

The impact of macroprudential policies on bank competition: Empirical study in Vietnam

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Abstract: In the banking system, excessively low or high levels of competition can impact the stability of the banking system. This paper examines the impact of macroprudential policies on banking competition in Vietnam. Utilizing data from 29 commercial banks over the period from 2009 to 2023, the authors found a positive relationship between these policy tools and banking competition. This indicates that, in addition to stabilizing the banking system, macroprudential policies targeting banks have improved market conditions, increased competition, and contributed to a healthier banking environment in Vietnam. This finding contributes in the implementation of macroprudential policies in Vietnam, as it highlights the ability to enhance positive impacts while mitigating the negative externalities of these tools.

Keywords: Bank competition, Commercial banks, Macroprudential policies, Market power.

1. Introduction

The global financial crisis of 2008 highlighted that merely ensuring the safety of individual financial institutions was insufficient. It necessitated a re-evaluation of how supervisory bodies and policymakers oversee financial institutions with the aim of maintaining financial stability. Consequently, macroprudential policies have become increasingly prominent in developed countries such as the United States and Europe. These policies aim to enhance the stability of the financial system and mitigate systemic risks within the banking sector. The primary goal of these policies is to prevent and reduce systemic financial risks. To date, the role of macroprudential policies has proven to have a positive impact on bolstering the resilience of banks to macroeconomic and financial shocks, particularly during the recent COVID-19 pandemic. Countries that tightened macroprudential tools prior to the pandemic and loosened them during the crisis experienced lower levels of financial and economic stress (Katharina & Kristin, 2021). Numerous studies have focused on their impact on financial stability and systemic risk. Theoretical research has laid the foundation for macroprudential policies aimed at achieving greater financial stability (Kogler, 2020) (Jeanne & Korinek, 2020). Some empirical studies have also identified two main objectives to assess the effectiveness of these policies: the intermediate objective of curbing credit growth and the financial cycle, and the ultimate objective of reducing systemic risk in the banking sector (Altunbas, Binici, & Gambacorta, 2018) (Meuleman & Vander Vennet, Macroprudential policy and bank systemic risk, 2020)). These studies have demonstrated that macroprudential policies are effective in enhancing risk resilience and limiting the accumulation of systemic risk at both the micro and macro levels. Furthermore, these policies have been shown to significantly impact banking activities by altering risk-taking behavior, which, in turn, can influence the level of competition and market power of banks.

Banks offer a wide range of financial products and services, from loans and savings accounts to more complex financial services such as asset management and investment. This diversity in offerings fosters competition, where banks not only compete on price but also on service quality and product innovation. However, excessive competition can lead to banks taking on higher risks, which may have severe

consequences for global financial stability (Allen & Gale, 2004). Therefore, limiting and controlling competition helps maintain the stability of the financial system, preventing spillover risks that could trigger a financial crisis (Beck, Demirgüç-Kunt, & Levine, 2006), while also ensuring that competitive rules are adhered to, preventing unfair competition practices.

Currently, there are only a few international studies on the impact of macroprudential policies on competition, such as those by (Mirzaei & Moore, 2021), (Scalco, Tabak, & Teixeira, 2021), (Gonzalez, 2022) with none focusing on this issue in Vietnam. Thus, research on the impact of macroprudential policies on competition in Vietnam will contribute to the theoretical foundation and provide empirical evidence in this area.

Vietnam has a banking-based financial system with a rapidly developing and increasingly complex financial market, characterized by significant interlinkages between the banking, financial, and insurance sectors. This complexity raises the risk of accumulating systemic risk within the banking system. From 2010 to 2016, due to the impact of the global financial crisis, Vietnam's commercial banking system faced numerous challenges and financial stress. To overcome these difficulties, the State Bank of Vietnam proactively and flexibly implemented macroeconomic policies, including monetary policies and macroprudential policies, by combining administrative tools with economic instruments. Many of these tools were traditional monetary policy instruments, while some were effectively macroprudential tools that played a crucial role in limiting and mitigating risks for commercial banks. However, there is still a lack of comprehensive studies assessing the impact of macroprudential policies on banking activities in general and competition in Vietnam. This study is among the first to fill that research gap in Vietnam. In this research, the authors will evaluate the impact of macroprudential tools on the competition of 29 Vietnamese commercial banks from 2009 to 2023. The result shows that during the research period, by tightening macroprudential tools, the State Bank of Vietnam was able to ensure the stability of the banking market while also increasing the level of competition among Vietnamese banks.

This paper is divided into five sections. Besides the introduction, in Section 2, the authors will review the theoretical framework and literature on the impact of MPP on bank competition. Section 3 defines variables and data used. Based on this, Section 4 shows the results and discussion of the research results, and Section 5 provides conclusions.

2. Theoretical Framework and Literature Review

2.1. Impact of Macroprudential Policies on Bank Competition

Macroprudential policies (MPs) have complex effects on bank competition because they are designed to address both financial stability and the competitive dynamics within the banking industry. MPs are typically aimed at mitigating systemic risks and preventing financial crises, but they can also influence the competitive structure of the banking sector. Instruments such as capital requirements, reserve requirements, credit limits, and debt-to-equity ratio controls all have varying impacts on the competitiveness of banks.

The primary goal of macroprudential policy is to create a more level playing field by reducing systemic risks and enhancing financial stability. This can, in turn, improve investor and consumer confidence in the banking system, fostering healthier competition. However, the impact of MPs on competition varies depending on the specific instruments used and the prevailing market conditions.

2.1.1. Capital – related Macroprudential Instruments

Capital requirements are one of the most widely used MPs, aimed at ensuring that banks maintain a sufficient capital buffer to withstand financial shocks. However, the effect of capital requirements on bank competition is ambiguous. On one hand, increased capital requirements can raise banks' operating costs, potentially forcing them to compete more aggressively in credit and deposit markets in an effort to expand market share and offset shrinking margins. On the other hand, while these requirements contribute to financial stability, they may also reduce competition in the banking sector. Higher capital requirements increase banks' costs, and if the additional capital does not generate sufficient returns to cover these costs, bank profitability may decline, thus impacting the bank's charter value. Additionally, stricter capital requirements can create barriers to entry and limit banking activity, reducing the threat

of new competitors and allowing existing banks to pass on higher costs to borrowers and depositors through wider margins (Claessens & Laeven, 2004). Furthermore, the impact of increased capital requirements is not uniform across banks. Due to asymmetry in compliance capabilities, large banks can more easily meet these requirements, thereby strengthening their market position. In contrast, small and medium-sized banks, which have less access to capital, may struggle to comply with capital requirements (Buch & Prieto, 2014). This can lead to fragmentation within the banking system, where larger banks maintain or enhance their dominance, while smaller banks face increased difficulty in competing.

2.1.2. Credit – related Macroprudential Instruments

Macroprudential policies related to credit supply, such as credit limits, concentration limits, foreign currency lending restrictions, and loan-to-value ratios, are designed to reduce credit supply. These instruments also have mixed effects on bank competition. On one hand, a reduction in credit supply can increase banks' market power, allowing them to set higher interest rate spreads. On the other hand, limitations on existing banks' lending activities can create opportunities for new entrants, thus boosting market competition. The positive effect on competition is greater in markets with fewer entry and activity restrictions. Concentration limits, for example, may require borrowers to diversify their lenders, which weakens the market power of relationship banks and can enhance competition (Petersen & Rajan, 1995). However, credit supply reductions can also increase banks' operating costs by reducing economies of scale and increasing average costs, leading to decreased competition, similar to the effects of capital-based policies (Gonzalez, 2022).

Capital-based MPIs may influence credit supply, but they are less directly linked to credit supply reductions compared to credit-supply-based policies. For example, higher capital requirements for systemically important financial institutions (SIFIs) allow banks some flexibility to choose between increasing capital, reducing risk, or scaling back credit. Dynamic loan-loss provisions, a capital-based MPI, have a countercyclical impact on credit supply, reducing credit availability during upturns and increasing it during downturns. Since these provisions only temporarily reduce credit supply, their effect on market entry attractiveness is less clear, even though they impose costs on existing banks. As a result, dynamic loan-loss provisions may have a less positive (or even negative) impact on competition compared to other macroprudential tools designed to curb loan growth more permanently, such as concentration limits or foreign currency lending restrictions.

2.1.3. Liquidity – related Macroprudential Instruments

Liquidity requirements, such as reserve requirements and margin ratios, force banks to hold a certain amount of liquid assets. These instruments are intended to mitigate liquidity risk and protect the financial system from liquidity shocks. However, these requirements can also affect credit supply and, consequently, competition. Higher reserve requirements, for instance, reduce the funds available for lending, which can impact competition in two opposing ways (Gonzalez, 2022). That said, the impact of liquidity policies on credit supply is generally less significant than that of credit-supply-based instruments.

It is also worth noting that certain MPIs may raise barriers to entry in banking and reduce competition (Agoraki, Delis, & Pasiouras, 2011). For instance, higher capital requirements for SIFIs can create obstacles for smaller banks' growth, potentially reinforcing the market power of large, established banks. These points highlight the theoretical contradictions in how changes in bank costs, credit supply, and entry barriers associated with MPIs affect bank competition. Moreover, since different MPIs have varying effects on charter values, credit supply, and entry barriers, their impact on competition may also vary.

In conclusion, MPIs have multidimensional effects on competition in the banking sector. While they contribute to enhancing financial stability and preventing systemic crises, instruments such as capital requirements, reserve requirements, and credit limits can reduce competition, particularly for smaller and newer banks. The resulting fragmentation between large and small banks could lead to a less competitive financial system with fewer players.

2.2. Literature Review

Most of the literature evaluating the effectiveness of macroprudential policies (MPIs) focuses on their impact on financial stability and systemic risk. Theoretical studies have established a rationale for MPIs aimed at enhancing financial stability (Kogler, 2020) (Jeanne & Korinek, 2020), while empirical studies have identified two main objectives to test their effectiveness: the intermediate goal of reducing credit growth and financial cycles, and the ultimate goal of lowering bank systemic risk (Altunbas, Binici, & Gambacorta, 2018) (Meuleman & Vander Vennet, Macroprudential policy and bank systemic risk, 2020).

To date, there has been limited research on the impact of MPIs on banking system competition. Only a few studies have examined this relationship, such as those by (Mirzaei & Moore, 2021), (Scalco, Tabak, & Teixeira, 2021), (Gonzalez, 2022) and more recently, (Ofori-Sasu, Agbloyor, Sarpong-Kumankoma, & Abor, 2023). The findings from these studies reveal mixed results, with some pointing to positive effects (Gonzalez, 2022), negative effects (Scalco, Tabak, & Teixeira, 2021) (Ofori-Sasu, Agbloyor, Sarpong-Kumankoma, & Abor, 2023), and effects that are moderated by other factors (Mirzaei & Moore, 2021).

Mirzaei and Moore (Mirzaei & Moore, 2021) analyzed the impact of nine bank and borrower-oriented MPIs on bank competition across 58 countries. Their study examined instruments including loan-to-value ratios, debt-to-income ratios, foreign currency credit limits, domestic credit limits, reserve requirements, interbank market activity limits, countercyclical capital buffers, dynamic credit loss provisions, and leverage ratios. The quantitative results showed that tightening MPIs generally reduced bank competition. However, stronger supervision and better institutional quality helped mitigate the negative effects on competition. The authors concluded that, on average, MPIs reduce bank competition, particularly in countries with weaker institutional quality and lower supervisory powers. However, this study relied on country-level data and did not fully control for endogeneity and omitted variables. Additionally, it did not analyze the specific impact of individual MPIs or consider potential differences across countries based on entry and activity restrictions.

Scalco et al. (Scalco, Tabak, & Teixeira, 2021), using data from 83 Brazilian banks, found that tightening six MPIs had a negative impact on bank competition. The authors demonstrated that tighter MPIs increased bank profitability while reducing competition in the Brazilian banking system. However, their study was limited to a single country, which constrains the ability to generalize the findings to other markets.

Gonzalez (Gonzalez, 2022), using data from 2,511 publicly listed banks across 52 countries, found that, overall, tightening MPIs increased bank competition as measured by the Lerner index. However, there were variations in how different MPIs affected bank competition across countries and policy types. Credit-related MPIs (such as concentration limits and foreign currency lending restrictions) and liquidity-related MPIs (such as interbank market activity limits and reserve requirements) were found to increase bank competition. In contrast, capital-related MPIs (such as dynamic credit loss provisions and additional capital requirements for systemically important banks) and taxation policies reduced competition. The degree to which legal and regulatory constraints on market entry and bank activities were tightened also influenced the overall impact of MPIs on competition. Based on quantitative analysis, González concluded that the effects of MPIs on bank competition depend on the specific instruments and regulatory context within each country.

Finally, the study by (Ofori-Sasu, Agbloyor, Sarpong-Kumankoma, & Abor, 2023) explored the potential for central banks to use MPIs to influence competition in the banking system across 52 African countries. Using data from 2006 to 2020, the authors constructed measures of market power, monetary policy, and MPIs. Their quantitative results indicated that tightening both monetary and macroprudential policies increased banks' market power, effectively reducing competition in the banking system.

This body of research highlights the complex and often contradictory effects of MPIs on bank competition, with outcomes varying based on the specific instruments used, the regulatory environment, and regional differences.

In Vietnam, there has been limited quantitative research on the effectiveness and impact of

macroprudential policy. The study by (Phạm, 2019) employed a quantitative time series model for Vietnam and a panel data model for a group of emerging and developed countries in Asia, including Vietnam, to assess the effectiveness of macroprudential policy in the country. This can be considered one of the first quantitative studies on the effectiveness of macroprudential policy in Vietnam. However, the study focused on evaluating the impact of macroprudential policy on credit growth, real estate prices, and the stabilization of the foreign exchange market. (Nguyễn, 2019) provided a comprehensive examination of macroprudential policy in Vietnam, covering the current state of policy, the assessment of macroprudential tools' effectiveness, and policy enforcement. However, the dissertation only evaluated the effectiveness of these tools on the intermediate target of credit growth. As such, there has yet to be any study in Vietnam that examines the impact of macroprudential intrusion on the Vietcombank competition. This is a research gap that the authors aim to address, in order to provide a basis for recommendations in the management of macroprudential policy by supervisory authorities.

3. Variables and Data

3.1. Variables and Hypothesis

3.1.1. Dependent variables - Bank Competition

In this study, the authors employ a non-structural approach to measure the level of competition among banks. According to the Efficient Structure Hypothesis (ESH), the primary impact of market power is not necessarily higher profits, but rather the operational efficiency achieved through market concentration (Clark, Radić, & Sharipova, 2018). This non-structural approach examines how changes in output factors respond to changes in input factors, using these measures to determine whether a bank possesses competitive strength. The most commonly applied measures in the non-structural approach include the H-index, the Lerner Index, and more recently, the Boone Indicator (Arrawatia, Misra, Dawar, & Maitra, 2019).

The Lerner Index determines the markup of a bank's price over its marginal cost, while the Boone Indicator also assesses market power by measuring the elasticity of profits (or market share) with respect to marginal costs. Among these, the authors use the Lerner Index to measure the level of competition, which is calculated as:

$$Lerner_{it} = \frac{P_{it} - MC_{it}}{P_{it}}$$

Where MC_{it} is the long-term marginal cost of bank i at time t , and P_{it} is the output price of bank i , calculated as revenue divided by total assets. The value of the Lerner Index ranges from 0 to 1. The authors estimate the marginal cost (MC) by differentiating the total cost (TC) with respect to output (TA). The estimation equation follows the methodology of Silva-Buston (2019). The Lerner index measures market power or the level of competition of a business. When the Lerner index increases, it indicates that banks have greater market power, which corresponds to a decrease in competition.

3.1.2. Macroprudential policies

In Vietnam, during the research period, the State Bank of Vietnam activated four groups of macroprudential tools, including those related to credit, capital, liquidity, and foreign exchange. The credit-related tools include the cap on credit growth, foreign currency lending targets, risk weights for securities and real estate loans, and the loan-to-value (LTV) ratio. The capital-related tools include the capital adequacy ratio, capital contribution limits for share purchases, and risk weights for securities and real estate loans. The liquidity-related macroprudential tools include the loan-to-deposit ratio, the liquidity coverage ratio, and the short-term capital lending ratio for medium- and long-term loans. Finally, the foreign exchange-related tools include foreign currency lending targets (which pertain to both credit and foreign exchange), foreign currency positions, and caps on foreign currency deposit rates.

To assess the impact of macroprudential policies, the authors constructed an index based on the method proposed by the IMF and presented in the study by (Lim, et al., 2011), which has since been widely adopted in research worldwide (e.g (Gao, Miller, & Taboada, 2018) (Meuleman & Vander

Vennet, 2020)), called MaPP Index. This variable represents a composite index that reflects the overall macroprudential policy stance across all tools. This index received value of 1 if one tool is tightened, and -1 if this tool is loosened. If there are multiple adjustments in the same (or opposite) direction within the same period, the values are summed (or offset each other). The use of the Mapp Index variable is considered to have a synergistic effect on the impact of instruments on risk, leading to the following research hypothesis:

H₁: Tightening macroprudential instruments affects bank competition.

3.1.3. Control variables

Control variables are divided into two main groups: bank-specific variables and macroeconomic variables.

3.1.3.1. Bank-Specific Factors are Intrinsic to Banks, Including

Bank Size - According to the theory of economies of scale, larger banks often have cost advantages, allowing them to enjoy greater market power or impose higher prices. Thus, larger bank size typically increases market power and reduces competition. However, several studies suggest that the relationship between competition and bank size is nonlinear. In their study, De Guevara et.al. (De Guevara, Maudos, & Pérez, 2005) analyzed a sample of banks in the European Union and found that competition decreases with bank size only up to a certain point; beyond this threshold, the relationship weakens. In a study of Spanish banks during the integration period, the authors (Maudos & De Guevara, 2007) found a nonlinear relationship in the opposite direction, identifying a point beyond which larger bank size reduces competition. This leads to the following research hypothesis:

H₂: Bank size affects bank competition.

Efficiency - The Efficiency-Structure hypothesis posits that more efficient banks can expand their market share, leading to an increase in the Lerner index and a decrease in competition (Lloyd-Williams, Molyneux, & Thornton, 1994) (Berger, 1995). Empirical research by (De Guevara, Maudos, & Pérez, 2005) shows that more efficient banks enjoy higher profit margins, likely due to lower marginal costs. Additionally, banks that manage their inputs more effectively can achieve higher efficiency and use it as a barrier to deter new entrants, thereby reducing competition (Khan, Kutan, Ahmad, & Gee, 2017). This leads to the following research hypothesis:

H₃: Bank efficiency reduces bank competition.

Risk Level - Research by (De Guevara, Maudos, & Pérez, 2005) and (Beck, Demirgüç-Kunt, & Levine, 2007) indicates that banks that invest more resources in managing risk (equivalent to reduced risk) tend to achieve higher profit margins, which implies a decrease in competition. This leads to the following research hypothesis:

H₄: Bank risk level reduces bank competition.

Diversification - Some empirical studies suggest that non-traditional income-generating activities of banks can enhance market power and reduce competition. For instance, (Valverde & Fernández, 2007) and (Ciarrapico & Cosci, 2011) found that competition among banks decreases as income from non-traditional activities increases, particularly in their studies of European banks. The authors explain that by enhancing cross-selling and increasing non-lending activities, banks can strengthen their relationships with customers, offering personalized and high-quality services. In practice, they impose switching costs. This leads to the following research hypothesis:

H₅: Diversification reduces bank competition.

3.1.3.2. Macroeconomic Environment

Market concentration, often discussed in the context of the Structure-Conduct-Performance (SCP) paradigm, significantly impacts market power. According to (Corvoisier & Gropp, 2002), the effect of concentration on banks' market power can vary depending on the product being considered. This leads to the following research hypothesis:

H₆: Market concentration affects bank competition.

Factors such as economic growth, inflation, or economic stability have a significant impact on market competition. (De Guevara, Maudos, & Pérez, 2005) pointed out that during periods of economic expansion (where demand for bank financing increases), banks can achieve relatively higher profits. Thus, periods of economic growth and financial stability enable banks to expand in size and efficiency, leading to relatively higher profit margins. The study uses four variables to represent economic environment factors: real GDP growth rate, inflation and a crisis indicator. This leads to the following research hypothesis:

H_7 : Economic growth affects bank competition.

H_8 : Inflation affects bank competition.

H_9 : Crisis affects bank competition.

3.2. Data

This study utilizes annual secondary data over a 14-year period from 2009 to 2023. Macroeconomic data were collected from credible sources such as the Vietnam General Statistics Office, the IMF's International Financial Statistics database, and the World Bank. Bank dataset were gathered from the Vietnamese company database (FIIN). Any missing data were supplemented from the annual financial reports published by the banks themselves. The research sample includes 29 commercial banks.

Table 1.
Descriptive statistics of variables.

	Mean	Median	Min.	Max.	SD. dev	N
Dependent variable						
LERNER	0.1249744	0.1109164	-0.1255136	0.5080301	0.1005633	413
Main regressor						
MaPPIIndex	2.143187	2	0	5	1.497778	433
Control variables						
LnTA	32.45612	32.4445	28.83398	35.37206	1.296488	433
CI	0.5873504	0.6026295	-16.46169	2.164832	0.8440649	432
NPL	0.0219336	0.0188	0	0.2975	0.020885	425
LDR	0.7497375	0.7536811	0.1899475	1.318359	0.17256	433
EA	0.0930494	0.0819239	0.0262139	0.3323916	0.042747	433
DIV	0.2519571	0.2442015	-2.222229	1.019428	0.2075953	432
P	0.3972286	0	0	1	0.4898901	433
HHI	0.0615509	0.0608954	0.0560256	0.0726571	0.0043404	433
GDP	0.0580429	0.0621081	0.026	0.081	0.0143426	433
INF	0.0528167	0.0352026	0.006312	0.1867773	0.0433156	433
Crisis	0.2009238	0	0	1	0.4011547	433

4. Model and Result

4.1. Model Description

Based on previous review and the characteristics of Vietnam financial market, the model is formulated as follows:

$$LERNER_{it} = \beta_0 + \beta_1 MaPP_{it} + \sum \beta^b BANKSPECIFIC_{it} + \sum \beta^M MACRO_t + u_{it} \quad (1)$$

Where:

- $LERNER_{it}$: represents the bank competition variable of bank i at time t;
- $MaPP_{it}$: represents the macroprudential policy instruments;
- $BANKSPECIFIC_{it}$: includes control variables such as total assets, non-performing loans, leverage, etc.;

- $MACRO_t$: includes macroeconomics variables, e.g HHI, GDP, CPI, and Crisis
- u_{it} is the error term.

With data from 29 commercial banks (CBs) over a 15-year period, a panel dataset was constructed, combining both cross-sectional and time-series data. The secondary data collected were first entered into Excel to compute the variables for the research model. The data were then processed using STATA software through panel data regression methods. The variables in the model were checked to ensure there was no multicollinearity Table 2. In panel data studies, three common estimation methods are typically used: Pooled OLS, Fixed Effects Model (FEM), and Random Effects Model (REM). After estimating the OLS, FEM, and REM models, the assumptions of homoscedasticity and no autocorrelation in the residuals may be violated. Such issues can lead to inefficient estimates and inaccurate standard errors, resulting in misleading test results. Therefore, the authors employ the Feasible Generalized Least Squares (FGLS) regression to address these issues. FGLS is used after running OLS, FEM, and REM to ensure that the parameter estimates are more efficient and reliable when the basic assumptions of the previous regression methods are not met. Table 2 presents the results of multicollinearity testing based on the VIF (Variance Inflation Factor). As shown, the VIF values for all variables are 10, indicating that there is no multicollinearity in the model.

Table 2.
Multicollinearity test.

Variables	VIF
MaPPIIndex	1.18
LnTA	3.71
CI	1.68
NPL	1.15
LDR	1.54
EA	2.16
DIV	1.93
P	1.64
HHI	2.23
GDP	1.45
INF	4.07
Crisis	3.48

Table 3.
Estimation result.

Variables	Hypothesis	OLS	REM	FEM	FGLS
MaPPIIndex	+	-0.0032861** [-2.26]	-0.0031104** [-2.49]	-0.002857** [-.628484]	-0.0025045*** [-4.36]
LnTA	+	0.0299366*** [9.73]	0.026077*** [6.19]	0.0272706*** [5.03]	0.0206832*** [7.86]
CI	-	-0.4132421*** [-26.62]	-0.3831342*** [-24.87]	-0.3737958*** [-23.45]	-0.4083337*** [-40.17]
NPL	-	0.6016764*** [5.14]	0.549211*** [5.36]	0.5410059*** [5.27]	0.4776622*** [8.12]
LDR	-	-0.0529123*** [-3.65]	0.0045639 [0.30]	0.016094 [1.00]	0.0020373 [0.19]
EA	+	0.6174744*** [8.32]	0.4245317*** [5.85]	0.390149*** [5.14]	0.2276821*** [3.97]
DIV	+/-	-0.0252826* [-1.89]	-0.0302927** [-2.44]	-.0320503** [-2.55]	-0.0264335*** [-3.30]
P	+	0.0161808*** [3.14]	0.0235602*** [3.58]	.0256796*** [3.50]	0.0167636*** [4.79]
HHI	+	1.342499* [1.89]	0.9608147 [1.45]	1.022006 [1.45]	0.9702043*** [3.97]

		[1.89]	[1.53]	[1.53]	[3.06]
GDP	+	-0.0353715 [-0.21]	-0.0273861 [-0.20]	-0.0442099 [-0.32]	0.1642138*** [2.65]
INF	-	-0.4903472*** [-5.10]	-0.4630717*** [-5.59]	-0.4430928*** [-5.16]	-0.3474639*** [-8.20]
Crisis	-	0.0249669** [2.44]	0.0343626*** [3.89]	0.037815*** [4.23]	0.0178524*** [3.53]
_cons		-0.6729306*** [-5.87]	-0.5728211*** [-3.70]	-0.628484*** [-3.15]	-0.3769615*** [-3.95]
N		408	408	408	408
R2		84.52			
F/Wald chi2		179.76***	1837.95***	140.15***	3167.1***
F (Likelihood)				7.97 (0.0000)	
Breusch and Pagan lagrangian multiplier test			189.02 (0.0000)		
Breusch-Pagan/ Cook-Weisberg test		16.03 (0.0001)			
Wald test				1131.11 (0.0000)	
Wooldridge test		684.207 (0.0000)			
Hausman (p-value)				12.34 (0.4191)	

Note: *, **, *** statistical significance at 10%, 5% and 1%.

4.2. Result and Discussion

From the Table 3, the estimation results show the following findings:

- **Macroprudential Policies:** Tightening macroprudential policies reduces the Lerner index, thereby increasing the level of competition among banks. This indicates the positive impact of macroprudential policies. In Vietnam, from 2011 to 2019, the State Bank of Vietnam (SBV) consistently activated macroprudential tools related to credit, capital, liquidity, and foreign exchange to mitigate the consequences of previous credit expansion and to limit the effects of the 2008 financial crisis. These policies significantly contributed to stabilizing the financial system, ensuring the safety of banks, reducing market concentration, and ultimately enhancing competition among banks.
- **Bank Size:** The size of a bank, as measured by total assets, has a positive relationship with the Lerner index; in other words, larger banks tend to reduce competition levels. This aligns with the theory of economies of scale, where larger banks typically have advantages and greater market power, leading to reduced competition in the market.
- **Management Efficiency:** Higher cost management efficiency reduces the Lerner index and increases bank competition. In Vietnam, banks that manage costs efficiently have an advantage in pricing and creating barriers to entry for new competitors, thereby enhancing competition.
- **Credit Risk:** An increase in credit risk leads to decreased competition among banks, while no significant relationship is found between liquidity risk and competition. The impact of credit risk on bank competition is consistent with the findings of (De Guevara, Maudos, & Pérez, 2005) and (Delis, 2012).
- **Listing on the Stock Exchange:** Banks listed on the stock exchange generally experience an increase in market power, leading to reduced competition among banks. Listed banks typically possess stronger capabilities, meeting the requirements for financial, managerial, and competitive strength, which gives them greater market power. In contrast, non-listed banks generally have poorer business performance.

- *Market Concentration:* Market concentration has a positive effect on the Lerner index, meaning that lower competition levels increase market competition among banks. This result is consistent with the trends in the Vietnamese banking system. Since 2012, Vietnamese commercial banks have completed their restructuring process, significantly expanded their operations, with many new banks established. Besides, Government and SBV policies aimed at limiting bank concentration, leading to intense competition.

- *Macroeconomic Variables:* Among the macroeconomic variables, only inflation has a negative impact on the Lerner index of banks. This is because, during periods of inflation, the input costs for banks increase, but in Vietnam, the ability to raise lending rates is often constrained by concerns over credit risk and government regulations. As a result, the Lerner index does not increase, and competition is not reduced.

5. Conclusions

This paper, using the sample of 29 banks of Vietnam from 2009 to 2023, identifies the impact of macroprudential policies on bank competition. The results indicate that, on average, a tightening in bank-oriented macroprudential policies increases bank competition.

Overall, the study demonstrates the positive impact of macroprudential policy tools on enhancing bank competition in a developing economy like Vietnam, which aligns with the studies of (Gonzalez, 2022) and (Mirzaei & Moore, 2021). The findings support the theory that macroprudential tools are effective in stabilizing financial markets, strengthening investor confidence, and consequently fostering healthy competition.

Moreover, the results have important policy implications because they identify macroprudential policies that increase both bank competition and stability. In particular, a tightening in instruments such as the limits on loan concentration, foreign currency loans, interbank exposure, and reserve requirements linked to foreign deposits or adjusted countercyclically increases both bank competition and stability. These policies are more attractive because they make the traditional benefits associated with bank competition in terms of greater efficiency, quality, and innovation compatible with the benefit of also increasing stability in the financial sector.

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