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How do banks price loans in the context of market concentration? Empirical evidence from Vietnam

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ABSTRACT

This paper investigates how market concentration influences banks' loan pricing in Vietnam, using an unbalanced panel dataset of 28 commercial banks from 2007 to 2023. The findings reveal that higher market concentration leads to increased loan costs, supporting the market power hypothesis. Banks in more concentrated markets exhibit stronger pricing power, allowing them to maintain higher interest rate spreads due to reduced competition. Moreover, larger banks with diversified income sources and higher current account savings account (CASA) ratios tend to offer lower loan prices. The quantile regression analysis shows that the effect of market concentration on loan pricing becomes more pronounced at higher loan price quantiles, indicating that banks with higher lending costs are more affected. Robustness tests using alternative proxies for market concentration, total deposits and total assets reinforce the consistency of the results. The study controls for various bank-specific characteristics and applies several econometric techniques, including GMM, Prais-Winsten, and Newey-West standard errors, to address concerns of endogeneity, autocorrelation, and heteroscedasticity. This research highlights the potential adverse effects of banking market concentration, such as reduced financial accessibility and inefficiencies in credit allocation, and emphasizes the need for regulatory measures to promote competition and financial inclusion.

Contribution/Originality: This study is the first to examine how market concentration affects loan pricing in Vietnam using quantile regression. It contributes by highlighting heterogeneity in pricing effects, validating competing theories, and employing robustness checks with multiple proxies and advanced econometric techniques in an emerging market context.

1. INTRODUCTION

The pricing of bank loans is a fundamental aspect of financial intermediation, influencing credit allocation, economic growth, and financial stability (Dhal & Ansari, 2013; Magri, 2019; Nguyen & Ho, 2024). Meanwhile, Boot (2000) suggests that market concentration within the banking industry plays a crucial role in determining loan pricing, as it affects the level of competition, interest rate spreads, and overall lending behavior of financial institutions. Therefore, understanding how banks price loans in the context of market concentration is vital for policymakers, regulators, and financial institutions to ensure efficient credit allocation and financial stability, particularly in emerging economies like Vietnam.

The banking sector in Vietnam has experienced substantial changes in the last twenty years, transitioning from a state-controlled system to a more competitive financial market (Nguyen & Nghiem, 2020). In the past, a limited

number of large state-owned commercial banks dominated financial activity; however, financial liberalization and regulatory reforms have promoted competition by permitting the entry of private and international banks into the market (Nguyen, 2020). Notwithstanding these advancements, apprehensions remain about the market dominance of leading banks, the efficacy of loan pricing, and the repercussions for financial stability. The coexistence of SOCBs, joint-stock banks, and foreign banks has created a complex competitive landscape that influences the cost and availability of loans (Dang & Nguyen, 2023).

According to the market power hypothesis, a reduction in market concentration reflecting heightened competition among banks tends to improve loan conditions by enhancing credit accessibility and lowering borrowing costs (Cetorelli & Strahan, 2006; Scott & Dunkelberg, 2003). In contrast, the information asymmetry hypothesis asserts that increased bank competition (reduced market concentration) leads to less advantageous loan conditions (Petersen & Rajan, 1995; Zarutskie, 2006). According to Petersen and Rajan (1995), heightened competition among banks weakens relationship-building, as financial institutions in a competitive lending environment are unable to capture future surplus generated by firms. Given these contrasting theoretical perspectives, empirical findings on the relationship between market concentration and bank loan pricing remain inconclusive.

This paper contributes to the existing literature by providing empirical evidence from Vietnam an emerging market where the banking system is still evolving. First, this paper examines the impact of market concentration on the loan pricing of Vietnamese commercial banks. Second, by employing multiple robustness checks, including alternative concentration measures (based on deposits and assets) and diverse econometric techniques such as GMM, Prais-Winsten, and Newey-West regressions, this study enhances the reliability of the empirical findings. Third, the paper provides novel insights by focusing on the heterogeneity of effects across the loan pricing distribution, an area that remains underexplored in the context of emerging markets. Fourth, the findings offer relevant policy implications for regulators aiming to balance competition and stability in banking markets. Finally, the study enriches the debate on the market power versus information asymmetry hypotheses in loan pricing by validating these theoretical perspectives in a transitional financial system like Vietnam. The remainder of this paper is structured as follows: Section 2 reviews the relevant literature. Section 3 presents the research methodology and data sources. Section 4 discusses empirical findings, while Section 5 concludes our study.

2. LITERATURE REVIEW

There are currently two main streams of research on the impact of market concentration on bank loan costs. On the one hand, the market power hypothesis suggests that increased competition in the banking sector (i.e., lower market concentration) enhances access to credit and reduces borrowing costs (Lian, 2018). In other words, higher market concentration is associated with higher lending costs. Accordingly, greater market concentration allows banks to restrict credit supply, manipulate lending interest rates, and exacerbate borrowers' financial constraints, thereby increasing borrowing costs (Huynh, 2023; Ryan, O'Toole, & McCann, 2014; Wang, Han, & Huang, 2020). Supporting this view, Degryse and Ongena (2008) indicate that more concentrated deposit or lending markets tend to be associated with higher interest rate spreads. Additionally, Cetorelli and Strahan (2006) find that newly established firms often face difficulties in accessing affordable capital in concentrated loan markets. In contrast, a less concentrated banking market fosters greater competition and enhances the overall efficiency of the banking sector, thereby facilitating access to credit and reducing borrowing costs (Love & Martínez Pería, 2015; Meslier, Sauviat, & Yuan, 2020). Consequently, this improved access to finance contributes to more effective economic growth via the channel of lower prices (Caggiano & Calice, 2016; Huynh, 2023). From this perspective, the paper proposes the following hypothesis:

H_{1a}: Market concentration positively impacts bank loan costs.

On the other hand, the information asymmetry hypothesis suggests that in markets with low concentration (higher competition), information asymmetry between lenders (banks) and borrowers will become a barrier for

lending institutions to limit new credit because higher competition makes it difficult for lenders to exploit future profits from borrowers, making it more expensive to collect information, which leads to an increase in loan costs (Petersen & Rajan, 1995). Meanwhile, stronger market power (implying a more concentrated market) enables large banks to establish lending relationships that help reduce information asymmetry and agency costs between banks and borrowers, efficiently allocate resources to less-informed borrowers, and develop lending relationships to gain informational rents in subsequent stages (Ryan et al., 2014) thereby easing credit constraints (Han, Zhang, & Greene, 2017; Meslier et al., 2020). Similarly, Zarutskie (2006) found that banking market competition increases financial constraints and barriers for start-up firms, as these firms are more exposed to information asymmetry, which in turn makes loans more expensive. Therefore, we propose the following hypothesis:

H_{1b}: Market concentration negatively impacts bank loan costs.

3. DATA AND METHODOLOGY

3.1. Model Specification

To conduct a quantitative analysis of market concentration and bank loan costs, this paper proposes the following equation.

$$LC_{i,t} = \beta_0 + \beta_1 HHIlending_t + \sum_{i=1}^{k} \beta_{2i} Controls_i + \delta_i + \varepsilon_{i,t}$$

Consistent with Ashraf and Shen (2019), this study employs the ratio of interest income to gross loans as a proxy for bank loan pricing. The main independent variable is $HHIlending_t$, representing the market concentration of the Vietnamese banking sector at year t, based on lending market share. The control variables included in the model are bank size, the current account savings account ratio (CASA), income diversification, non-performing loan ratio, and bank performance. In addition, in line with Nguyen, Pham, Phan, Alam, and Tran (2024), this study incorporates bank fixed effects (δi) to account for unobserved, time-invariant characteristics at the bank level, such as organizational culture and managerial practices. However, time fixed effects are excluded from the model specification, as the Herfindahl-Hirschman Index (HHI) remains constant across banks within each year. Therefore, including time fixed effects would absorb the entire variation of HHI (Gulen & Ion, 2016). Table 1 presents the details of the variable measurements.

Table 1. Variables description.

Variables	Abbreviation	Variable measurements
Dependent variables		
Banks' loan pricing	LC	Interest income to gross loans ratio
Independent variables		
Market concentration (Based on total lending)	HHIlending	HHIlending $= \sum_{i=1}^{n} (MS_i)^2$ MS_i: The total lending of bank i
Bank size	Size	SIZE = Ln (Total assets)
Current account savings account	CASA	$CASA = \frac{Total\ demand\ deposit}{Total\ deposit}$
Income diversification	IDIV	$IDIV = 1 - HHI_{Income} = 1 - [\left(\frac{NET}{NETOP}\right)^2 + \left(\frac{NON}{NETOP}\right)^2]$ Where: NET: Interest income

Variables	Abbreviation	Variable measurements
		NON: Non-interest income NETOP: Bank's total income
Non-performing loan ratio	NPL	$\text{NPL} = \frac{Total\ non-performing\ loans}{Total\ loans}$
Bank performance	ROA	$\text{ROA} = \frac{Net\ income}{Total\ Assets}$
Alternative independent variables		
Market concentration (Based on total deposits)	HHIdeposits	$\text{HHIdeposit} = \sum_{i=1}^{n}(MS_i)^2$ MS_i: The total deposit of bank i
Market concentration (Based on total assets)	HHIassets	$\text{HHIassets} = \sum_{i=1}^{n}(MS_i)^2$ MS_i: The total assets of bank i

3.2. Data

This paper utilizes an unbalanced panel dataset consisting of 28 Vietnamese commercial banks from 2007 to 2023, comprising a total of 451 observations. This dataset is collected from the WiData database. This paper winsorizes all variables at the 1st and 99th percentile levels to remove potential outlier effects in the analyses. The dataset covers key financial indicators such as interest income, total lending, deposits, assets, CASA ratio, non-performing loans, and return on assets (ROA), which are essential for evaluating loan pricing behaviors. Additionally, the dataset allows for constructing multiple Herfindahl-Hirschman Indexes (HHIs) based on lending, deposits, and assets to measure market concentration. The choice of the 2007–2023 period reflects a critical phase in Vietnam's financial sector development, capturing post-WTO accession reforms, increased foreign bank participation, and multiple regulatory changes affecting competition and credit allocation.

Table 2. Descriptive statistical analysis.

Variable	Obs	Mean	Std. dev.	Min	Max
LC	451	0.144	0.071	0.073	0.720
HHIlending	451	0.108	0.015	0.090	0.145
HHIdeposit	451	0.099	0.014	0.089	0.143
HHIassets	451	0.093	0.012	0.081	0.126
Size	451	32.229	1.339	28.342	35.372
CASA	353	0.154	0.097	0.010	0.505
IDIV	357	0.286	0.132	0.010	0.646
NPL	352	0.022	0.021	0.000	0.298
ROA	451	0.010	0.008	-0.055	0.060

4. EMPIRICAL RESULTS

4.1. Descriptive Statistics

Table 2 shows the descriptive statistics of the data set. Accordingly, the LC of Vietnamese commercial banks from 2007 to 2023 reaches an average value of 0.144 with a standard deviation of 0.071. The smallest value is 0.073 for Vietnam Thuong Tin Commercial Joint Stock Bank in 2015, and the largest value is 0.720 for Tien Phong Commercial Joint Stock Bank in 2008. For the explanatory variable, lending market concentration (HHIlending) has an average value of 0.108 with a standard deviation of 0.015 and ranges from 0.090 to 0.145.

Table 3. Correlation matrix.

Variables	HHIlending	Size	CASA	IDIV	NPL	ROA
HHIlending	1.000					
Size	-0.465	1.000				
CASA	0.027	0.401	1.000			
IDIV	-0.182	0.361	0.493	1.000		
NPL	-0.024	-0.143	-0.156	-0.035	1.000	
ROA	-0.099	0.291	0.401	0.298	-0.174	1.000

The correlation coefficient is a statistical measure that assesses the strength of the linear relationship between two variables. The results in Table 3 show that the correlation coefficients of the variables are all below 80%, so these independent variables are suitable for regression (Judge, Griffiths, Hill, Lütkepohl, & Lee, 1991).

Table 4. Empirical results.

Variables	Baseline (1)	Additional variables (2)	GMM (3)	Prais-Winsten (4)	Newey-West (5)	Two-way cluster (6)
HHIlending	1.655*** (0.167)	0.954** (0.427)	0.903*** (0.235)	2.303*** (0.299)	2.082*** (0.237)	0.954* (0.538)
Size		-0.028*** (0.007)	-0.017*** (0.006)	-0.002 (0.004)	-0.006** (0.003)	-0.028** (0.011)
CASA		-0.272*** (0.050)	-0.271*** (0.049)	-0.141*** (0.040)	-0.122*** (0.032)	-0.272*** (0.053)
IDIV		-0.050* (0.026)	-0.255*** (0.017)	-0.043* (0.023)	-0.008 (0.031)	-0.050 (0.037)
NPL		0.371* (0.201)	-0.384 (0.235)	0.071 (0.187)	0.524*** (0.201)	0.371** (0.178)
ROA		2.702*** (0.456)	6.357*** (0.439)	2.910*** (0.478)	2.767*** (0.530)	2.702*** (0.648)
L.LC			0.274*** (0.028)			
Constant	-0.037** (0.018)	0.976*** (0.278)	0.608*** (0.217)	-0.029 (0.134)	0.095 (0.090)	0.976** (0.423)

Note: All financial variables are winsorized at 1% level on top and bottom of the distribution. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are standard errors.

4.2. Main Results

Table 4 presents the main research results, in which Model (1) conducts a single regression of the HHI variable to assess the unique impact of market concentration on bank loan costs. Model (2) adds control variables. Models (3)-(6) respectively use: (i) Two-step GMM regression to solve the endogeneity problem; (ii) Prais-Winsten regression to overcome the autocorrelation issue; (iii) Newey-West regression to produce consistent estimates in the presence of autocorrelation and heteroscedasticity; and (iv) Two-way cluster regression by bank and time to minimize the potential impact of heteroscedasticity and autocorrelation in panel data.

The results in Table 4 show that market concentration (HHIlending) has a positive impact on the cost of loans of Vietnamese commercial banks, and this result is statistically significant in all econometric models. This research results imply that as the market becomes more concentrated, Vietnamese commercial banks tend to provide loans at higher costs, ceteris paribus. Our research results are similar to Degryse and Ongena (2008), Love and Martínez Pería (2015), and Meslier et al. (2020). One of the key reasons why Vietnamese commercial banks tend to increase lending costs in a highly concentrated market is their greater market power. When a few large banks dominate the credit market, they can impose higher interest rates without significant concerns about competition from smaller banks (Ryan et al., 2014; Wang et al., 2020). These banks can leverage their dominant position to maximize profits by maintaining a high interest rate spread between deposit and lending rates (Degryse & Ongena, 2008). According to economic theory, in a perfectly competitive market, banks compete by lowering lending rates to attract customers. However, in a highly concentrated market, banks face less competitive pressure from rivals, allowing them to maintain

higher lending rates, which increases borrowing costs for businesses and individuals while negatively impacting economic growth (Caggiano & Calice, 2016). Another reason is that banks can exploit the "switching costs" effect to maintain high lending rates. In a highly concentrated market, customers find it difficult to switch banks due to high switching costs. For instance, a business with a long-term credit relationship with a particular bank may face significant challenges when attempting to transition to another bank due to factors such as credit history, costs incurred from applying for a new loan, or collateral constraints. As a result, banks do not face pressure to lower interest rates to retain customers, as they are aware that customers have limited alternative options. In many cases, borrowers are compelled to accept higher interest rates rather than seek a different bank with more favorable lending conditions. Last but not least, high market concentration often reduces banks' incentives to innovate in designing more flexible and cost-effective loan products. In a highly competitive market, banks must continuously innovate to attract customers by offering preferential interest rates, flexible repayment terms, or superior customer service. However, when a few large banks dominate the market, this incentive for innovation diminishes. Banks may retain unattractive lending conditions while still maintaining a stable customer base due to their control over a significant market share. As a result, lending costs remain high even when market conditions suggest the need for adjustment.

Regarding the control variables, the research results in Table 4 demonstrate that bank size (Size), current account savings account ratio (CASA), and income diversification (IDIV) have negative impacts on loan prices, implying that larger banks, with higher CASA ratios and better income diversification capabilities, will offer cheaper loans. Accordingly, larger banks benefit from economies of scale, enabling them to reduce operational costs and access lower-cost funding sources, which allows them to offer loans at more competitive interest rates. A higher CASA ratio indicates a greater reliance on low-interest deposits, reducing the bank's overall funding costs and enabling it to provide loans at lower interest rates. In addition, income diversification (IDIV) represents the extent to which a bank generates revenue from various non-interest income sources, such as fees, commissions, and investment activities. A well-diversified income structure reduces the bank's dependence on interest income, allowing it to set more favorable lending rates while maintaining profitability.

4.3. Alternative Measurements of Market Concentration

To test the robustness of the research results, this paper uses alternative measurements of the Vietnamese banking market concentration, including HHI based on total deposits (HHIdeposits) and total assets (HHIassets). The research results are presented in Table 5.

Table 5. Alternative measurements of market concentration.

Variables	LC (7)	LC (8)
HHIdeposits	0.601* (0.362)	
HHIassets		0.164 (0.461)
Size	-0.015*** (0.003)	-0.016*** (0.003)
CASA	-0.050 (0.034)	-0.044 (0.035)
IDIV	-0.034 (0.033)	-0.032 (0.032)
NPL	0.549*** (0.204)	0.492** (0.210)
ROA	2.563*** (0.563)	2.670*** (0.592)
Constant	0.538*** (0.111)	0.624*** (0.138)

Note: All financial variables are winsorized at 1% level on top and bottom of the distribution. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Standard errors are clustered at the bank level. Numbers in parentheses are standard errors.

The research results in Models (7) and (8) in Table 5 indicate that the regression coefficients of HHIdeposits and HHIassets are positive, further reinforcing the main findings of this paper by supporting the positive relationship between market concentration and banks' loan pricing in Vietnam. However, the impact of market concentration based on total assets remains inconclusive, as the regression coefficient of HHIassets is not statistically significant.

4.4. Quantile Regression Results

Table 6 reports the results of a quantile regression analysis, an extension of median regression, to explore how the relationship between market concentration and bank loan pricing varies across different points of the loan price distribution (quantiles = {0.10, 0.30, 0.50, 0.70, 0.90}). Unlike ordinary least squares (OLS), which estimates the average conditional effect under the assumption of a constant relationship across observations, quantile regression allows for heterogeneity in the conditional distribution of the dependent variable. When sample heterogeneity is present, OLS estimates may lack robustness. In contrast, quantile regression provides a more nuanced view by estimating a series of conditional quantile functions, thereby capturing variations in effects across the distribution. This technique also relaxes the restrictive assumptions of homoscedasticity and identically distributed error terms across loan pricing levels.

Table 6. Quantile regression results.

Variables	$Q10^{th}$ (1)	$Q30^{th}$ (2)	$Q50^{th}$ (3)	$Q70^{th}$ (4)	$Q90^{th}$ (5)
HHIlending	0.715***	1.276***	1.719***	2.432***	4.324***
	(0.184)	(0.159)	(0.205)	(0.322)	(0.603)
Size	-0.001	-0.003	-0.005**	-0.007**	-0.015**
	(0.002)	(0.002)	(0.002)	(0.003)	(0.006)
CASA	-0.101***	-0.110***	-0.116***	-0.127***	-0.155*
	(0.021)	(0.020)	(0.026)	(0.039)	(0.082)
IDIV	-0.030*	-0.021	-0.014	-0.002	0.028
	(0.016)	(0.014)	(0.022)	(0.039)	(0.089)
NPL	0.391***	0.446***	0.489***	0.558**	0.743
	(0.141)	(0.135)	(0.163)	(0.241)	(0.498)
ROA	2.197***	2.431***	2.615***	2.913***	3.702**
	(0.337)	(0.304)	(0.406)	(0.667)	(1.449)
Constant	0.040	0.062	0.080	0.109	0.186
	(0.070)	(0.066)	(0.076)	(0.105)	(0.209)

Note: All financial variables are winsorized at 1% level on top and bottom of the distribution. ***, **, * indicate significance at the 1%, 5%, and 10% level respectively. Numbers in parentheses are standard errors.

The results from Table 6 reinforce the main research findings by indicating the positive impact of market concentration on the loan pricing of Vietnamese commercial banks. Additionally, the coefficients on HHIlending in Columns (1)–(5) demonstrate that the impact of market concentration on bank loan costs is consistently positive and increases significantly with higher quantiles. This suggests that for banks with more expensive lending costs (higher LC quantiles), increasing market concentration will lead these banks to raise their loan prices. In summary, the empirical findings show that market concentration not only affects the average loan price but also influences the distribution of banks' loan costs.

5. CONCLUSIONS

This study provides empirical insights into the impact of market concentration on bank loan pricing in Vietnam, a country undergoing significant financial sector transformation. Our findings reveal that higher market concentration measured by the Herfindahl-Hirschman Index (HHI) is positively associated with increased loan costs. This result aligns with the market power hypothesis, suggesting that dominant banks in concentrated markets

exercise greater pricing power, leading to higher lending costs for businesses and individuals. The persistence of this relationship across various econometric models reinforces the robustness of our findings. One of the primary drivers of this phenomenon is reduced competition. In a highly concentrated banking market, large financial institutions face fewer incentives to lower interest rates, as they encounter minimal competitive pressure from smaller banks. This lack of competition allows dominant banks to sustain high-interest rate spreads, leading to inefficiencies in credit allocation. Furthermore, high market concentration diminishes the need for banks to innovate or offer competitive loan products, potentially stifling financial sector development.

Our quantile regression results provide additional insights, demonstrating that the impact of market concentration on loan pricing intensifies at higher loan price quantiles. This suggests that banks that already charge higher lending costs experience an even greater price increase when market concentration rises. This outcome has significant implications for businesses and borrowers, as elevated loan prices can hinder investment, slow economic growth, and reduce financial inclusion. The study also highlights the role of bank characteristics in influencing loan pricing. Larger banks, those with diversified income sources, and institutions with a higher current account savings account (CASA) ratio tend to offer loans at lower interest rates. These findings suggest that promoting income diversification and encouraging deposit mobilization strategies could help mitigate the adverse effects of market concentration on lending costs.

From a policy perspective, our findings underscore the importance of regulatory interventions to foster a more competitive banking environment. Policymakers should consider measures to reduce market concentration, such as encouraging new entrants, promoting financial technology (fintech) solutions, and enforcing stricter anti-monopoly regulations. Additionally, enhancing transparency in loan pricing and improving access to alternative financing channels could help counteract the monopolistic tendencies observed in concentrated banking markets.

Future research could explore the role of financial innovation, digital banking, and regulatory reforms in shaping competitive dynamics in emerging markets. Investigating how these factors interact with market concentration to influence loan pricing would provide valuable insights for policymakers and financial institutions striving to create a more inclusive and efficient financial system.

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