"Market structure and bank performance: A comprehensive picture of Vietnam"

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MARKET STRUCTURE AND BANK PERFORMANCE: A COMPREHENSIVE PICTURE OF VIETNAM

Abstract

In the context of the fact that the structure of the Vietnamese banking market has undergone many fluctuations, which has had an impact on banking activities, and the fact that many related studies have been carried out, but the answer is still limited and inconsistent, it is necessary to study the impact of the market structure on banking operations in Vietnam. The paper comprehensively examines the impact of market structure on various aspects of bank performance in Vietnam. The study uses three measures of the structure of the banking industry, namely, the total market share of the largest banks, the squared market share of all banks according to the Herfindahl-Hirshchman index, and the Lerner index on market power (inverse bank competition), to ensure the results are not dependent on any specific measure. The paper applies the two-step system generalized method of moments estimator to conduct regression analysis for a sample of 30 banks from 2007 to 2021. All obtained estimates generally show positive effects on bank performance due to greater market power and higher banking concentration. Concretely, more market power and greater concentration improve bank asset quality, management efficiency, bank profitability, and lending capacity. Overall, the findings of this paper all support the bright side of less competition and more concentration, which is essential to derive policy implications related to supervising competitive environments and stimulating consolidated financial systems.

Keywords	asset quality, bank competition, Lerner index, market concentration, market power
JEL Classification	G21, G28

INTRODUCTION

Thus far, economic theories and empirical studies have introduced conflicting predictions about the relationship between market structure and banking activities in different countries and regions. This highlights the importance of investigating the influence of market structure on bank performance in individual countries to uncover specific implications. In addition, studies on the role of the market structure in bank lending, particularly loan growth, are limited as only a few previous studies have paid attention to the topic. Therefore, more research is needed to exploit the comprehensive influence of the market structure on bank performance to elucidate its implications.

Based on the above arguments, this study examines the impact of the market structure on the performance of the Vietnamese banking system. There are favorable conditions for studying the current issues in Vietnam. The financial system of this country is mainly bank-based, making banks the primary funding providers in the economy, and any inefficiencies in banking business operations can have serious consequences. Vietnamese banks have undergone significant changes and reforms since 2007, implemented by policymakers and supervi-

sors to alleviate risks and enhance bank soundness, in response to the requirements of the World Trade Organization accession and the financial crisis. Deregulation and the promotion of innovation have lowered entry barriers, encouraging new competitors' participation and increasing market competition (Nguyen et al., 2018). The State Bank of Vietnam (SBV), as a banking supervisor, has encouraged weak banks to consolidate under the project "Restructuring the system of credit institutions in Vietnam for the period 2011–2015", expecting the banking industry to have a smaller number of banks with a larger scale. Accordingly, multiple banks have been subject to mergers and acquisitions. The privatization strategy has also partly reduced the dominant position of state-owned banks (Dang & Huynh, 2022). In a context where the banking market structure has been changing rapidly in Vietnam, it is essential to determine its impact on bank characteristics and business performance.

1. LITERATURE REVIEW

The market structure of the banking industry is an important factor in academic and policy debates, constituting a significant foundation for an efficient and stable financial system. One of the reasons for bank failure is increased competition (Gan, 2004; Jeon & Lim, 2013; Schaeck et al., 2009). Business deregulation and innovation have made the banking industry more competitive. Studying the level of competition in the banking industry can shed light on signs of a bank's underperformance. In addition, there has been rapid consolidation of banks worldwide over the past decades, which has increased policymakers' concerns about market concentration (Allen & Gale, 2004; Berger et al., 2009; Caminal & Matutes, 2002; S. Kasman & A. Kasman, 2015). Bank competition and market concentration are two main aspects when studying the structure of the banking market.

The following part reviews the related literature on

1) the impact of market structure on the level of bank risk;

2) the effect of market structure on management efficiency and bank profitability; and

3) the influence of market structure on bank lending. Then, corresponding hypotheses are developed.

Regarding the competition-bank risk nexus, there are two opposing theoretical models. First, the competition-stability hypothesis suggests that the more competitive banks are, the more financially stable they are; in other words, the greater level of market concentration may cause banks to be risk-

ier. According to Mishkin (1999), concentrated banking systems can engage in more risk-taking behaviors based on the concept of being "too big to fail" due to government guarantees. A less competitive and highly concentrated banking market can create risky loans associated with higher interest rates charged to customers, making them more difficult to repay (Boyd & De Nicoló, 2005).

However, under the competition-fragility hypothesis, high concentration leads to less risk (Keeley, 1990). This is because high market power allows banks to protect the value of their franchises by accumulating capital and holding low-risk investments. In addition, market power allows banks to increase profits by charging high prices, thus creating a buffer against any adverse market shocks. The extant empirical literature provides mixed evidence on the relationship between bank riskiness and market structure in both single and multinational studies (Albaity et al., 2019; Craig & Dinger, 2013; S. Kasman & A. Kasman, 2015; Khan & Ahmad, 2022; Leroy & Lucotte, 2017).

Banks have more market power in a more concentrated market, allowing them to continue underperforming without being forced out of the market. Thus, this structure-conduct-performance hypothesis suggests that concentration in the market is associated with lower efficiency and profitability (Bain, 1951). Concentrated markets exhibit less competition pressure and discourage bank managers from trying to maximize bank efficiency.

In addition, the hypothesis of banking specificity may exert a negative effect of competition on performance. The theoretical literature suggests that competition in the banking market can lead to information asymmetry between banks and borrowers

(Dell'Ariccia & Marquez, 2004). Thus, competition can increase supervisory costs and reduce the length of customer relationships, thereby reducing bank efficiency and profitability (Petersen & Rajan, 1995).

In the banking literature, empirical evidence on the link between market structure and bank efficiency is limited and inconsistent. For instance, Pruteanu-Podpiera et al. (2015) investigate the relationship between competition and efficiency in the Czech banking industry from 1994 to 2005 and then find a negative link, in agreement with Yin (2021) using a dataset covering 148 countries for the period 1995–2015. However, with the US banking data, Koetter et al. (2012) find supporting evidence showing a positive association between competition and efficiency, similar to Schaeck and Cihák (2014) for European banks. Meanwhile, studies by Tan (2016) and Tan (2017) conclude that there is no clear and consistent impact of competition on bank profitability in China.

The competitiveness of the banking system affects the credit access of manufacturing industries in the economy. In this regard, several different views have been emphasized in the existing literature. The first group argues that credit availability is enhanced in a less competitive banking environment (Petersen & Rajan, 1995), where banks with high market power have close relationships associated with their willingness to provide credit to businesses. The theory has also claimed a positive relationship between banks' market power and credit supply thanks to their easy access to alternative funding sources (Boyd & De Nicoló, 2005).

However, as banks accumulate market power, they begin to charge higher lending rates, which in turn exacerbates moral hazard and adverse selection problems (Stiglitz & Weiss, 1981). Under this mechanism, bad debts may rise accordingly, boosting the financial risks of banks and reducing their reputation in the interbank market. With this risk-shifting theory (Boyd & De Nicoló, 2005), banks can hedge against exogenous shocks by increasing their holdings of liquid assets, alternatively speaking, reducing lending.

Although much theoretical debate exists about the impact of banking market structure on access to finance, only a few related studies have explored

this link empirically. Beck et al. (2004) document the negative impact of bank market power on firms' access to bank credit in 74 developed and developing countries. In contrast, Carletti and Leonello (2019) show that banks with lower market power are incentivized to invest more in liquidity reserves and tend to grant fewer loans.

Although previous scholars have used many measures of market structure, there has been general disagreement about the most optimal one. Among those measures, market concentration indicators are commonly used but have been criticized for several reasons, including their inability to measure competition effectively. The Lerner Index is a prominent measure of market power/bank competition (Lerner, 1934), but it also has weaknesses. In general, different measures infer different market structure characteristics; therefore, the impact of the market structure depends on the selection of specific measures. Much prior research on market structure employs only a single measure, which can be misleading and provide a less comprehensive assessment as each measure has its own advantages and disadvantages (Dang & Huynh, 2022; Dang & Nguyen, 2022; Hussain & Bashir, 2019; Huynh & Dang, 2021; Khan et al., 2016). As a result, it makes more sense to use alternative measures of market structure in the same study.

In summary, the present literature displays limited evidence on the impact of market structure on bank performance and reveals a gap in the literature that needs to be filled. The paper performs this task by developing the following hypotheses to explore the impact of the market structure on bank performance:

H1A: An increase in market power and banking concentration may reduce bank credit risk.

H1B: An increase in market power and banking concentration may increase bank credit risk.

H2A: An increase in market power and banking concentration may reduce management efficiency and bank profitability.

H2B: An increase in market power and banking concentration may increase management efficiency and bank profitability.

H3A: *An increase in market power and banking concentration may reduce bank lending.*

H3B: *An increase in market power and banking concentration may increase bank lending.*

2. METHODOLOGY AND DATA

The study designs the following general econometric model to analyze the empirical relationship between market structure and bank performance:

$$Y_{i,t} = \alpha_0 + \alpha_1 \cdot Y_{i,t-1} + \alpha_2 \cdot MT_{i,t-1} + \\ + \alpha_3 \cdot BC_{i,t-1} + \alpha_4 \cdot MC_t + \varepsilon_{i,t}, \quad (1)$$

where i and t correspond to banks and years. The dependent variable Y included in the model is credit risk (the non-performing loan ratio and the loan loss provision ratio), cost efficiency (the ratio of total non-interest expenses to total revenue and the ratio of operating expenses to total assets), bank profitability (ROE and ROA ratios), and bank lending (the growth rate of loan growth). The lagged dependent variable is to determine the dynamic panel form, showing persistent banking behaviors over the years. To have better estimates of the relationship between the market structure and bank performance and to limit the bias of omitted variables, control variables are added to the regression, accounting for bank-level variables (BC) and macro variables (MC). Corresponding to each dependent variable, specific control variables are used based on the existing literature (Dietrich & Wanzenried, 2014; Haq & Heaney, 2012; Kupiec et al., 2017).

The market structure variable (MT) reflects the degree of competition among banks or market power and the degree of market concentration. The study uses three different measures of the market structure: the asset-based CR3/CR5 index, the asset-based HHI index, and the Lerner index. The CR3/CR5 index represents the share of the market's top three/five banks in total banking industry assets; a higher value means higher concentration. The HHI index is the sum squared of each bank's market share in the

banking industry; a higher value also indicates a higher concentration level. If we accept some prevalent theoretical propositions, a more concentrated market means a lower level of competition as banks exercise their greater market power (Boyd & De Nicoló, 2005).

With the Lerner index, it measures a bank's market power and is calculated as the difference between price and marginal cost divided by price:

$$Lerner_{it} = \frac{P_{it} - MC_{it}}{P_{it}}, \quad (2)$$

where P is a bank's output price (the ratio of total income to total assets), and MC is the marginal cost. The Lerner index takes a value from 0 to 1, given that level 0 implies perfect competition, while level 1 indicates monopoly (Berger et al., 2009; Turk Ariss, 2010). To determine MC, it is necessary to estimate a trans-log cost function.

The study uses the two-step system GMM estimator to analyze the proposed dynamic panel model and control endogeneity (Arellano & Bover, 1995; Blundell & Bond, 1998). The two-step system GMM setting is estimated in STATA using the xtabond2 command with instrument collapse options (Roodman, 2009). The consistency of the GMM estimator is confirmed if there is no second-order autocorrelation in the errors and if the instrumental variables are valid. The validity of the instruments is checked through the Hansen test of over-identifying restrictions, and the Arellano-Bond test is employed to check for autocorrelation.

To estimate the model, the study constructs an annual dataset from a bank's financial statements. The study also aggregates macroeconomic data from the International Financial Statistics (IFS) and the SBV. Banks that do not have data on the indicators needed to be studied for the respective period should not be part of the sample. Based on data availability, the sample has a total of 30 banks with data running from 2007 to 2021. Although this number of banks cannot cover the entire system, these banks still account for about 95% of total market assets in 2021. Table 1 presents descriptive statistics of all variables used.

Table 1. Summary statistics of all variables

Variables	Definitions	Obs.	Mean	SD	Min	Max
Lerner	Lerner index of market power	439	0.349	0.089	0.195	0.518
CR5	Total market share of 5 largest banks	439	0.586	0.052	0.539	0.713
CR3	Total market share of 3 largest banks	439	0.422	0.044	0.376	0.530
HHI	Squared market share by HHI	439	0.088	0.015	0.075	0.125
NPL	Non-performing loans/Total customer loans	395	2.077	1.117	0.539	5.016
LLP	Loan loss provisions/Total customer loans	439	0.959	0.672	0.122	2.516
Non-interest expenses	Ratio of non-interest expenses to total revenue	439	21.684	5.889	11.909	31.849
Operating expenses	Ratio of operating expenses to total assets	439	1.571	0.470	0.791	2.537
ROA	Return on assets	439	0.854	0.597	0.032	2.156
ROE	Return on equity	439	9.425	6.337	0.561	21.915
Loan growth	Loan growth rate	431	27.579	26.518	−2.358	101.758
Capital	Equity/Total assets	439	9.696	4.293	4.859	20.470
Loan share	Ratio of customer loans to total assets	439	56.046	12.400	32.400	74.968
LLR	Loan loss reserves/Total customer loans	439	1.262	0.513	0.423	2.499
Liquidity	Liquid assets/Total assets	439	33.562	10.791	17.719	56.053
Size	Natural logarithm of total assets	439	32.144	1.262	29.961	34.486
Income diversification	Ratio of non-interest income to operating income	439	21.647	13.789	−2.585	53.029
Deposits	Deposits/Total assets	439	62.946	13.134	35.514	83.600
GDP	Annual economic growth by GDP	439	5.795	1.323	2.580	7.130
Monetary policy	Refinancing rates by SBV	439	7.513	2.734	4.000	15.000

3. RESULTS

All subsequent results successfully satisfy the diagnostic tests for confirming the utilization of the dynamic panel model and the GMM estimator. Specifically, the lagged dependent variable consistently demonstrates significance across all regression analyses, providing evidence of persistence in bank performance. The Hansen test, conducted to assess over-identification, validates the joint reliability of our instruments. Additionally, the Arellano-Bond test detects first-order autocorrelation but does not indicate any second-order autocorrelation.

3.1. Regression results in the function of credit risk

First, the impact of bank competition on credit risk is analyzed in the model of bad debts. According to the estimated results reported in Table 2, there is a statistically significant and negative relationship between the Lerner index and the NPL ratio, confirming that banks with higher market power may select better borrowers and thereby reduce credit risk. The results show that an increase of one unit of market power through the Lerner index has the potential to reduce the NPL ratio by 2.735%, and this result is entirely economically relevant.

Table 2 also presents the regression results for the market concentration and bad debt link. Accordingly, all three measures (CR5/CR3 and HHI) have a negative relationship with the NPL ratio, and the results are statistically significant in all columns. This pattern suggests that higher concentration reduces credit risk. The estimated coefficients of the HHI and CR are slightly different, but they all ensure economic significance. For example, the results show that an increase of one unit of market concentration through the total market share index of the five largest banks is likely to reduce the NPL ratio by 2.303%.

Switching to Table 3 presenting empirical results on the impact of the market structure on credit risk through loan loss provisions, the findings continue to support the negative association between market power/banking concentration and credit risk, identical to the previous analysis for NPLs. Thus, all results support hypothesis *H1A*, that an increase in market power and concentration could mitigate bank credit risk.

3.2. Regression results in the function of cost management efficiency and bank profitability

Table 4 shows the estimated results of the impact of bank competition on cost efficiency through

Table 2. Market structure and non-performing loans

Dependent variable	NPL			
	(1)	(2)	(3)	(4)
Lagged dependent variable	0.283***	0.538***	0.556***	0.553***
	(0.071)	(0.030)	(0.027)	(0.028)
Lerner	−2.735***	−	−	−
	(0.840)	−	−	−
CR5	−	−2.303***	−	−
	−	(0.430)	−	−
CR3	−	−	−2.855***	−
	−	−	(0.514)	−
HHI	−	−	−	−8.280***
	−	−	−	(1.461)
Capital	0.143***	−0.019***	−0.019***	−0.019***
	(0.033)	(0.006)	(0.006)	(0.006)
Loan share	−0.008**	−0.002	−0.002	−0.002
	(0.004)	(0.001)	(0.001)	(0.001)
Size	0.398***	−0.080***	−0.081***	−0.081***
	(0.120)	(0.027)	(0.025)	(0.026)
Income diversification	−0.004	−0.001	−0.002	−0.001
	(0.002)	(0.002)	(0.002)	(0.002)
GDP	−0.027	−0.083***	−0.080***	−0.088***
	(0.019)	(0.012)	(0.011)	(0.012)
Monetary policy	0.092***	0.113***	0.113***	0.116***
	(0.021)	(0.009)	(0.009)	(0.009)
Observations	355	355	355	355
Banks	30	30	30	30
Instruments	30	30	30	30
AR(1)	0.007	0.000	0.000	0.000
AR(2)	0.160	0.117	0.111	0.115
Hansen	0.196	0.162	0.183	0.171

Note: Standard errors are shown in parentheses. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 3. Market structure and loan loss provisions

Dependent variable	LLP			
	(1)	(2)	(3)	(4)
Lagged dependent variable	0.653***	0.382***	0.417***	0.396***
	(0.053)	(0.077)	(0.071)	(0.075)
Lerner	−0.774***	−	−	−
	(0.235)	−	−	−
CR5	−	−1.102***	−	−
	−	(0.362)	−	−
CR3	−	−	−1.212***	−
	−	−	(0.412)	−
HHI	−	−	−	−3.752***
	−	−	−	(1.245)
Capital	−0.004	0.022***	0.022***	0.022***
	(0.024)	(0.005)	(0.005)	(0.005)
Loan share	−0.003**	−0.003**	−0.003**	−0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Size	0.088	0.174***	0.168***	0.171***
	(0.070)	(0.033)	(0.033)	(0.033)
Income diversification	−0.004***	−0.004**	−0.004**	−0.004**
	(0.001)	(0.002)	(0.002)	(0.002)
GDP	−0.040***	−0.019*	−0.016	−0.020*
	(0.013)	(0.011)	(0.011)	(0.011)
Monetary policy	0.026***	0.011	0.009	0.010
	(0.004)	(0.008)	(0.008)	(0.008)
Observations	409	409	409	409
Banks	30	30	30	30
Instruments	30	22	22	22
AR(1)	0.000	0.001	0.000	0.000
AR(2)	0.305	0.662	0.626	0.646
Hansen	0.519	0.286	0.262	0.283

Note: Standard errors are shown in parentheses. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4. Market structure and bank efficiency by non-interest expenses

Dependent variable	Non-interest expenses			
	(1)	(2)	(3)	(4)
Lagged dependent variable	0.653***	0.473***	0.487***	0.473***
	(0.040)	(0.045)	(0.041)	(0.045)
Lerner	−8.384***	−	−	−
	(2.978)	−	−	−
CR5	−	−9.618***	−	−
	−	(2.633)	−	−
CR3	−	−	−8.958***	−
	−	−	(2.966)	−
HHI	−	−	−	−30.520***
	−	−	−	(9.186)
Capital	0.825***	0.440***	0.439***	0.440***
	(0.135)	(0.054)	(0.054)	(0.053)
LLR	2.962***	1.843***	1.941***	1.859***
	(0.490)	(0.376)	(0.359)	(0.363)
Size	1.553***	0.595**	0.583**	0.592**
	(0.281)	(0.247)	(0.245)	(0.251)
Income diversification	0.007	0.004	0.002	0.003
	(0.007)	(0.012)	(0.012)	(0.012)
GDP	0.178**	0.364***	0.353***	0.349***
	(0.083)	(0.074)	(0.070)	(0.071)
Monetary policy	−0.335***	−0.503***	−0.503***	−0.505***
	(0.041)	(0.046)	(0.044)	(0.045)
Observations	409	409	409	409
Banks	30	30	30	30
Instruments	29	28	28	28
AR(1)	0.001	0.001	0.001	0.001
AR(2)	0.576	0.565	0.519	0.541
Hansen	0.175	0.149	0.153	0.143

Note: Standard errors are shown in parentheses. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

the measure of non-interest expense to revenues. The negative sign of the Lerner index implies that increased market power, or reduced competition, promotes bank efficiency in terms of cost reduction. The coefficient of the Lerner index is −8.384, suggesting that increasing the Lerner index by one unit may increase cost efficiency or reduce the non-interest expense ratio by 8.384%.

Table 4 also presents the estimated results of bank concentration and cost efficiency. For the main variables of interest, bank concentration (measured by CR3/CR5 and HHI) is statistically significant and has a negative relationship with the cost variable. This implies that banking concentration may cultivate management efficiency. The estimated coefficients of HHI and CR ensure economic significance. For example, the coefficient on the HHI index in Table 4 is −30.520, implying that increasing the HHI concentration of squared market shares by one unit may boost cost efficiency or cut the non-interest expense ratio by 30.520%.

The paper then displays the results with a cost-efficiency score estimated as the ratio of operating costs to total assets, as a robustness test. Table 5

presents strong evidence that the Lerner, CR3/CR5, and HHI indices are negatively correlated with the inefficiency measure. This finding is in line with the previous results using the non-interest expense variable, indicating that market power and banking concentration raise efficiency.

Next, in terms of the influence of industry competition on bank profitability, the results of Table 6 show that a lower level of competition (larger Lerner index) in the market leads to a higher ROA of banks. The coefficient of the Lerner index is 1.797, showing that an increase of one unit in the Lerner index could make ROA rise by 1.797%. Besides, all three remaining concentration measures have positive significant coefficients. A high value of these market structure variables indicates that a concentrated market is associated with higher returns on assets. In terms of magnitude, the coefficient on the HHI is 4.829, implying that increasing the concentration by the squared of the banking market share by one unit would increase ROA by 4.829%.

Table 7 also conducts a robustness test, whereby the findings show that a more concentrated mar-

Table 5. Market structure and bank efficiency by operating expenses

Dependent variable	Operating expenses			
	(1)	(2)	(3)	(4)
Lagged dependent variable	1.237***	0.895***	0.815***	0.885***
	(0.115)	(0.169)	(0.164)	(0.159)
Lerner	−0.892**	–	–	–
	(0.356)	–	–	–
CR5	–	−1.699***	–	–
	–	(0.353)	–	–
CR3	–	–	−2.196***	–
	–	–	(0.398)	–
HHI	–	–	–	−6.270***
	–	–	–	(1.230)
Capital	−0.096***	−0.022	−0.013	−0.019
	(0.024)	(0.015)	(0.014)	(0.014)
LLR	−0.182***	−0.147**	−0.115**	−0.132**
	(0.065)	(0.063)	(0.054)	(0.057)
Size	−0.116*	−0.007	−0.001	−0.008
	(0.067)	(0.030)	(0.029)	(0.029)
Income diversification	−0.003	0.000	−0.001	0.000
	(0.002)	(0.003)	(0.002)	(0.003)
GDP	−0.025**	0.009	0.014*	0.007
	(0.010)	(0.008)	(0.008)	(0.008)
Monetary policy	0.058***	0.043***	0.038***	0.044***
	(0.011)	(0.011)	(0.011)	(0.011)
Observations	409	409	409	409
Banks	30	30	30	30
Instruments	27	21	21	21
AR(1)	0.005	0.002	0.003	0.002
AR(2)	0.906	0.546	0.492	0.530
Hansen	0.191	0.197	0.183	0.190

Note: Standard errors are shown in parentheses. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6. Market structure and bank profitability by ROA

Dependent variable	ROA			
	(1)	(2)	(3)	(4)
Lagged dependent variable	0.456***	0.665***	0.725***	0.690***
	(0.052)	(0.052)	(0.051)	(0.053)
Lerner	1.797***	–	–	–
	(0.193)	–	–	–
CR5	–	1.591***	–	–
	–	(0.348)	–	–
CR3	–	–	1.440***	–
	–	–	(0.389)	–
HHI	–	–	–	4.829***
	–	–	–	(1.178)
Capital	0.087***	0.009	0.004	0.007
	(0.019)	(0.006)	(0.006)	(0.006)
LLR	−0.187***	−0.042	−0.045	−0.048
	(0.038)	(0.048)	(0.048)	(0.049)
Size	0.306***	0.080**	0.065*	0.074**
	(0.064)	(0.035)	(0.034)	(0.035)
Income diversification	−0.001*	−0.000	−0.000	−0.000
	(0.001)	(0.002)	(0.002)	(0.002)
GDP	0.006	−0.020**	−0.014	−0.014
	(0.005)	(0.010)	(0.009)	(0.009)
Monetary policy	0.016**	−0.003	−0.005	−0.004
	(0.006)	(0.006)	(0.006)	(0.005)
Observations	409	409	409	409
Banks	30	30	30	30
Instruments	29	28	28	28
AR(1)	0.002	0.003	0.003	0.003
AR(2)	0.610	0.426	0.389	0.408
Hansen	0.147	0.137	0.126	0.129

Note: Standard errors are shown in parentheses. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 7. Market structure and bank profitability by ROE

Dependent variable	ROE			
	(1)	(2)	(3)	(4)
Lagged dependent variable	0.688***	0.729***	0.769***	0.738***
	(0.064)	(0.036)	(0.038)	(0.037)
Lerner	17.496***	–	–	–
	(3.542)	–	–	–
CR5	–	23.068***	–	–
	–	(3.395)	–	–
CR3	–	–	24.405***	–
	–	–	(4.187)	–
HHI	–	–	–	76.761***
	–	–	–	(12.532)
Capital	0.578***	0.124**	0.126**	0.120**
	(0.102)	(0.056)	(0.060)	(0.056)
LLR	−1.096***	0.093	−0.078	−0.047
	(0.281)	(0.371)	(0.355)	(0.363)
Size	2.113***	1.036***	0.960***	1.044***
	(0.349)	(0.266)	(0.272)	(0.267)
Income diversification	−0.011	−0.025**	−0.022*	−0.024**
	(0.012)	(0.011)	(0.012)	(0.011)
GDP	0.445***	0.006	0.037	0.056
	(0.089)	(0.102)	(0.108)	(0.104)
Monetary policy	−0.148**	−0.251***	−0.268***	−0.264***
	(0.067)	(0.045)	(0.047)	(0.045)
Observations	409	409	409	409
Banks	30	30	30	30
Instruments	29	28	28	28
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.191	0.258	0.253	0.269
Hansen	0.184	0.221	0.213	0.210

Note: Standard errors are shown in parentheses. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 8. Market structure and bank loan growth

Dependent variable	Loan growth			
	(1)	(2)	(3)	(4)
Lagged dependent variable	0.155***	0.285***	0.432***	0.432***
	(0.056)	(0.086)	(0.062)	(0.073)
Lerner	172.178***	–	–	–
	(15.644)	–	–	–
CR5	–	446.142***	–	–
	–	(52.031)	–	–
CR3	–	–	339.497***	–
	–	–	(41.384)	–
HHI	–	–	–	1,472.305***
	–	–	–	(157.610)
Capital	−3.294***	−0.623	−0.928**	−0.273
	(0.289)	(0.409)	(0.461)	(0.368)
Size	−16.054***	−3.617***	−5.608***	−4.127***
	(1.279)	(0.697)	(1.067)	(0.762)
Liquidity	−0.239	−0.108	−0.120	−0.026
	(0.171)	(0.078)	(0.178)	(0.064)
Deposits	0.039	−0.242**	0.241	0.273**
	(0.113)	(0.110)	(0.178)	(0.122)
GDP	0.708***	−2.922***	−0.622*	−0.987***
	(0.234)	(0.543)	(0.361)	(0.356)
Monetary policy	0.638**	−0.109	0.822**	0.288
	(0.275)	(0.370)	(0.402)	(0.459)
Observations	379	379	379	379
Banks	30	30	30	30
Instruments	29	23	26	23
AR(1)	0.003	0.003	0.001	0.001
AR(2)	0.321	0.791	0.830	0.884
Hansen	0.235	0.156	0.227	0.132

Note: Standard errors are shown in parentheses. Symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

ket, or banks with better market power, likely cause an improvement in bank profitability via ROE. To sum up, all the findings in this part consistently support hypothesis *H2B*.

3.3. Regression results in the function of bank loan growth

Table 8 indicates empirical results on the impact of bank competition on loan growth. The regression results obtain a positive and significant coefficient on the Lerner index, revealing that greater market power may boost the number of loans granted by banks in the surveyed years. This impact of bank market power also has economic implications. Specifically, a one-unit increase in the Lerner index would increase the annual growth rate of bank loans by 172.178%. This result is relevant given that the standard deviation of the Lerner index is 0.089 and the mean loan growth is 27.579%.

In addition, Table 8 examines three country-level banking concentration measures. Since the high values of the CR3/CR5 and HHI indexes indicate a high degree of bank concentration, the positive coefficients on these variables justify a positive link between bank concentration and loan growth. This result shows that a higher degree of bank concentration can explain a higher loan growth rate. The effect of banking market concentration in this case also confirms economic significance. For instance, the coefficient of CR5 in Table 8 is 446.142, revealing that increasing concentration by total market share by one standard deviation (0.052) may increase bank lending by 23.20% (446.142·0.052). Thus, all the results support hypothesis *H3B*.

4. DISCUSSION

All obtained estimates generally show positive effects on bank performance due to greater market power and higher banking concentration. The study's findings indicate that more market power and greater concentration improve asset quality, management efficiency, overall profitability, and lending volume. This consistent pattern aligns with previous studies (Albaity et al., 2019; Khan & Ahmad, 2022; Yin, 2021), verify-

ing that the market structure plays a vital role in navigating the performance of Vietnamese banks.

Overall, the results obtained consistently support the competition-fragility hypothesis (Keeley, 1990). Increased competition may encourage banks to take on higher risks and damage asset quality. For example, banks may be more willing to grant loans to borrowers with lower credit ratings and higher risk. Price competition may adversely affect their asset portfolio, reduce franchise values, and weaken management efficiency, causing a decline in bank profitability (Petersen & Rajan, 1995). Besides, the regression results show that more concentrated markets and higher market power yield greater loan growth. This result is consistent with the argument linked to easy access to alternative funding sources by banks (Boyd & De Nicoló, 2005).

Although the literature on the link between bank competition or market concentration and bank performance has been extensively explored, this paper still makes certain contributions to the existing literature in some areas. Firstly, the paper approaches market structure through competition/market power and market concentration, using different measures based on the Lerner index, the HHI index, and the market share of leading banks. Using different measures gives a multidimensional assessment of the market structure; hence, the results are not dependent on any specific measure. Secondly, the paper explores the relationship between the market structure and a diverse set of bank performance indicators, including credit risk, bank efficiency, profitability, and bank lending. This approach may give a comprehensive inspection and draw a large picture from which policy development could ensure balance and harmony. In this vein, the paper significantly expands the existing research by examining changes in bank lending behavior in response to changes in the market structure. Compared with previous studies that are still limited in analyzing this aspect, the sample of this paper covers banks from Vietnam, an emerging and transitional country, which facilitates an interesting comparison with previous work.

CONCLUSION

This study uses three measures of the structure of the banking industry, namely the total market share of the three and five largest banks, the squared market share of banks according to the Herfindahl-Hirshchman index, and the Lerner index on market power (inverse bank competition), on the basis that it is more appropriate to consider a combination of market structure indicators to ensure consistency and multi-dimensionality in examined relationships. The two-step system GMM estimator is applied to conduct regression analysis, focusing on endogeneity control. With data availability, the study uses the sample of 30 banks from 2007 to 2021 and the following findings are obtained:

1) The research examines the impact of banking concentration and competition on credit risk. The study measures credit risk using the non-performing loan ratio and the loan loss provision ratio. The results confirm that banks with higher market power, in a more concentrated market, alleviate credit risk. This result is consistent with two different credit risk measures.

2) The study examines whether banking concentration and market competition lead to changes in the efficiency of cost management and the profitability of the Vietnamese banking sector. Bank efficiency is approached from the perspective of cost management, as the higher the cost per unit of revenue or asset, the less efficient the bank. A bank's profitability measures return on assets (ROA) and return on equity (ROE). The analysis shows that bank concentration and increased market power significantly positively affect management efficiency in terms of cost reduction. The results also show that greater market power (higher Lerner index) and higher industry concentration in the market lead to higher banks' overall profitability (ROA and ROE).

3) The study also explores the overall impact of the market structure on banks' ability to extend loans. Empirical results show that increased market power, as well as higher concentration, increases bank loan growth.

The results comprehensively show a negative effect of competition and a positive effect of market concentration on various bank performance indicators. Therefore, policymakers in the banking sector should re-evaluate policies that support competition, given its disadvantages. In the context of increased competition leading to many problems with credit quality and financial safety of the system, they need to be careful and vigilant in promoting banks to operate in a fiercely competitive environment, and they also need to perform increased surveillance in such a competitive environment. In addition, mergers and acquisitions of small and medium-sized banks should be encouraged to introduce a more consolidated financial system.

AUTHOR CONTRIBUTIONS

Conceptualization: Thi Mai Phuong Duong.
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Formal analysis: Thi Mai Phuong Duong.
Investigation: Thi Mai Phuong Duong.
Methodology: Thi Mai Phuong Duong, Van Dan Dang.
Project administration: Thi Mai Phuong Duong, Van Dan Dang.
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