



# Bank competition and monetary policy in regulating economic leverage

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**Abstract.** The purpose of this study is to investigate the relationship between bank competition, monetary policy regulation, and the economic leverage ratio, aiming to provide valuable insights for optimizing monetary policy and enhancing the competitiveness of the banking industry. Empirical data from the Chinese banking sector was utilized, and a multiple regression model was employed to analyze the influence of bank competition on the economic leverage ratio under monetary policy regulation, as well as to explore the underlying mechanisms. The results of the study indicate a significant impact of bank competition on the economic leverage ratio under monetary policy regulation, with a more pronounced effect observed when the market concentration within the banking industry is low. Additionally, the transmission mechanism of monetary policy plays an intermediary role in this process.

**Keywords:** Bank competition; Monetary policy; Economic leverage ratio;

## 1 Introduction

Leverage tools play a significant role in the healthy development of the economy. An appropriate leverage ratio not only promotes economic growth and improves the efficiency of fund allocation but also helps address financial crises and mitigate systemic risks in an economic downturn. However, incorrect usage of leverage tools can lead to credit defaults and other adverse factors that may trigger financial crises.

The objective of this research is to examine the effects of bank competition on the monetary policy's regulation of the economic leverage ratio, along with its underlying mechanisms, through empirical investigation. A primary focus will be given to studying the impact of monetary policy regulation within a competitive banking environment, and the subsequent analysis of its influence on the economic leverage ratio. Furthermore, we aim to explore the mechanisms through which bank competition impacts the monetary policy's regulation of the economic leverage ratio.

## 2 Related literature

### (1) Bank competition and measurement methods

In the field of banking competition, the level of entry barriers set by a country can either strengthen or rapidly weaken the degree of competition. Bank competition can be measured by both structural and non-structural analysis. The Lerner index is the main method adopted in this study to measure competitiveness. The advantage of the Lerner index is its flexibility, as it does not rely on the assumption of market equilibrium.<sup>1</sup> Lerner index can be utilized to assess the competitiveness of individual market participants over different time periods. It can also gauge the competitiveness of banks in specific financial sectors and provide an overall reflection of the competitiveness within the banking industry through the use of arithmetic mean.<sup>2</sup>

### (2) Leverage ratio

From the perspective of liabilities, analyzing the leverage ratio reveals the total debt situation and corporate structure of a company over a specific period.<sup>3</sup> By using leverage ratio analysis, one can understand the current and future debt scale and debt-servicing pressure of the company. From the perspective of assets, analyzing the leverage ratio reflects the total assets and their composition of a company. If one wants to understand the company's economic resources, profitability, and other aspects at a specific time point, leverage ratio can be employed.

### (3) Monetary policy

Commercial banks are expected to be influenced by a series of effects from monetary policy. Loose monetary policy brings optimistic market prospects and increased risk appetite for commercial banks, leading to more optimistic credit policies and credit behavior. Conversely, during periods of monetary tightening, the increased uncertainty in the banking market caused by economic downturn often leads to a decrease in risk appetite and an increase in risk aversion among commercial banks.<sup>4</sup> The People's Bank of China controls the growth of money supply at a moderate pace to maintain the stability of the Chinese yuan. Additionally, since 2008, China has implemented a countercyclical adjustment monetary policy emphasizing the synergy between fiscal and monetary policies, further enhancing the effectiveness of monetary policy regulation.<sup>5</sup> In summary, the regulation of economic leverage through monetary policy has significant implications for the stability and sustainability of macroeconomic development, with bank competition playing a crucial role within it.

## 3 Mechanism

### 3.1 Mechanism of bank competition on leverage ratio

The market competition among domestic commercial banks in China is constantly evolving and dynamic. This competition not only provides market opportunities but also leads to a wider range of banking products. Chinese commercial banks have been dominant in the financial market due to their rapid growth and advantages in terms of scale and scope. However, they now face significant challenges, such as the impact of

internet finance models and customer migration.

Bank competition has a notable impact on the transmission mechanism of monetary policy.<sup>6</sup> Banks' lending behavior plays a crucial role in this process. In highly competitive regions, banks tend to direct credit funds towards sectors with higher interest rates, lower risks, or greater profit potential. Monetary policy adjusts accordingly. Moreover, the speed of monetary policy transmission is affected by bank competition. In competitive regions, banks strive to expand their lending portfolios to capture a larger market share, resulting in faster transmission of monetary policy changes.

Bank competition also promotes the decentralization of monetary policy transmission. Fierce competition limits the market control of individual banks, reducing concerns about monopolistic practices and increasing transparency.

Furthermore, bank competition impacts corporate financing structures. As competition intensifies, interest rates decrease, reducing financing costs for enterprises.<sup>7</sup> Bank competition allows enterprises to select from a more diverse range of financing channels. However, the emphasis on short-term debt for cost reduction may lead to negative long-term effects on enterprises' debt structure.

Bank competition can also affect macroeconomic fluctuations. It influences fund allocation direction and can amplify macroeconomic fluctuations through transmission mechanisms and financing structures. Intensified competition leads to flexible lending strategies that favor high-risk, high-return sectors, contributing to macroeconomic fluctuations.<sup>8</sup> Excessive competition in loan interest rates exacerbates financial market risks.<sup>9</sup> Changes in corporate financing structures driven by bank competition can also influence economic development.

In conclusion, the competition among Chinese commercial banks has a significant impact on monetary policy transmission, corporate financing structures, and macroeconomic fluctuations. Continued reforms and advancements are necessary to enhance banks' ability to adapt to the market economy and meet evolving financial demands.

### 3.2 The Lerner index as a measure of bank competition

This study utilizes the Lerner index to evaluate the level of competition among banks. The Lerner index is a metric that reflects the size of monopoly power and the extent of market competition.<sup>10</sup> It is calculated using the following equation:

$$L = (P - MC) / P \quad (1)$$

Where P represents price, which is derived by dividing total bank revenue by total assets. MC represents marginal cost. The Lerner index (L) ranges from 0 to 1 and indicates the degree of competition. A higher index value is associated with a larger monopoly power. Specifically, the Lerner index measures the level of deviation between price and marginal cost. When prices are considerably higher than marginal costs, it suggests a strong monopoly power. A Lerner index of 0 implies perfect competition in the market.

The calculation of marginal cost (MC) involves the following equation:

$$\ln(TC) = \alpha_0 + \alpha_1 \ln y + \frac{1}{2} \alpha_2 (\ln y)^2 + \sum_{i=1}^3 \beta_j \ln w_j + \sum_{i=1}^3 \sum_{k=1}^3 \beta_{jk} \ln w_j \ln w_k + \sum_{i=1}^3 \gamma_j \ln y \ln w_j + \varepsilon \quad (2)$$

Here, TC represents total cost, including funding costs, operating expenses, taxes, compensation expenses, reserve expenses, and non-operating expenses.  $y$  denotes total assets.  $W_j$  represents input prices, typically comprising capital, labor, and funding costs. Through regression analysis, coefficient estimates are derived, and differentiating TC with respect to  $y$  yields:

$$MC = \frac{TC}{y} \left( \alpha_1 + \alpha_2 \ln y + \sum_{j=1}^3 \gamma_j \ln w_j \right) \quad (3)$$

By substituting the estimated coefficients, the marginal cost can be computed. Finally, this value is applied in the formula to obtain the Lerner index.

## 4 Empirical analysis

### 4.1 Data sources and samples

The dataset utilized in this study was sourced from the "China Banking Statistical Yearbook," the "Annual Report on Monetary and Financial Statistics," published by the China Financial Information Center, and the Wind financial database. Initially, banks engaged in mergers and acquisitions, bankruptcy liquidation, and financial penalties were excluded to ensure the comparability and representativeness of the selected sample. Eventually, a sample comprising 20 banks was selected to conduct the analysis and research, covering the period from 2018 to 2022. A total of 60 quarters of data were extracted for analysis.

### 4.2 Variable interpretations

(1) Leverage. The leverage ratio of a bank in year  $t$  is calculated by dividing its equity assets by its total assets in that year. (2) Lerner. A Lerner index is employed to assess the level of competition among banks. (3) Assets. The asset size of a bank has a significant impact on various aspects. In this study, the natural logarithm of the total assets is adopted as a measure of the bank's asset size. (4) ROT. Return on assets is utilized to represent the profitability level of a bank in this study. (5) Ratio. The loan-to-deposit ratio measures the proportion of loans disbursed by a bank relative to the deposits it holds. (6) dr007. This study employs the overnight repurchase rate in the interbank market as an indicator of loose monetary conditions.

### 4.3 Panel data model

We adopt a panel data model to examine the relationship between leverage and various explanatory variables in the banking industry. The panel data model is specified

as follows:

$$\text{Leverage}_{i,t} = \beta_1 \text{Lerner}_{i,t} + \beta_2 \ln \text{assets}_{i,t} + \beta_3 \text{ROTA}_{i,t} + \beta_4 \text{ratio}_{i,t} + \beta_5 \text{dr007}_{i,t} + u_{it} \quad (4)$$

where  $i$  denotes different banks ( $i = 1, 2, 3, \dots, N$ ), and  $t$  represents different years ( $t = 1, 2, \dots, T$ ).

**Table 1.** Results of panel data model regression

Source	SS	df	MS	Number of obs	=	100
Model	.001449763	5	.000289953	F (5, 94)	=	6.22
Residual	.004382625	94	.000046624	Prob > F	=	0.0001
Total	.005832388	99	.000058913	R-squared	=	0.2486
				Adj R-squared	=	0.2086
				Root MSE	=	.00683

  

Leverage	Coefficient	St. err.	t	P> t	[95% conf. interval]
Lerner	.0639372	.0182664	3.50	0.001	.0276688 .1002057
ROTA	.0085862	.0043698	1.96	0.052	-.0000982 .0172625
ratio	.0001582	.0000639	2.48	0.015	.0000314 .000285
dr007	-.0020042	.0022932	-0.87	0.384	-.0065574 .0025489
lnassets	.0004842	.000565	0.86	0.394	-.0006376 .001606
_cons	.0097488	.0182782	0.53	0.595	-.026543 .0460406

The regression coefficient of the Lerner index is estimated to be 0.182664 in Table 1, and it is found to be statistically significant at the 1% level. This implies that as the competition among banks in China intensifies, a decrease in the Lerner index corresponds to a decline in leverage. Therefore, under heightened competition, banks experience a reduction in their leverage ratios, indicating an increase in their risk exposure.

**4.4 Robustness check**

We have conducted a robustness check on the previous analysis results by adjusting the sample size. In particular, we extended the observation period for the 20 banks in the data from 2018-2022 to 2015-2022. The results of the robustness check are displayed in Table 2.

**Table 2.** Results of the robustness check by adjusting the number of samples

Source	SS	df	MS	Number of obs	=	160
Model	.005363469	5	.001072694	F (5, 94)	=	17.27
Residual	.009567674	154	.000062128	Prob > F	=	0.0000
Total	.014931143	159	.000093907	R-squared	=	0.3592
				Adj R-squared	=	0.3384
				Root MSE	=	.00788

  

Leverage	Coefficient	St. err.	t	P> t	[95% conf. interval]
Lerner	.0730314	.0164849	4.43	0.000	.0404658 .1055971
ROTA	.0079585	.0040557	1.96	0.052	-.0000536 .0159705
ratio	.0003001	.0000558	5.37	0.000	.0001896 .0004104
dr007	-.0038327	.0022343	-1.72	0.088	-.0082466 .0005811
lnassets	.0004851	.0005277	0.92	0.359	-.0005572 .0015275
_cons	.0071671	.0163682	-0.44	0.662	-.0395023 .0251681

After conducting the robustness check, it was found that the regression coefficient of the Lerner index is estimated to be 0.164849, and it remains statistically significant at the 1% level. Although there were slight changes in the goodness of fit and coefficients of various indicators, these changes were minor, and the conclusions remained consistent.

## 5 Conclusion

The results of the study suggest that an increase in bank competition is associated with higher economic leverage ratios, although this relationship is non-linear. And the influence of monetary policy on the economic leverage ratio is contingent upon the degree of bank competition. There is a time lag in the effect of monetary policy implementation on the economic leverage ratio. Adjustments to banking regulatory policies play a certain role in altering the level of bank competition and the economic leverage ratio.

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