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# THE RISK-TAKING CHANNEL AND MONETARY TRANSMISSION MECHANISMS IN CHINA

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## ABSTRACT

This study is one of very few studies which have investigated if the risk-taking channels of monetary policy exist in China and which transmission mechanisms are more significant than others. This study uses a new estimation methodology, dynamic panel GMM estimation, to effectively reduce the endogeneity problem. Using data from forty-seven commercial banks in China during the period of 2006-2016, we find that the risk-taking channel of monetary policy exists in China for various monetary policy instruments, such as statuary reserve ratio, prime lending rate and the growth rate of broad money supply. China's monetary policy influences bank's risk-taking through the valuation effect, searching for yield effect, and competition effect, but not insurance effect. Monetary authorities in China should encourage moderate competition in the banking industry, while commercial banks in China should improve their risk management and innovate their business to lower the impact of monetary policy on bank's risk-taking.

**Contribution/ Originality:** This study is one of very few studies which have investigated if the risk-taking channels of monetary policy exist in China and which transmission mechanisms are more significant than others. This study uses new estimation methodology, dynamic panel GMM estimation, to effectively reduce the endogeneity problem.

## 1. INTRODUCTION

The excessive risk-taking in U.S. banking industry, which is encouraged by Federal Reserve's long-term expansionary monetary policy, is deemed as a key factor that contributes to the financial crisis in 2008. Since then, monetary policy and its relationship with bank's risk-taking have aroused intense interest among researchers. Borio and Zhu (2008) were the first to propose the risk-taking channel of monetary policy. The changes in monetary policy can influence the risk perception and risk tolerance of financial intermediaries, thereby affect portfolio risk, asset pricing and the terms of external financing. Disyatat (2011) believes that commercial banks earn profits mainly through actively taking risk and managing risk, and bank's perception of risk plays an important role in the transmission mechanisms of monetary policy. In theory, scholars (Adrian and Shin, 2009; De Nicolò *et al.*, 2010; Angeloni *et al.*, 2015; Reyes and Gomez-Gonzalez, 2015; Delis *et al.*, 2017; Neuenkirch and Nöckel, 2018) argue that

monetary policy in developed countries affects bank's risk-taking through valuation effect, searching for yield effect, insurance effect, and habit formation effect. However, there is not much research on the risk-taking channel and transmission mechanisms in developing countries. China is a major developing country; its financial system is still dominated by banks. Due to the less stringent financial regulation, commercial banks in China are more market and profit driven, competition among banks is more intense, and bank's risk taking becomes more sensitive to monetary policy. Presently, China's financial market is still immature, which may make monetary policy and supervision less effective, and affect the risk preference of financial institutions and stability of financial system. Therefore, it is especially important to study the risk-taking channel and monetary transmission mechanisms in China. This article uses GMM estimations and a dynamic panel model to empirically examine bank's risk-taking channel and transmission mechanisms for different monetary policy tools in China.

## 2. LITERATURE REVIEW

Since 2008, studies on monetary policy and bank's risk-taking channel mainly focus on its existence, contributing factors, transmission effects and transmission mechanisms. As for the risk-taking channel and transmission mechanism of monetary policy, there are valuation effect, searching for yield effect, insurance effect, habit formation effect and competition effect.

Valuation effect. Valuation effect is considered to be the mechanism through which monetary policy influence the income and cash flows of firms and banks, thereby affecting bank's risk taking. In the loosening monetary policy environment, firm's cost of capital decreases, the value of firm's assets and collaterals goes up, and their net cash flows increase; banks lower their expectations on firm's probability of default and the losses from default, thereby reducing bank's perception and estimation of risk. As a result, banks ease their credit screening, their risky asset ratio goes up as well as their risk taking. Dell'Ariccia and Marquez (2006) show that as bank's cost of capital falls with expansionary monetary policy, so do their standards in screening borrowers, moral hazard problems worsen, and bank's risk taking increases. Neuenkirch and Nöckel (2018) also document evidence of lowered lending standards for borrowers during the expansionary phase of monetary policy in Eurozone, which is consistent with valuation effect. Adrian and Shin (2009) found that banks adjust leverage in response to the changes in asset value. When the value of collateral rises with loosening monetary policy, banks expand their balance sheets with increased collateralized lending. This worsens adverse selection problem and jeopardize financial stability. Borio and Zhu (2012) are the first to propose the risk taking channel of monetary policy, i.e., monetary policy can affect the income, cash flows and valuation of financial institutions and corporations, thereby influencing their risk perception, risk tolerance and risk taking. Milcheva and Sebastian (2016) showed that through variations in residential investment, the housing market plays a role in the monetary transmission mechanism even in countries with less developed mortgage markets.

Searching for yield. During periods of low interest rates, the return on bank's risk-free assets drops further than the return on risky assets; and psychological and institutional factors may induce banks to take on more risk and invest in risky assets to search for higher yield (Rajan, 2006). Low interest rate reduces nominal asset yield, but the debt obligations in the previous period are fixed at higher interest rates. Banks may adopt radical investment strategy in an attempt to reach return target. Dell'Ariccia and Marquez (2006) find that the interest spreads between deposits and loans usually narrow under low interest rate policy. In order to maintain their market share and earn higher return, banks would take on excessive risk. Borio and Zhu (2012) believe that the larger the difference between actual interest and interest target, the more powerful the searching for yield effect is. This transmission mechanism is more pronounced when nominal interest rate is close to zero. Angeloni *et al.* (2015) find that monetary policy can affect bank's risk taking through bank's capital structure and asset risk. Low interest rates can increase bank's risk by inducing banks to use more short-term liabilities instead of long-term capital financing. Their VAR evidence suggests that the existence of banks amplify the transmission effects of monetary policy on

economic output and asset prices. Ozşuca and Akbostancı (2016) find that in general, low short-term interest rates reduce the risk of outstanding loans; but when short-term interest rates fall below a theoretical benchmark, bank risk increases. Paligorova and Santos (2017) find that extended periods of low interest rates make banks to assume the interest rate would remain low for a prolonged period, which encourages banks to increase their allocation to risky assets to achieve higher yield.

Insurance effect. Depending on the relative transparency and market expectations of monetary policy, commercial banks may reduce risk taking, or intensify moral hazard problems. The effectiveness of this transmission mechanism is related to the monetary policy targets as well as their response mechanisms. The more transparent and predictable the monetary policy is, the more likely commercial banks would take on higher risk. For example, central bank's "the lender of last resort" regime can induce the free rider problem; central bank may have to come to the rescue when situation deteriorates due to the herding behavior of commercial banks. Altunbas *et al.* (2010) find that when financial market participants foresee that monetary authorities would step in and save the unstable economy caused by external shocks, they tend to take on excessive risk before the expected monetary policy comes out. De Nicolò *et al.* (2010) believe that the communication policies between monetary authority and financial institutions as well as how financial institutions react to monetary policy are also important factors that affect the risk taking channel of monetary policy. Agur and Demertzis (2010) emphasize that as bank's shareholders are protected by limited liability, the value of bank's equity is essentially a call option. The value of this call option increases with the volatilities of the underlying assets. During normal operations, bank's shareholders earn net income, and when the bank falls into debt crisis, the government or deposit insurance serves as implied guarantee. When the monetary authority implements a low interest rate policy, bank shareholders' earnings become lower; in order to achieve a higher equity value, banks would take on more risk.

Habit formation effect. Habit can affect asset prices through the consumption structure of consumers. Under expansionary monetary policy, there is adequate market liquidity, lower cost of capital and higher asset prices, consumers, businesses and banks are more optimistic and believe that market and economy will continue to prosper. As a result, their risk appetite grows. In their study of equity risk premium, Campbell and Cochrane (1999) find that investors consume more than their normal level and are less risk averse during economic expansion. They conclude that expansionary monetary policy can increase investor's risk preference and bank's risk taking.

Competition effect. Under expansive monetary policy, banks face the problem of decreasing marginal profit. When the competitions among banks becomes more intense, banks may lower lending standards in order to gain market share. Han and Liu (2018) study 115 commercial banks in China during the years 1996 to 2014. They empirically test the relationship between market competition and bank's risk taking. They find that as the competition in the banking industry becomes more intense, banks reduce their risk. The increased competition in bank's loan business lowers the lending rate, reduces firm's cost of debt and their incentive to invest in high risk projects. As a result, bank's risk decreases.

Based on relevant literature, the transmission mechanisms of monetary policy on bank's risk taking are shown in Figure 1.

In this paper, we build a dynamic panel model with the data of 47 commercial banks in China[1] during the period of 2006 to 2016.[2] We use GMM estimation to examine the existence of risk taking channel for different monetary policy instruments, and the transmission mechanisms of the risk taking channel. The main contributions of this paper are: (1) New research perspective. Most scholars analyze bank's risk taking channel and transmission

[1]Sample banks include 5 systematically important banks (Industrial and Commercial Bank of China, Agriculture Bank of China, Construction Bank of China, Bank of China, and Postal Savings Bank of China), 12 shareholding banks, and 30 large city commercial banks. The data are collected from National Tai'an Research Service Center CSMAR database, People's Bank of China "Monetary Policy Implementation Report", Bankscope database and the annual reports of the sample banks.

[2]During the period of 2006 to 2016, the monetary policy in China has gone through the process of contraction—expansion—moderate expansion—stabilization; therefore, we can gain a more comprehensive understanding of the relationship between monetary policy and bank's risk taking.

mechanisms in theory, there are relatively fewer empirical studies on how specific transmission mechanisms affect bank's risk taking and the relative importance of these transmission mechanisms. We use relevant variables to identify valuation effect, searching for yield effect, competition effect, and insurance effect,[3] and investigate how monetary policy affects bank's risk taking through these transmission mechanisms after bank characteristics and macroeconomic factors are controlled for. China is a major developing country where banks play a dominant role in its financial system. It is both intriguing and essential to us to examine if the risk taking channel of monetary policy exist in China and which transmission mechanisms are more significant than others.

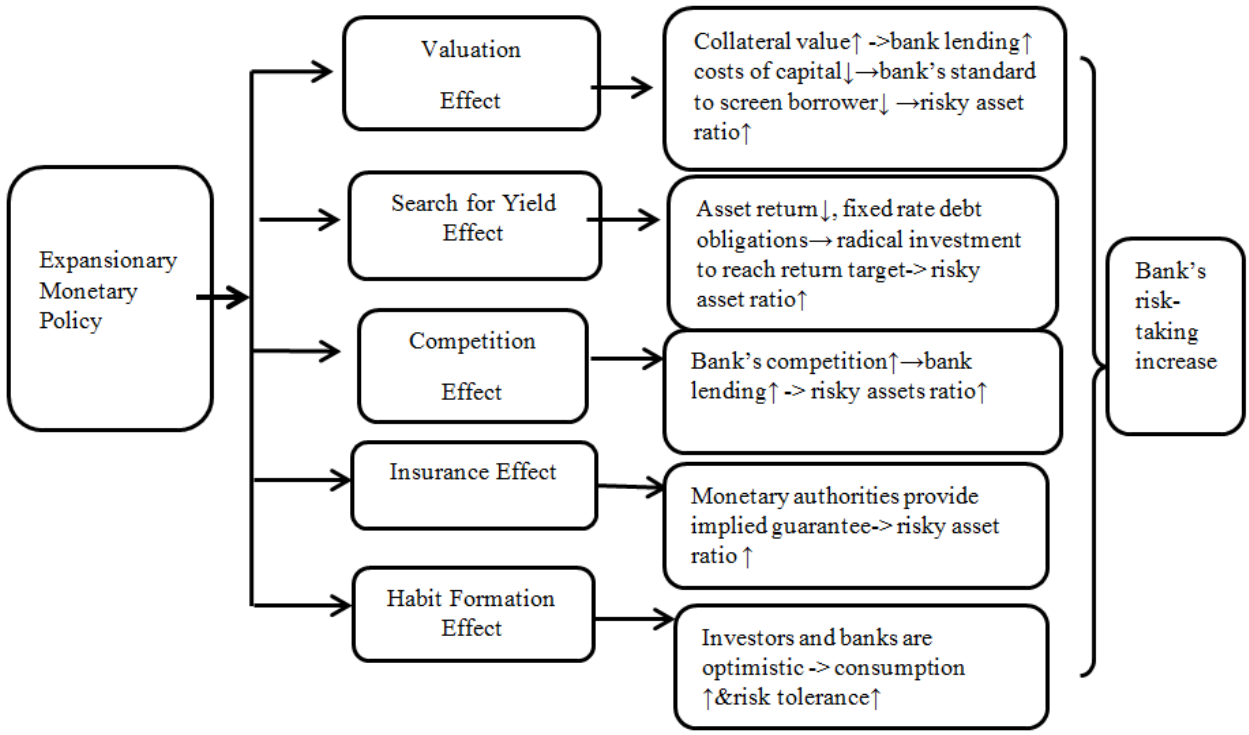


**Figure-1.** The transmission mechanisms through which monetary policy affect bank's risk-taking.

(2) Research methodology. We use GMM estimation to effectively reduce the endogeneity problem; we also include the interactive term of monetary policy and transmission mechanisms to determine the dependency of bank's risk taking channel of monetary policy on different transmission mechanisms.

## 3. RESEARCH METHODOLOGY

### *3.1. Research Hypothesis*

Prior research has shown that the risk taking channel of monetary policy exists in China. With the development in theoretical analysis on bank's risk taking channel, variables such as bank size, bank capital and macroeconomic indicators are introduced to examine the determinant factors on bank's risk taking. Other scholars focus on the transmission mechanisms and use the growth rate of real estate prices, bank profitability or other bank characteristics to examine the relationship between monetary policy and bank's risk taking (Xu and Chen, 2012; Han and Liu, 2018). Based on existing studies on bank's risk taking channel and transmission mechanisms, we propose the following research hypothesis:

*Hypothesis 1: The risk taking channel of monetary policy exists in China. As statutory reserve ratio and prime lending rate decrease or the growth rate of broad money supply (M2R) increases, bank's risk preference increases.*[4]

[3]As it is hard to find a variable to quantify the habit formation effect, we do not empirically test this particular transmission mechanism in this paper.

[4]Lower statutory reserve ratio, lower prime lending rate, or higher growth rate of the broad money supply M2 is usually related to expansionary monetary policy.

*Hypothesis 2: China's monetary policy affects bank's risk taking through valuation effect. The higher the growth rate of real estate price, the more risk a bank assumes.*

*Hypothesis 3: China's monetary policy affects bank's risk taking through searching for yield effect. The lower the return on assets in the previous period, the higher the bank risk. That is, banks that are less profitable are more likely to take on additional risk to achieve higher return.*

*Hypothesis 4: China's monetary policy affects bank's risk taking through competition effect. As the competition among banks becomes more intense, bank's risk decreases.*

*Hypothesis 5: China's monetary policy affects bank's risk taking through insurance effect. Systematically important banks have bigger risk appetite in the expansionary monetary policy environment.*

### *3.2. Variables Selection*

Proxies for Bank's Risk-taking. As an ex-ante measure of bank risk, risky asset ratio can better reflect bank's willingness to take additional risk due to searching for yield effect or insurance effect. Non-performing loan ratio indicates the quality of bank's credit, while Z-score measures bank's bankruptcy risk. To capture the changes of bank's overall risk, this paper uses risky asset ratio ($Risk_{asset}$) and non-performing loan ratio ($Risk_{npl}$) as measures of bank risk. We also use Z-score to test for robustness.

Proxies for Monetary Policy. The prime lending rate has become a commonly used instrument in recent years. In this paper, statutory reserve ratio (Reserve), the prime lending rate for one-year loan (L-rate) and the negative of the growth rate of broad money supply ($M_2R$) are used as proxies for monetary policy.[5]

**Table-1.** Variable definition.

| Variable type | Variable name | Variable definition |
|---|---|---|
| Bank Risk-Taking | Risky Asset Ratio ($Risk_{asset}$)<br>Non-performing Loan Ratio ($Risk_{npl}$)<br>Bank's Bankruptcy Risk (Z-score) | Risk-Weighted Assets/Total Assets*100%<br>Non-performing Loans/Total Loans*100%<br>The Standard Deviation of ROA/ (ROA + Capital Asset Ratio)*100% |
| Monetary Policy | Statuary Reserve Ratio (Reserve)<br>Prime Lending Rate (L-rate)<br>Negative of $M_2$ Growth Rate ($M_2R$) | Statutory Reserves/Total Deposits*100%<br>The Average Prime Lending Rate for One-Year Loans*100%<br>Broad Money Supply Growth Rate*100%*(-1) |
| Transmission Mechanisms | Return on Assets($ROA_{-1}$)<br>Dummy Variable for Bank Importance (SYS)<br>Lerner Index (Lerner)<br>Growth Rate of Real Estate Price (Housep) | Net Income/Average Total Assets*100%<br>If the bank belongs to systematically important banks, SYS=1; else SYS=0<br>Competitiveness Index of Listed Banks<br>Growth rate of real estate price*100% |
| Bank Heterogeneity | Bank Capital Adequacy ($CAP_{-1}$)<br>Bank Size ($SIZE_{-1}$)<br>Liquidity Ratio (Liq) | Net Capital/Risk-Weighted Assets*100%<br>The Natural Logarithm of Total Assets<br>Current Assets/Current Liabilities*100% |

Proxies for Transmission Mechanisms. The average growth rate of real estate price where the bank is headquartered (Housep), the lagged return on assets ($ROA_{-1}$), a dummy variable on bank importance (SYS),[6] and the

[5]We use the negative of M2 growth rate so that the coefficients of all monetary policy variables could have the same positive or negative sign.

Lerner index of banking industry[7]are used to proxy for valuation, searching for yield, insurance, and competition effect.

Control Variables. We control for bank characteristics such as lagged capital adequacy ($CAP_{-1}$) and lagged bank size ($SIZE_{-1}$). As bank liquidity is related to bank risk, we also include liquidity ratio (Liq). This article uses nominal GDP growth rate to control for macroeconomic conditions.

### *3.3. Model*

This paper uses the following dynamic panel model:

$$risk_{i,t} = \beta_1 risk_{i,t-1} + \beta_2 MP_t + \beta_3 SIZE_{i,t-1} + \beta_4 CAP_{i,t-1} + \beta_5 Lid_{i,t} + \beta_6 GDP_t + \beta_7 ROA_{i,t-1} + \beta_8 housep_{j,t} + \beta_9 Lerner_{i,t} + \beta_{10} SYS + \nu_i + \mu_{i,t} \quad (1)$$

$$risk_{i,t} = \beta_1 risk_{i,t-1} + \beta_2 MP_t + \beta_3 SIZE_{i,t-1} + \beta_4 CAP_{i,t-1} + \beta_5 Lid_{i,t} + \beta_6 GDP_t + \beta_7 MP_t \times SYS + \beta_8 MP_t \times Lerner_{i,t} + \beta_9 MP_t \times ROA_{i,t-1} + \beta_{10} MP_t \times housep_{j,t} + \nu_i + \mu_{i,t} \quad (2)$$

Model (1) is used to examine the overall relationship of monetary policy and bank's risk taking, as well as four transmission mechanisms, i.e., valuation effect, searching for yield effect, competition effect and insurance effect. The coefficient $\beta_2$ is used to examine the existence of bank's risk taking channel: if $\beta_2$ is negatively significant, then bank's risk taking channel exists; if coefficients $\beta_7$ and $\beta_9$ are significantly negative, then monetary policy affects bank's risk taking through searching for yield and competition effect; if coefficients $\beta_8$ and $\beta_{10}$ are positively significant, then monetary policy affects bank's risk taking through valuation effect and insurance effect.

We use model (2) to further examine the transmission mechanisms through which monetary policy affects bank's risk taking. If the interactive terms of monetary policy with $\beta_8$ and $\beta_9$ are significantly positive, then monetary policy affects bank's risk taking through competition effect and searching for yield effect; if the interactive terms of monetary policy with $\beta_{10}$ and $\beta_7$ are significantly negative, then monetary policy affects bank's risk taking through valuation effect and insurance effect.

Since both model (1) and model (2) include lagged dependent variables as regressors, the models have endogeneity problems. The estimators from commonly used panel data techniques such as fixed effects and random effects are biased and inconsistent, while there may be weak instrumental variable problems with instrument variables (IV) and first difference GMM estimators. Dynamic GMM estimation can effectively reduce the effects of endogeneity on empirical results. This is because the parameter estimations are derived from traditional econometric estimation techniques by assuming the error term of the model follows certain distribution, while GMM estimation allows autocorrelation and heteroscedasticity in the model. For finite sample, systematic GMM estimation could result in smaller deviation than first difference estimation. Therefore, we use dynamic panel GMM estimation in this paper.

### *3.4. Empirical Results*

The estimation results of model (1) are shown in Table 2. As can be seen from the Table, the three proxies for monetary policy (the MP coefficients) are always negatively significant, which is consistent with hypothesis 1. The risk taking channel of monetary policy exists in China. The coefficient of capital adequacy ratio is generally negative, which implies that capital regulatory measures can control bank risk in China. There is a negative relationship between bank size and bank risk, i.e., larger banks are more prudent in their investment strategies.

[6]Bank importance is a dummy variable that equals to one if the bank belongs to the systematically important banks, otherwise it equals to zero. Too big to fail is a moral hazard problem that systematically important banks foresee that the monetary authority or government would come to the rescue during economic downturn; these banks would increase their risky asset ratio and take on more risk.

[7]Lerner index in banking industry is used as a proxy for the competition effect. It is calculated as follows: $Lerner=(P_{it}-MC_{it})/P_{it}$ , where Pit is the output price of the $i^{th}$ bank in year t; MC it is the marginal cost of the $i^{th}$ bank in year t. the marginal cost is derived from the logarithm of a cost function.

Bank liquidity is negatively correlated with bank risk, implying that bank liquidity can lower bank risk to some extent. In recent years, the introduction of various liquidity management instruments such as medium term loan facilities (MLF) and Pledged Supplementary Lending (PSL) can ease bank's liquidity problems and reduce bank risk. The estimated coefficient of GDP growth rate is significantly negative, indicating that bank's risks are lower during economic expansion.

Table 2 also demonstrates the estimation results on transmission mechanisms. The estimated coefficient of valuation effect is positive, which is consistent with hypothesis 2. This indicates that as real estate prices rise in the expansionary monetary policy environment, the value of firm's collateral goes up, banks tend to take on more risk. The return on assets, which is a proxy for searching for yield effect, is negatively correlated with bank risk; which is consistent with hypothesis 3. Banks that are less profitable are more inclined to take on higher risk. The Lerner index, which is a proxy for industry competition, is also negatively correlated with bank risk. This is consistent with hypothesis 4, that is, monetary policy affects bank's risk taking through competition effect. However, the coefficient of insurance effect is significantly negative, implying that systematically important banks are more conservative with risk taking compared with other banks.

**Table-2.** Empirical results from model (1).

| Dependent variable | Risky asset ratio | | | Dependent variable Non-performing loan ratio | | |
|---|---|---|---|---|---|---|
| | L-rate | Reserve | M2R | L-rate | Reserve | M2R |
| MP | -0.0472[c] (-1.87) | -0.0078[b] (-1.98) | -0.0193[c] (-1.69) | -0.0875[a] (-13.21) | -0.0573[a] (-14.86) | -0.0664[a] (-7.51) |
| Risk-$_{-1}$ | 0.1395[a] (3.86) | 0.3347[a] (2.76) | 0.2082[a] (2.70) | 0.3089[a] (69.57) | 0.3165[a] (75.16) | 0.3135[a] (12.26) |
| CAP-$_{-1}$ | 0.042 □1.64) | -0.0184[b] (-2.13) | 0.0052 (1.29) | -0.0255[b] (-2.22) | -0.0182[a] (-11.31) | -0.0242 (-0.15) |
| SIZE-$_{-1}$ | -0.0132[c] (-1.89) | 0.0126 (1.49) | -0.0251[a] (-7.04) | -0.6767[a] (-34.06) | -0.5703[a] (-27.82) | -0.6163[a] (-18.28) |
| GDP | -0.0138[a] (-3.09) | -0.0235[a] (-2.95) | -0.0047 (-0.96) | -0.0748[a] (-2.71) | -0.1466[a] (-12.58) | -0.0736[a] (-7.21) |
| Liq | -0.0470 (-1.04) | -0.0195[b] (-2.31) | -0.0319[a] (-2.98) | -0.0038[c] (-1.81) | 0.0015 (1.08) | -0.0078[a] (-3.56) |
| ROA-$_{-1}$ | -0.0062[b] (-2.36) | -0.0166[c] (-1.94) | 0.0139 (0.70) | -0.5391[a] (-5.36) | -0.5656[b] (-2.57) | -0.5577[c] (-1.94) |
| Housep | 0.0054[a] (5.64) | 0.0036[b] (2.34) | 0.0035[a] (2.89) | 0.0344[a] (27.48) | 0.0306[a] (23.69) | 0.0352[a] (6.74) |
| Lerner | -0.7407[a] (-9.99) | -0.4196[a] (-2.91) | -0.4946[a] (-4.27) | -0.0257[a] (-37.81) | -0.0156[a] (-16.82) | -0.0256[a] (-33.87) |
| SYS | 0.0487 (1.63) | -0.0574 (-1.59) | -0.2627[a] (-2.86) | -0.8672[a] (-2.71) | -1.8901[a] (-4.02) | -1.735[a] (-3.56) |
| Number of observations | 347 | 347 | 347 | 347 | 347 | 347 |
| AR(2) (p-value) | 0.4820 | 0.5390 | 0.8670 | 0.3370 | 0.3190 | 0.3260 |
| Sargan test (p-value) | 0.1970 | 0.1570 | 0.2130 | 0.1170 | 0.1090 | 0.1040 |

**Note:** values in parentheses is t-stat, a, b, c corresponds to 1%, 5%, 10% confidence level, respectively.

Given that we do not find evidence that is consistent with insurance effect, we do not include the interactive term of monetary policy and the proxy for insurance effect in model 2. We analyze whether monetary policy affects bank's risk taking through valuation effect, searching for yield effect or competition effect. Table 3 displays the estimation results of model 2. The coefficient of the interactive term with valuation effect is significantly negative, which means that banks are more likely to take on higher risk when firm's collateral value increase under expansionary monetary policy. The interactive term with the proxy for searching for yield effect is positive,

implying that less profitable banks are more likely to take on excessive risk under expansionary monetary policy. The coefficient of the interactive term with competition effect is also positive, indicating that the more competitive the banking industry is, the less risk the bank would take under expansionary monetary policy.

**Table-3.** Empirical results from model (2).

| Dependent variable Risky asset ratio | | | | Dependent variable Non-performing loan ratio | | |
|---|---|---|---|---|---|---|
| | L-rate | Reserve | M2R | L-rate | Reserve | M2R |
| MP | -1.0216[a] (-3.81) | -0.1088[b] (-2.44) | -0.1417[b] (-2.39) | -0.4076[a] (-27.55) | -0.0137[c] (-1.83) | 0.0561 (0.85) |
| Risk-1 | 0.3815[a] (5.99) | 0.3513[a] (4.28) | 0.4926[a] (11.89) | 0.4648[a] (41.65) | 0.4582[a] (74.28) | 0.4291[a] (7.09) |
| CAP-1 | 0.0658 (1.29) | 0.0349 (1.11) | -0.059[b] (-2.29) | -0.0301[a] (-29.72) | -0.0320[a] (-21.87) | -0.0922[a] (-3.04) |
| SIZE-1 | -0.1056 (-1.44) | -0.0768[c] (-1.81) | -0.115[a] (-6.63) | -0.2698[a] (-43.28) | -0.2068[a] (-30.30) | 0.0507 (1.42) |
| GDP | -0.0453 (-0.73) | 0.1087 (1.07) | 0.7302 (1.27) | -0.1829[a] (-27.83) | -0.1202[a] (-11.88) | 0.0073 (0.12) |
| Liq | -0.0230[b] (-2.24) | -0.0125[c] (-1.82) | -0.0190[a] (-3.21) | -0.0011 (-0.28) | 0.0003 (0.551) | -0.0158[c] (-1.90) |
| ROA-1*MP | 0.0083[b] (2.18) | 0.0121 (1.30) | -0.0091 (-1.55) | -0.0477 (-1.11) | 0.0286[b] (2.34) | 0.0067[b] (2.50) |
| Lerner*MP | -0.4041 (-1.55) | 0.0889[c] (1.76) | 0.0770[b] (2.37) | 0.0426[b] (2.06) | 0.0339[a] (10.30) | 0.0408 (0.57) |
| Housep*MP | -0.0113[a] (-5.00) | -0.0012[b] (-2.41) | -0.0026[a] (-3.77) | -0.0043[a] (-63.43) | -0.0036[a] (-12.77) | 0.0004 (0.46) |
| Numbers of observtions | 357 | 357 | 357 | 357 | 357 | 357 |
| AR (2 (p-value) | 0.1570 | 0.4260 | 0.4430 | 0.3007 | 0.3043 | 0.3250 |
| Sargan test (p-value) | 0.6170 | 0.0840 | 0.1610 | 0.1052 | 0.1110 | 0.4990 |

**Note:** values in parentheses is t-stat, a, b, c corresponds to 1%, 5%, 10% confidence level, respectively.

**Table-4.** Robustness tests on risk taking channel.

| Dependent variable: Z-score | | | |
|---|---|---|---|
| | L-rate | Reserve | M2R |
| MP | -0.0238[b] (-2.44) | 0.4961 (1.65) | -0.0722[a] (-13.30) |
| Risk-1 | 0.3815[a] (5.99) | 0.3513[a] (14.28) | 0.4105[a] (33.78) |
| CAP-1 | -0.1108[b] (-2.05) | -0.0195[a] (-12.86) | 0.0557 (1.26) |
| SIZE-1 | -0.5570[a] (-3.□3) | -0.0317[a] (-18.66) | -0.3350[a] (-15.70) |
| Liq | 0.0821 (1.61) | -0.0013 (-0.16) | -0.0792 (-0.666) |
| GDP | -0.4445[a] (-2.78) | -0.0279[a] (-15.84) | -0.0615[c] (-1.86) |
| ROA-1 | 0.0559 (0.77) | -0.0126[b] (-2.20) | -0.2405[c] (-1.68) |
| Housep | 0.1309[b] (2.51) | 0.0074[a] (7.81) | 0.0089[b] (2.26) |
| Lerner | -0.1055[a] (-3.17) | -0.6787 (-1.16) | -0.7510[a] (-9.80) |
| SYS | -0.0332[a] (-3.70) | 0.2225 (1.53) | 0.0076[c] (1.86) |
| AR(2) (p-value) | 0.8190 | 0.6730 | 0.6190 |
| Sargan test (p-value) | 0.3040 | 0.0875 | 0.1120 |

**Note:** Values in parentheses is t-stat, a, b, c corresponds to 1%, 5%, 10% confidence level, respectively.

### *3.5. The Robustness Test*

We use Z-score (a measure for bank's bankruptcy risk) as a dependent variable to test the robustness of our model. As shown in Table 4, except for statutory reserve ratio (which is insignificant), proxies for other monetary policy are significantly negative. Valuation effect is always significant. There is also significant searching for yield effect and competition effect. Consistent with our previous findings, there is no insurance effect. All results listed in Table 5 are also consistent with our previous results.

**Table-5.** Robustness tests on the transmission mechanisms of risk taking channel.

| Dependent variable: Z-score | | | |
|---|---|---|---|
| | **L-Rate** | **Reserve** | **M2R** |
| MP | -0.9431[a]<br>(-3.01) | 0.5219<br>(1.33) | -0.1068[c]<br>(-1.66) |
| $Risk_{-1}$ | 0.2887[a]<br>(5.05) | 0.4598[a]<br>(6.05) | 0.4805[a]<br>(22.52) |
| $CAP_{-1}$ | -0.0178[b]<br>(-2.79) | -0.0846[a]<br>(-3.03) | 0.0721<br>(1.43) |
| $SIZE_{-1}$ | -0.0235[a]<br>(-2.86) | -0.2287[b]<br>(-2.15) | -0.0156[a]<br>(-12.70) |
| Liq | 0.0092<br>(1.36) | -0.0530[a]<br>(-2.88) | -0.0046<br>(-0.616) |
| GDP | -0.5644[b]<br>(-2.14) | 1.2500[a]<br>(10.56) | -0.0772[a]<br>(-2.67) |
| $ROA_{-1}$*MP | 0.0222[c]<br>(1.86) | 0.0036[b]<br>(2.11) | -0.0139<br>(-1.17) |
| Lerner*MP | 0.0706<br>(1.31) | 0.0719[a]<br>(3.22) | 0.0093[a]<br>(2.75) |
| Housep*MP | -0.0016[a]<br>(-2.90) | -0.0033[a]<br>(-3.17) | -0.0026[a]<br>(-3.80) |
| AR(2) (p-value) | 0.9710 | 0.780 | 0.7060 |
| Sargan test (p-value) | 1.000 | 0.1130 | 0.2400 |

**Note:** Values in parentheses is t-stat. a, b, c corresponds to 1% 5% 10% confidence level, respectively.

## 4. CONCLUSIONS

We collected data from 47 commercial banks in China during years 2006 to 2016 to examine the transmission mechanisms through which monetary policy affects bank's risk taking. The main conclusions are as follows. Bank's risk taking channel of monetary policy exists in China. The monetary policy in China affects bank's risk taking through valuation effect, searching for yield effect, and competition effect. Our empirical results are inconsistent with insurance effect. This may be due to more stringent regulatory requirements on capital adequacy for large banks in China, and the fact that these banks have more experience and expertise on risk management.

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