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# Macroprudential Policy, Shadow Banking and Commercial Banks' Risk-taking

**Tiange Zhao***

*International Business School Suzhou, Xi'an Jiaotong-Liverpool University, Suzhou, 215028,China

**Abstract:** This study systematically explores the impact of macroprudential policy (MPP) and the Two-Pillar regulatory framework (TPRF) on commercial banks' risk-taking, using a fixed-effects model for the period 2010-2020. The study finds MPP can not only decrease the level of risk-taking of commercial banks, but also contain the risks caused by loose monetary policy (MNP), and that TPRF can effectively play a role in financial stability. Specifically, the MPP and TPRF can reduce risks through the mechanism of shadow banking.

**Keywords:** Commercial banks' risk-taking; Shadow banking; Macroprudential policy

## 1. Introduction

As a traditional macroeconomic policy tool, MNP has performed poorly in maintaining financial stability, and an accommodative MNP may even amplify financial risks. Against this background, MPP has received unprecedented attention and countries have tried to introduce MPP tools, which will accompany with MNP to maintain financial stability. However, the objectives of MNP and MPP are not fully aligned, which may lead to friction and conflict in policy effects. Thus, this study explores the effect of MPP and TPRF in regulating commercial banks' risk-taking form the perspective of shadow banking.

## 2. Theory Development and Hypothesis

MPP can be effective in reducing the level of risk-taking by commercial banks. These policies typically use three types of instruments - asset-based, capital-based, and liquidity-based - to regulate the financial system in a countercyclical manner. During economic upswings, MPP are tightened to prevent excessive credit and asset price inflation, thereby curbing the risk-taking behavior of commercial banks. On the other hand, during economic downturns, the implementation of accommodative MPP has no significant impact on commercial banks' risk-taking behavior.

MPP can also help reduce commercial bank risk-taking resulting from accommodative MNP. While earlier studies had concluded that MNP is risk-neutral, recent research by Borio and Zhu (2012) shows that accommodative MNP can lead to increased risk-taking by commercial banks. However, MPP tools such as dynamic provisioning regimes can dampen this increased risk-taking. Accordingly, the author proposes the following hypothesis.

H1: MPP can reduce the level of risk-taking of commercial banks.

H2: TPRF can reduce the risk-taking level of commercial banks.

MPP are effective in limiting the size of shadow banking activities carried out by commercial banks. Such policies aim to prevent risk spillovers resulting from excessive linkages between banks and non-bank financial institutions. Given that commercial banks are systemic players in the financial system, MPP restrict their dealings with other financial institutions. Since a significant portion of these dealings is conducted in the form of shadow banking, limiting them helps to naturally control the scale of shadow banking. As a result, MPP can effectively curb the expansion of shadow banking.

TPRF is another effective measure to limit the expansion of shadow banking. During periods of accommodative MNP, market interest rates tend to be lower, which in turn lowers financing costs. Consequently, commercial banks have more liquidity and are more likely to engage in shadow banking, leading to an expansion of such activities. However, MPP tools can help to constrain the expansion of commercial banks' credit and assets, leaving them with less money to invest in shadow banking activities. This curbs

the expansion of shadow banking activities caused by loose MNP, and thus MPP and MNP work in tandem to limit the growth of shadow banking.

H3: MPP can reduce the scale of shadow banking and thus the level of risk-taking by commercial banks.

H4: TPRF can reduce the size of shadow banking and hence the level of risk-taking of commercial banks.

# 3. Data and Variables

## 3.1 Data

Considering that macro-prudential supervision was systematically incorporated into the banking supervision system after the introduction of Basel III in 2010, this study selects 261 Chinese commercial banks for the period 2010-2020 as the research samples to avoid the heterogeneity and outliers. The data is obtained from the CSMAR database, the iMaPP database, and the CEI database.

## 3.2 Variables

A.Commercial banks' risk-taking

This paper uses Z-score and non-performing loan ratio to measure commercial banks' risk-taking.

B.MPP

Zhang and Zoli (2016) suggest that the loan-to-value ratio cap and the reserve policy are the most frequently used tools among MPP tools used in China. Thus, this paper adopts deposit-reserve ratio (Drr) and loan-to-value ratio (Ltv) to measure MPP density.

C.MNP

This study uses the interbank offered rate (SHIBOR90) to measure price-based MNP instruments and the broad money growth rate (M2rate) to measure quantity-based MNP instruments.

D.TPRF

This paper uses the interaction term of MNP and MPP to measure TPRF.

E.Control variables

Introduced by Altunbas et al. (2018), this study uses following control variables, respectively, bank size (Size), leverage ratio (Lev), profitability (Roa), deposit share (Deposit), deposit to loan ratio (Ldr), provision coverage ratio (Pcr),and real GDP growth rate (Gdpr).

# 4. Model Construction

## 4.1 Baseline Model

To test H1 and H2 and examine the impact of MPP and TPRF on commercial banks' risk-taking, the following models are constructed.

$$Risk_{it} = \alpha_0 + \alpha_1 Mapp_t + \sum_{j=2}^{8} \alpha_j Controls_{it} + \mu_i + \xi_{it} \tag{1}$$

$$Risk_{it} = \beta_0 + \beta_1 Mapp_t + \beta_2 Micro_t + \beta_3 Mapp_t \times Micro_t + \sum_{j=4}^{10} \beta_j Controls_{it} + \mu_i + \xi_{it} \tag{2}$$

Where  is the commercial bank,  is the year,  is the control variable, is the individual fixed effect and  is the random error term.

## 4.2 Mediating Effect Model

To validate H3 and H4 and to explore the specific channels through which MPP and TPRF affect commercial banks' risk-taking, the following mediating effects models are constructed.

$$Shadow_{it} = \gamma_0 + \gamma_1 Mapp_t + \sum_{j=2}^{8} \gamma_j Controls_{it} + \mu_i + \xi_{it} \tag{3}$$

$$Risk_{it} = \eta_0 + \eta_1 Mapp_t + \eta_2 Shadow_{it} + \sum_{j=3}^{9} \eta_j Controls_{it} + \mu_i + \xi_{it} \tag{4}$$

$$Shadow_{it} = \lambda_0 + \lambda_1 Mapp_t + \lambda_2 Micro_t + \lambda_3 Mapp_t \times Micro_t + \sum_{j=4}^{10} \lambda_j Controls_{it} + \mu_i + \xi_{it} \tag{5}$$

$$Risk_{it} = \delta_0 + \delta_1 Mapp_t + \delta_2 Rate_t + \delta_3 Mapp_t \times Rate_t + \delta_4 Shadow_{it} + \sum_{j=5}^{11} \delta_j Controls_{it} + \mu_i + \xi_{it} \quad (6)$$

Models (3) and (4) are used to test the specific mechanisms by which MPP affect commercial banks' risk-taking. Models (5) and (7) are used to test the specific mechanisms by which TPRF affects commercial banks' risk-taking.

# 5. Empirical Results

## 5.1 Baseline Model Regression Result

In the regression results on the impact of MPP on commercial banks' risk-taking, the coefficient of MPP (Mapp) is significant at the 1% level of significance, which suggests that MPP reduces the level of commercial bank risk-taking and H1 is verified. In the regression results of TPRF on commercial banks' risk-taking, The coefficient on MNP (Rate) is significantly positive at the 1% significance level and the coefficient on the interaction term (Mapp×Rate) is significantly negative at the 1% level of significance. TPRF reduces the level of risk-taking by commercial banks, thereby achieving the objective of maintaining financial stability, H2 is verified.

## 5.2 Mediating Effect Result

To examine the specific channels through which MPP and TPRF affect commercial banks' risk-taking, this paper uses a mediating effects model to test the mediating effects of shadow banking. In the regression results of model (2), the coefficient of MPP (Mapp) is significantly positive at the 1% level of significance, which indicates that MPP can inhibit commercial bank risk-taking. In the regression results of model (3) and model (4), where γ 1 , η 1 and η 2 are significant at the 10%, 1% and 10% levels respectively, and shadow banking plays a mediating role between MPP and commercial bank risk-taking, H3 is verified. The coefficient of MNP (Rate) is significantly positive at the 5% level, while the coefficient of the interaction term between MPP and MNP (Mapp×Rate) is significantly negative at the 10% level, indicating that MPP can reduce the risk-taking of commercial banks with an accommodative MNP. In the regression results for models (5) and (6), where λ3, δ3 and δ4 are significant at the 1%, 10% and 10% levels, respectively, indicating that shadow banking mediates between TPRF and commercial bank risk-taking, and H4 is verified.

## 5.3 Robustness Test

This paper employs a robustness test of the above study using different proxy variables replacing important parameters of the original model. This paper uses the non-performing loan ratio to measure commercial bank risk-taking and loan-to-value ratio to measure MPP, and takes the 7-day interbank lending rate as a proxy variable for MNP It is found that the sign and significance of the regression coefficients are consistent with the results of the original model and the results estimated by the model in this paper can be considered valid.

# 6. Conclusion

Based on the above analysis, this paper makes the following policy recommendations. First, regulators should pay attention to the differences in the effectiveness of MPP in different directions in maintaining financial stability and continue to improve TPRF so that both tight and accommodative MPP can play a better financial stability function. Second, when choosing MPP tools, regulators should strengthen the supervision of shadow banking, thus reducing the level of risk-taking of commercial banks and maintaining financial stability.

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