liquidity risk and enhance banking system stability. Li et al. (2020) [14] believed that due to the knowledge spillover effect and external supervision effect, with the inflow of foreign capital, the risk-taking level of banks will be reduced. Gu and Zhang (2021) [10] found that the increase in the scale of cross-border capital flows weakened loan competition among banks, thereby suppressing the risk-taking of banks.

Some cholars believe that capital flows will increase bank risk-taking levels. Goldfajn and Valdes (1997)[7] conducted an early study on bank risk and capital flows, and they found that before and after banking crises, there would be significant fluctuations in the scale of capital flows. Xu (2021)[17] conducted research on banks in emerging markets and found that global capital flows will increase bank risk-taking if degree of financial openness is high. Xie and Yu (2023) [16] found that capital flows significantly increased commercial banks‘ systemic risks. Fang et al. (2017) [6] found that after China open capital account, the scale of bank capital flows increased, and bank's liability side may face greater liquidity risks, and the capital side faces financing cost risks, increasing bank systemic risks. Chen and Li (2022) [2] thought that banks' active risk-taking and passive risk-taking have increased due to capital flows. In summary, the academic community has not yet reached a consensus on capital flows and bank risk-taking.

There are some theoretical studies. Bruno and Shin (2015) [3] found that capital flows increase risk-taking of financial intermediaries through international risk-taking channels. He and Li (2018) [11] applied the study of international risk-taking channels to China. Establishing a theoretical model, they showed that capital flows push up risk-taking level by increasing post-risk of information asymmetry of financial intermediaries, which explains the large fluctuations in the stock market in 2015. Zhang and Zhong (2020) [19] used the DSGE model to find that cross-border capital flows form a global financial cycle, which makes bank‘s risk-taking in other countries converge with that of the United States and do harm to the financial stability of other countries.

Regarding different types of capital flows, Zhou (2018) [22] found that direct investment outflows and securities investment inflows would aggravate bank risks. Gu and Yu (2020) [9] found that cross-border capital flows would push up bank credit risks. Cross-border capital flows are divided into direct investment inflows and indirect investment inflows and the increase in bank risk was

mainly affected by indirect investment. Zhao and Xu (2021)[21] found that foreign direct investment had no impact on bank risks, but other investments increased banks risk. Jing et al. (2022) [13] found that the volatility of cross-border liabilities had a far greater spillover effect on bank risks than cross-border assets.

As for the different types of banks, Dinger and Kaat (2020)[4] studied eurozone banks found that influence of capital inflows is related to the bank's credit scale and average loan quality. The impact on large banks and banks with lower capital levels is more obvious. Zhao and Xu (2021) [21] found that banks with larger scales, higher capital adequacy ratios, and stronger profitability are more sensitive to capital flow. However, Zhao and Chen (2023) [20] found that compared with large banks, the risk-taking of small and medium-sized banks increased faster.

3. Theoretical Analysis

Capital flows may affect banks' risk-taking through various channels. Capital flows affect banks‘optimal risk asset allocation structure by affecting their funding costs. With the inflow of cross-border funds, the cost of obtaining funds decreases, then the credit business expands. Banks may relax credit requirements and look for subprime lenders to issue loans. To increase operating income, banks expand leverage or invest in high-risk and high-yield projects, which aggravates bank risks. When the international financial market is hit and cross-border capital flows out, bank credit tightens and operating profits decline, triggering operating risks. At the same time, enterprises’ repayment ability declines. Affected by the international financial shock, banks' expected losses may further accumulate because of financial asset price fluctuation, which, increases bank risks. Besides that, cross-border capital flows may exacerbate banks' liquidity mismatch. Capital enters the banking system in the form of short-term funds, while increased credit on bank's asset side is generally long-term funds, which aggravates bank risk-taking. In addition, capital flows affect ex-post risk of intermediary information asymmetry. When capital flows in, the return on ordinary assets declines. Then banks have the motivation to buy higher-risk assets, which increases the moral hazard of financial intermediaries. The higher the risk level, the higher the risk-bearing effect of capital flows. When the risk value is too high, cross-border capital behavior is reversed and a financial contraction is formed. Hypothesis 1 is proposed.

H1: Cross-border capital flows intensify commercial banks' risk-taking level.

As for Different types of banks. Compared with city and rural commercial banks, state-owned banks and joint-stock banks have a stronger ability to absorb savings. Faced with shock, the scale of credit of big banks does not fluctuate significantly, and the impact on changes in asset structure is limited, therefore the effect on risk-taking will be limited. Besides that, the quality of loan recipients of city and rural commercial banks is not as good as that of state-owned banks and joint-stock banks. When the scale of credit increases, urban and rural commercial banks are more likely to look for secondary lenders, which may cause a liquidity mismatch. The asset quality of state-owned banks and joint-stock banks is generally higher and the fluctuations in asset prices are smaller when faced with cross-border capital liquidity shocks. In addition, owing to larger scale and high market share, big banks are subject to stricter supervision. They are required to have higher risk-bearing capacity than city and rural commercial banks and operate more prudently. Therefore, the shock of capital flows is unlikely to affect them. Hypothesis 2 is proposed.

H2: Compared with state-owned banks and joint-stock banks, cross-border capital flows have a greater impact on the risk-taking level of city and rural commercial banks.

4. Model Design

4.1. Data Sources

We select 38 banks that were listed on Chines stock market before 2016, including 6 state-owned banks, 9 joint-stock banks, and 23 city commercial banks. The samples range from 2016-2022, with a total of 266 observations. Macroeconomic data comes from the China Economic Network database, and bank financial data comes from the Eastmoney.

4.2. Variable Selection

Independent variables. According to Sun and Wang (2020) [15], the ratio of the balance of non-reserve financial accounts to GDP is chosen as the proxy for the level of cross-border capital flows (CF).

Dependent variable. Based on the research of Xu (2021) [17], the non-performing loan ratio (NPL) is selected as the proxy variable to measure bank risk-taking. The higher the proportion, the greater the bank's risk-taking. In addition, the Z value (Z) is selected as an auxiliary variable for bank risk-taking. The larger the Z value, the higher the degree of bank risk-taking.

Control variables. Referring to the studies of Jiang and Chen (2011), Gu and Bian (2021) [8] this paper selects GDP growth rate (GDP), money supply growth rate (M2), and economic policy uncertainty (EPU) as macroeconomic control variables and selects bank capital adequacy ratio (CZ) as a proxy variable to measure capital level, and the stock market value (SMV) to measure the level of market development. Bank size (size), loan-to-deposit ratio (CD), and return on assets (ROA) are chosen as micro-bank characteristic variables.

Instrumental variables. To solve endogeneity problems and avoid the effect of omitted variables, this paper selects loan balance (LB) as an instrumental variable for the endogeneity test based on the research of Zhao and Chen (2023) [20].

4.3. Empirical Model

4.3.1. Benchmark Regression Model

To examine the impact of capital flows on bank risk-taking, the benchmark panel regression model is as follows:

$$RISK_{it} = \beta_0 + \beta_1 CF_t + \beta_3 X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

The dependent variable is the risk-taking level of bank i in year t, the independent variable is the cross-border capital flow in year t, X_{it} contains a series of control variables, μ_i is the individual fixed effect, and ε_{it} represents the random error of the model.

4.3.2. Two-stage Least Squares Regression

To deal with the endogeneity problem between capital flows and bank risk-taking, this paper selects loan balance as an instrumental variable for a two-stage regression and conducts an endogeneity test.

$$\widehat{CF_{it}} = \alpha_0 + \alpha_1 DKYE_t + \alpha_3 X_{it} + \mu_i^{'} + \varepsilon_{it}^{'} \quad (2)$$

$$RISK_{it} = \gamma_0 + \gamma_1 \widehat{CF_{it}} + \gamma_3 X_{it} + \mu_i^{''} + \varepsilon_{it}^{''} \quad (3)$$

5. Empirical Results and Analysis

5.1. Descriptive Statistics

Table 1 reports the descriptive statistics of the relevant variables. The mean of cross-border capital flows (CF) is -0.24, with a maximum of 1.19, and a minimum of -3.7. The mean of the non-performing loan ratio (NPL) isv1.38, with a minimum of 0.75, and a maximum of 2.47.

Table 1: Descriptive Statistics

Variable	Observation	Mean	Standard deviation	Minimum	Maximum
CF	266	0.48	1.51	-1.19	3.70
NPL	266	1.38	0.35	0. 75	2.47
Z	266	0.11	0.04	0.03	0.32
CZ	266	13.88	1.52	10.8	19.26
SMV	266	13.15	0.27	12.77	13.52
size	266	510.77	811.79	4.18	3960.97
CD	259	77.62	14.16	38.97	110.61
ROA	266	0.90	0.29	0.45	2.51
EPU	266	6.29	0.31	5.89	6.67
GDP	266	5.73	2.09	2.24	8.4
M2	266	9.59	1.39	8.1	11.8

5.2. Regression Results

Table 2 shows the impact and heterogeneity analysis of capital on bank risk-taking. The benchmark regression results in column (1) show that the coefficient of cross-border capital flows is 0.11, which is significant at the 1% level, which means that cross-border capital flows intensify banks' risk-taking. When the scale of cross-border capital flows increases by 1%, banks' risk-taking levels increase by 0.11%.

Since the asset and liability structures of different types of banks are different, a heterogeneous analysis is conducted. Column (2) of Table 2 report that the coefficient of CF on state-owned commercial banks did not pass the significance test, column (3) show that the coefficient of CF on joint-stock commercial banks also did not pass the significance test and column (4) show that the coefficient of CF on city and rural commercial bank pass the significance test, which means that the impact of capital flows is heterogeneous. Capital flows are difficult to affect the risk-taking levels of state-owned banks and joint-stock banks, but the effect of capital flows on city and rural commercial bank risk-taking is relatively large.

Table 2: Benchmark Model Results

Variable	(1) Full sample	(2) State-owned banks	(3) Joint-stock banks	(4) City and rural banks
CF	0.11*** (4.84)	0.02 (1.05)	0.04 (0.99)	0.16*** (5.41)
Control variable	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
N	259	42	63	154
Adj-R^2	0.77	0.83	0.81	0.82

*, **, *** indicates significance at the 10%, 5% and 1% levels respectively; the t value is in parentheses.

5.3. Robust Test

The following robustness test is conducted. Firstly, we replace the main explanatory variables. The proxy variable of bank risk-taking is replaced by the Z value from the non-performing loan ratio, and a panel regression test is conducted. The coefficient of CF is still positive and significantly at the 1% level, which is consistent with results obtained by the above benchmark regression. Secondly, we eliminate the sample data in 2020 to avoid the impact of the coronavirus epidemic on bank risks. The cross-border capital flow coefficient is 0.18 and is significant at the 1% level. Therefore, the previous research results are relatively robust (Table 3).

Table 3: Robust test result

variable	(1)Replace explanatory variables Z-score	(2)Eliminate some samples NPL
CF	0.0075*** (2.85)	0.18*** (3.88)
Control variable	Yes	Yes
Individual fixed effects	Yes	Yes
N	259	222
Adj-R^2	0.67	0.77

5.4. Endogenous Treatment

There may be endogeneity, that is, capital flows may increase the risk-taking of banks, but the increase in bank risk may also increase the scale of capital flows. To alleviate the endogeneity problem, referring to the research of Zhao and Chen (2023), we select loan balance as an instrumental variable and conduct a two-stage regression. On the one hand, bank loan balances will be affected by capital flows. When capital flows is large, banks will have more loan balances. When capital flows is low, loan balances will also be reduced. On the other hand, the impact of bank loan balances on bank risk-taking is relatively small. Therefore, it is reasonable to select bank loan balances for two-stage instrumental variable regression.

Table 4 shows that instrumental variable passed the weak instrumental variable test. Column (1) in Table 4 represents the first stage of regression. There is a positive correlation between capital flow and loan balance. When bank loan scale is large, the capital flow scale is high. Column (2) shows the results of the second-stage regression, using estimated value of capital flows as the explanatory variable, and the results are still significantly positive. Therefore, after considering endogeneity issues, the previous research results are still true.

Table 4: Instrumental variable regression

Variable	(1) CF	(2) LB
LB	0.0063*** (-5.30)	
$\widehat{CF}$		0.33*** (3.44)
Control variables	Yes	Yes
Individual fixation effect	Yes	Yes
Weak instrumental variable testing		Yes
N	249	249
Adj-R^2	0.87	0.74

6. Conclusion

This paper mainly studies the impact of cross-border capital flows on bank risk-taking. According to empirical test, firstly, capital flows affect the risk-taking level of banks, and the greater scale of capital flows, the less favorable it is for banks to take risks. Secondly, the findings in the paper indicate heterogeneity in the risk-taking capacity of different types of banks, and the impact of cross-border capital flows on the risk-taking of city and rural commercial banks is much greater than that of state-owned banks and joint-stock banks.

References

[1] Chari, A., & Henry, P. B. (2004). Risk sharing and asset prices: evidence from a natural experiment. The Journal of Finance, 59 (3), 1295-1324.

[2] Chen, R. & Li, J. (2022). Short-term Cross-border Capital Flows, Exchange Rate Fluctuations and Bank Risktaking—Based on the Mediating Role of Asset Price and Liquidity Mismatch. Financial Regulation Research, (01), 58-78.

[3] Bruno, V., & Shin, H. S. (2015). Capital flows and the risk-taking channel of monetary policy. Journal of monetary economics, 71, 119-132.

[4] Dinger, V., & Te Kaat, D. M. (2020). Cross-border capital flows and bank risk-taking. Journal of Banking & Finance, 117, 105842.

[5] Enrica D. (2006). Bank Fragility and Inter national Capital Mobility. IMF Working Paper.

[6] Fang, Y., Yan, R. & Zheng, Z. (2017). Research on the Influencing Mechanism of Capital Account Opening on Bank Risk: A Comprehensive Analysis Framework. Studies of International Finance, (11), 33-43.

[7] Goldfajn I., Valdes R. O. (1997) "Capital Flows and the Twin Crises: The Role of Liquidity". International Monetary Fund. Wording paper.

[8] Gu, H. & Bian, Y. (2021). Ross-border Capital Flows, Fluidity Mismatch and Bank Stability—Based on the Dual Perspective of Bank Profitability and Risk Bearing Capacity. Economist, (06), 32-41.

[9] Gu, H. & Yu, J. (2020). Does Cross-border Capital Flow Increase Bank Credit Risk—Based on Capital Inflow, Outflow and Aggregate Flow. Journal of International Trade (09), 144-159.

[10] Gu, H., & Zhang, J. (2021). Loan Competition, Deposit and Loan Spreads and Bank Risk-taking: Moderate Effect of Cross-border Capital Flows and Bankers' Confidence. Financial Economics Research, (06), 82-97.

[11] He, G., & Li, J. (2018). International Risk-taking Channel of Capital Flow. Economic Research Journal, (05), 146-160.

[12] Jin, C., Li, Y., & Jiang, X. (2020). Cross-border Capital Flows, Macroprudential Management and Financial Stability. World Economy Studies, (03), 46-59+136.

[13] Jing, Z., Li, X., & Fang, Y. (2022). Cyclical Fluctuation of Cross-Border Capital Flows and Risk Spillover Effects on the Chinese Banking Sector. The Journal of World Economy, (01), 182-205.

[14] Li, Z. Song, K., & Yang, J. (2020). Banking Openness, Foreign Ownership and Bank Risk-Taking. Finance & Trade Economics, (10), 96-110.

[15] Sun, T., & Wang, X.(2020). How Do Differences Between Internal and External Financial Factors Affect China's Capital Flows? Journal of Financial Research, (03),1-20

[16] Xie, X., & Yu, J. (2023). Cross-border capital flow, bank risk-taking and systemic risk of commercial banks. Shanghai Finance, (03), 29-43+56.

[17] Xu, L. (2021). Global Liquidity Dynamics and Bank Risk-taking in Emerging Market Countries. World Economy Studies, (11), 64-76+136.

[18] Zhang M. & Liu, Y. (2021). Will a Deteriorating Current Account Increase Domestic Asset Price Fluctuation? —A Study Based on Mechanism and Time-Varying Effect of G20. Studies of International Finance, (05), 34-43.

[19] Zhang, L., & Zhong, Q. (2020). The Global Financial Cycle, US Monetary Policy, and the Impossible Trinity. Journal of Financial Research (02), 15-33.

[20] Zhao, H., & Chen, Y. (2023). Research on the Impact of Cross-border Capital Flows on Bank Risk-taking under the Dual-pillar Regulation. Huabei Finance, (03), 1-13+28.

[21] Zhao, Y., & Xu, Z. (2021). The impact of cross-border capital flows on the Chinese banking system. SAGE Open, 11 (2), 21582440211021410.

[22] Zhou, G. (2018). The impact of capital account opening on financial risk: An analysis from the perspective of capital flow. Journal of International Economic Cooperation, (07), 82-88.