Lisbon School of Economics & Management
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MASTER

M.Sc. In Monetary and Financial Economics

MASTER'S FINAL WORK

DISSERTATION

BANKING CONCENTRATION, COMPETITION AND FINANCIAL STABILITY – A COMPARISON BETWEEN COLOMBIA AND PORTUGAL

MARCELA ALEXANDRA ATEHORTÚA ROPERO

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Abstract

This paper examines the relationship between banking concentration, competition, and financial stability in Colombia and Portugal over the period 2014–2024. Employing a Fixed Effects panel regression model with cluster-robust standard errors, the study analyses the five largest banks in each country using the Herfindahl–Hirschman Index (HHI) as a measure of market concentration, the Lerner Index as a proxy for individual market power, and the Z-score as an indicator of financial stability. The empirical results — based on 55 bank-year observations per country — reveal a statistically significant negative relationship between sector-wide concentration (HHI) and stability ($\beta = -33.78$, $p < 0.10$), consistent with the concentration-fragility hypothesis. Conversely, individual market power (Lerner Index) exerts a positive and highly significant effect on the Z-score ($\beta = 3.07$, $p < 0.01$), supporting the charter value hypothesis. GDP growth emerges as a key macroeconomic determinant of stability in both markets. Descriptively, the two countries follow divergent structural paths: Colombia exhibits a trend toward greater market contestability, characterized by declining concentration and compressing margins driven by digitalization and regulatory reform, while Portugal has undergone aggressive consolidation, reaching oligopolistic concentration levels by 2024 alongside a profitability rebound in market power. These findings suggest that financial stability can be sustained through structurally distinct mechanisms — competitive discipline in the Colombian case, and charter value preservation in the Portuguese context — with significant implications for the design of macroprudential policy in both emerging and developed banking systems.

Keywords: Bank competition, Bank concentration, financial stability.
JEL Classification: G21, L11, G28, C23.

Introduction

The financial sector, comprising banks, insurance companies, and investment funds, is a fundamental pillar of economic growth and stability. It facilitates resource allocation, supports investment, enables efficient payment systems, and manages financial risks. Within this sector, banking concentration—the dominance of a limited number of large institutions—has become a major topic of debate among policymakers and academics because of its implications for competition, financial stability, and economic resilience (Kim, Batten, & Ryu, 2020).

Traditionally, concentrated banking systems were considered more stable because larger institutions benefit from greater diversification, stronger capital positions, and more sophisticated risk management practices. However, the 2007–2008 global financial crisis challenged this perspective by demonstrating that large institutions may also amplify systemic risk through moral hazard, excessive risk-taking, and their "too-big-to-fail" status. Consequently, the relationship between banking concentration and financial stability is now recognised as complex and highly dependent on institutional and regulatory conditions (Kim, Batten, & Ryu, 2020).

This debate has given rise to two competing theoretical perspectives. The concentration–stability hypothesis argues that market power enhances bank profitability and charter value, encouraging prudent behaviour and strengthening financial stability. Conversely, the concentration–fragility hypothesis suggests that excessive concentration reduces competitive pressure, encourages moral hazard, and increases systemic vulnerability. Empirical evidence remains inconclusive, indicating that the effects of concentration vary across countries and institutional settings.The remainder of this paper is structured into five subsequent sections. Section 1 provides a comprehensive literature review, examining the theoretical foundations of the concentration-stability and concentration-fragility paradigms. Section 2 describes recent empirical evidence on concentration and financial stability. Section 3 details the methodology and data, defining the Z-score as the proxy for financial stability and specifying the Fixed Effects econometric model.

Section 4 presents the results and a comparative discussion for Colombia and Portugal. Finally, Section 5 offers conclusions, policy implications, and suggestions for future research.

1. Literature review

The empirical and theoretical debate on the relationship between concentration and financial stability is a nuanced and complex one, revolving amongst two primary paradigms: the "concentration-stability" view and the "concentration-fragility" view.

The "concentration-stability" perspective argues that higher levels of banking market concentration are positively associated with financial stability. This view posits that when markets are less competitive and banks enjoy more market power, they are incentivized to maintain stability in order to protect their higher profit margins, or "charter value" (Keeley M. , 1990) (Marcus, 1984). In more concentrated markets, banks are less likely to engage in overly risky behaviour because the potential loss of their market position and long-term profits would be too costly. As a result, banks in these environments tend to take a more cautious approach to lending, focusing on maintaining healthy balance sheets and stable operations.

Additionally, the concentration-stability argument suggests that larger, more dominant banks in concentrated markets are better positioned to absorb economic shocks (Allen & Gale, 2004). These banks often have more diversified portfolios, which helps them spread risk across different asset classes, reducing their vulnerability to financial distress. Furthermore, concentrated markets may facilitate easier monitoring by regulators and supervisors, who can oversee a smaller number of large institutions more effectively than many smaller banks (Beck, Demirguc-Kunt, & Levine, 2006). This improved oversight and the ability to coordinate responses during crises further contribute to the overall stability of the banking system (Smith, 1984 and Repullo, 2004).

Moreover, in times of crisis, concentrated banking markets may allow for more effective coordination among institutions to prevent systemic collapse (Vives, 2016).

When fewer large players dominate market, it is easier for central banks and regulators to orchestrate bailouts or mergers, thereby stabilizing sector and reducing likelihood of contagion (Beck, Demirguc-Kunt, & Levine, 2006). This ability to act cohesively in response to potential disruptions serves as significant stabilizing factor. Furthermore, structural advantages of larger banks, such as increased diversification and higher 'charter value', incentivize prudent behaviour and provide necessary buffers against external shocks (Martinez-Miera & Repullo, 2010). This oversight efficiency contributes to overall resilience of financial system.

Conversely, concentration-fragility paradigm presents opposing view, suggesting that greater market concentration undermines financial stability. This view argues that when banks possess significant market power, they charge higher interest rates on loans, which exacerbates moral hazard and encourages borrowers to engage in riskier projects (Boyd & Nicoló, 2005) (Carlson, Correia, & Luck, 2022). Additionally, larger institutions in concentrated markets often become 'too-big-to-fail,' incentivizing excessive risk-taking due to expectation of government bailouts (Mishkin, 1999). Recent evidence from 2023 banking crisis further suggests that concentration of business models and institutional deposit bases in large entities can unmask hidden vulnerabilities during rapid interest rate hikes (Institute, 2025). Lack of competitive pressure may also reduce banks' incentives to innovate or improve their risk management practices, increasing the vulnerability of the banking sector to financial shocks (Bank, 2025).

These competing paradigms illustrate the complex relationship between market concentration and financial stability. The "concentration-fragility" view emphasizes the dangers of high market power, such as excessive risk-taking and moral hazard, while the "concentration-stability" perspective highlights the benefits of reduced competition, such as higher profit margins and greater stability. Policymakers and regulators must carefully weigh these dynamics when designing regulations that balance the need for competitive markets with the imperative of maintaining financial stability. Achieving the right balance is crucial to fostering a resilient banking sector capable of supporting sustainable economic growth.

2. Empirical Evidence on Concentration and Financial Stability

Recent empirical evidence from the last five years (2020–2025) confirms that the impact of banking concentration on financial stability remains a nuanced and multi-faceted phenomenon, increasingly characterized by non-linear relationships and threshold effects Calice, Leonida & Muzzupappa, 2021 and Cuestas, Lucotte & Reigl. 2019. While the foundational debate between the "Concentration-Stability" and "Concentration-Fragility" paradigms persists, contemporary research suggests that the outcome depends heavily on modern variables such as economic policy uncertainty, capital regulation, and bank-level heterogeneity Desalegn, Zhu, & Borojo, 2023 and Srivastava, Singh, & Jain, 2023.

A defining characteristic of this recent literature is its methodological evolution. To address the complexities of modern financial systems, scholars have moved beyond simple linear regressions, employing advanced techniques such as Two-step System GMM to control for endogeneity Oredegbe, 2022 and Srivastava, Singh, & Jain, 2023. GARCH-MIDAS models to analyse high-frequency market volatility (Zeeshan, 2024), and Stochastic Frontier Analysis (SFA) to measure profit efficiency as a proxy for resilience (Kozak & Wierzbowska, 2021). These approaches allow for a more precise identification of the "channels" through which market structure affects stability, such as risk-taking incentives and the "too-big-to-fail" moral hazard.

The table below provides a comprehensive summary of these recent findings across diverse geographical and institutional contexts:

Table 1. Consolidated Summary of Empirical Literature (2020-2025)

Author(s) & Year	Region / Period	Methodology	Key Findings
Cao-Alvira & Gomez-Gonzalez (2025)	Colombia (2016-2021)	Financial statement analysis (>18,000 firms)	High regional bank concentration increases firm

			leverage, potentially raising systemic risk.
Zeeshan (2024)	India (Recent)	GARCH-MIDAS (Mixed-frequency data)	Banking concentration is positively associated with increased volatility in equity and bond markets.
Seho et al. (2024)	Malaysia (2003-2019)	System GMM / Z-score analysis	Concentration benefits Islamic banks' stability but negatively affects conventional banks.
Nguyen et al. (2024)	Vietnam (2007-2020)	Tobit Regression	Supports the **competition-stability** hypothesis; competitive environments exhibit higher stability.
Benchimol & Bozou (2024)	Theoretical / USA	Nonlinear DSGE Model	Oligopolistic competition amplifies financial shocks more than monopolistic competition via markups.
Desalegn et al. (2023)	China (2011-2019)	GMM and Instrumental Variables (IV)	Both economic policy uncertainty (EPU) and high competition reduce financial stability.
Srivastava et al. (2023)	India	Two-step System GMM (Translog Lerner)	U-shaped relationship: stability is lower in both highly competitive and highly concentrated markets.
Ferreira (2023)	European Union (27 countries)	Panel Data Estimations (2006-2021)	Validates the **competition-fragility** hypothesis; increased competition reduces overall stability.

Oredegbe (2022)	BRICS & G7 (2005-2014)	Dynamic Panel GMM	Competition improves stability (**competition-stability**), though drivers differ between BRICS and G7.
Carlson et al. (2022)	USA (Historical Era)	Regression Discontinuity (RD)	Competition fosters credit growth but increases financial fragility and default risk.
Yudaruddin (2022)	Central Asia (1993-2017)	Panel Data Analysis	Higher concentration increases stability, especially when combined with high bank capitalization.
Tran et al. (2022)	133 Emerging Markets	Aggregate Panel Regression	Supports **concentration-stability**; concentration enhances the positive effect of capital on resilience.
Kiemo & Mugo (2021)	Kenya (2001-2017)	Three-step Panel GMM	Both competition and consolidation have contributed to improving banking stability.
Vujanović & Fabris (2021)	Montenegro	Panel Data Techniques	Concentration is harmful for small banks; increasing competition positively affects credit risk.
Kozak & Wierzbowska (2021)	SECE Region (19 countries)	Stochastic Frontier Approach (SFA)	Concentration has a non-linear positive impact on bank profit efficiency and stability.
Calice et al. (2021)	Global (1997-2015)	Mediation & Non-linear Analysis	Stability improves until 50% concentration (profitability) but declines after 65% (credit risk).

Barrell & Karim (2020)	19 OECD Countries	New Industrial Economics (NIE) Indicators	Increased market power (Lerner Index) and concentration reduce the frequency of banking crises.
Cuestas et al. (2020)	Baltic Countries	2SLS Panel Regression	Found that an **inverted U-shape**: concentration is only harmful above specific thresholds (Lerner > 0.6).

Source: Author's own elaboration based on official data

As this updated overview demonstrates, the relationship between concentration, competition, and financial stability is increasingly viewed through the lens of non-linearity. For instance, the findings of Calice, Leonida, & Muzzupappa (2021) and Cuestas, Lucotte, & Reigl (2019) suggest the existence of "optimal thresholds" of concentration, beyond which the system transitions from a state of resilience (driven by higher profits and ease of monitoring) to a state of fragility (driven by credit risk and systemic interconnectedness).

Furthermore, recent studies highlight that traditional metrics like the Herfindahl-Hirschman Index (HHI) are insufficient if used in isolation. Modern research emphasizes the behavioural dimension of competition, using the Lerner Index or Boone Indicator to capture how banks exercise market power (Barrell & Karim, 2020). The role of institutional moderators also remains paramount; for example, in emerging economies, high concentration may only lead to stability if accompanied by robust capital requirements and financial freedom (Yudaruddin, 2022 and Tran, Nguye, & Nguyen, 2022). Consequently, the "Value Added" of contemporary research lies in moving away from universal models toward context-sensitive frameworks that account for bank size, ownership structure, and the prevailing regulatory environment.

3. Methodology and data

To empirically assess the relationship between market structure and stability, this study computes a comprehensive set of indicators using bank-level annual data. Following the recent methodological standards in banking literature (Srivastava, Singh, & Jain, 2023 and Ferreira, 2023), the estimation process is structured as follows:

- *Market concentration - Herfindahl–Hirschman Index (HHI):*

The HHI is calculated annually for both the Colombian and Portuguese banking sectors to capture structural changes. Unlike simple concentration ratios (CR5), the HHI accounts for the relative distribution of market power among all players:

$$HHI_t = \sum_{i=1}^{N} s_{it}^2 \quad (1)$$

where s_{it} represents the market share of bank *i* in year *t* (calculated by total assets).

- *Market Power: The Lerner Index and Translog Cost Function*

The Lerner Index L_{it} is used as a proxy for market power, measuring the bank's ability to maintain a markup over its costs. It is defined as:

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

where Pit is calculated as the ratio of total revenue (interest and non-interest income) to total assets. Given the data availability for both regions, this study adopts a proxy

for marginal cost (MCit) based on operational efficiency. It is calculated as the ratio of Operational Costs to Income-Generating Assets:

$$MC_{it} = \frac{\text{Operational Costs}_{it}}{\text{Income-Generating Assets}_{it}} \quad (3)$$

This approach follows the logic that for a financial intermediary, the "marginal unit" of production is the management of assets that produce returns (loans and investments). By using AGI instead of total assets, we exclude non-productive assets (such as fixed assets or non-earning cash), providing a more precise measure of the cost associated with the bank's core intermediation business

- *The Boone Indicator*

To complement the Lerner index, the Boone indicator was estimated. The use of Boone indicator is based on the premise that in competitive markets, efficient banks with lower MC are rewarded with higher profits:

$$\pi_{it} = \alpha + \beta c_{it} + \epsilon_{it} \quad (4)$$

where π_{it} are the profits, C_{it} are the costs, and β is the Boone coefficient. A more negative β reflects stronger competition, as efficient banks gain more market share when competition intensifies.

- *Financial stability*

The Z-score is the primary measure of bank solvency. It indicates the distance to default by measuring the number of standard deviations that returns must fall to deplete equity:

$$Z_{it} = \frac{ROA_{it} + E_{it}/A_{it}}{\sigma(ROA_{it})} \quad (5)$$

where ROA_{it} is return on assets, E_{it}/A_{it} is the equity-to-assets ratio, and $\sigma(ROA_{it})$ is the standard deviation of ROA. Higher Z-scores imply lower insolvency risk.

- In addition, the *Net Interest Income (NII)* is considered:

$$NII_{it} = II_{it} - IE_{it} \quad (6)$$

where NII_{it} denotes net interest income, II_{it} interest income and IE_{it} interest expenses. This indicator reflects the capacity of banks to generate intermediation income.

3.1. Data

3.1.1. Data for Colombia

The Colombian dataset covers the period 2014–2024 and focuses on the five largest institutions in the banking system: Bancolombia, Banco de Bogotá, Davivienda, BBVA Colombia, and Banco de Occidente. As of December 2024, these banks held approximately 60.3% of total banking assets, with individual market shares of 22.3% (Bancolombia), 12.2% (Davivienda), 10.7% (Banco de Bogotá), 8.9% (BBVA Colombia), and 6.2% (Banco de Occidente). This makes them highly representative of the structure and dynamics of the sector. The focus on these institutions is consistent with the empirical literature, which typically concentrates on the dominant players that drive systemic outcomes in concentrated financial markets.

The construction of the indicators relies on annual bank-level financial statements obtained from the Superintendencia Financiera de Colombia (SFC), complemented with information disclosed in the institutions' own reports. The dataset includes variables such as total assets, equity, net income, interest income and expenses, operating costs, credit portfolios, and investments. In addition, macroeconomic variables are incorporated as controls: real GDP growth (PIB), the interbank interest rate (TIB), and the nominal exchange rate (TRM). These series were obtained from the Banco de la República and the Departamento Administrativo Nacional de

Estadística (DANE). Including macroeconomic indicators allows the analysis to account for systemic and cyclical conditions that influence competition, concentration, and financial stability outcomes.

Overall, the dataset focuses on the largest institutions, ensuring representativeness, while the inclusion of macroeconomic variables enables the empirical assessment to integrate both micro-level bank behaviour and broader macro-financial conditions.

3.1.2. Data for Portugal

The Portuguese dataset covers the period 2014–2024 and include the leading institutions in the national banking system. The sample will focus on the largest banks in terms of assets and systemic importance, such as Caixa Geral de Depósitos, Millennium BCP, Novo Banco, Banco Santander Totta, and Banco BPI. Together, these institutions represent a substantial share of the Portuguese banking market—estimated at more than 80% of total banking assets—and therefore provide a representative picture of the sector's dynamics. The construction of the indicators relies on annual bank-level financial statements, obtained from the Banco de Portugal (BdP) and the banks' publicly available reports. Variables considered include total assets, equity, net income, interest income and expenses, operating costs, credit portfolios, and investments.

To account for systemic and macroeconomic conditions, the analysis also incorporates variables such as GDP growth, money market interest rates, and the euro exchange rate, sourced from Banco de Portugal and Eurostat. These macroeconomic controls ensure comparability with the Colombian case and allow for an assessment of how broader financial conditions influence competition, concentration, and stability.

3.2. Definition of Variables: Stability, Concentration, and Market Power

This section defines the variables used in the econometric estimation. Indicators are categorized into a dependent variable representing financial stability, main independent variables of interest (market structure), and control variables capturing bank-specific and macroeconomic conditions.

3.2.1. Dependent Variable: Financial Stability Proxy

To measure bank stability, this study utilizes the Z-score. This indicator serves as a proxy for the distance-to-default, representing the number of standard deviations a bank's returns must fall below the expected value before equity is depleted. A higher Z-score indicates greater financial stability and a lower probability of insolvency.

3.2.2. Independent Variables of Interest

HHI (Concentration): The Herfindahl-Hirschman Index serves as the primary measure of market concentration. It is calculated by summing the squares of the market shares of all banks in the system.

Lerner Index (Market Power): This indicator measures the ability of an individual bank to set prices above marginal costs. It captures the degree of market power and competitive advantage beyond simple market share.

3.2.3. Control Variables

To ensure robustness of the model and mitigate variable bias, controls are included:

Bank-Specific Controls: ln_activos - Logarithm of total assets (Bank Size); cosfond - Cost of funding; cartdep and cartactiv - Ratios for deposit-to-loan structure and asset composition.

Macroeconomic Controls: var_pib - Annual GDP growth rate to account for economic cycles; tib - Interbank interest rate; trm - Exchange rate fluctuations.

Table 2. Summary of Variables for Econometric Model

Category	**Variable Name**	**Description**	**Source**
Dependent	z_score	Proxy for distance-to-default	Calculated by Author
Main Independent	hhi	Herfindahl-Hirschman Index	Calculated by Author
Main Independent	lerner	Individual bank market power	Calculated by Author
Bank Controls	ln_activos	Natural log of total assets	Official Financial Statements

Bank Controls	cosfond	Cost of funds ratio	Official Financial Statements
Macro Controls	var_pib	GDP growth percentage	Central Bank / World Bank

Source: Author's own elaboration based on banks' financial statements and official data

3.3. Econometric Model: Fixed Effects Specification

To analyse the relationship between market structure and financial stability, this study employs a Fixed Effects (FE) panel data model. This specification is selected to address the presence of unobserved heterogeneity among the analysed banking institutions. By focusing on the "within" variation, the FE model controls for time-invariant characteristics—such as management culture, ownership structure, or specific regulatory history—that could otherwise bias the results.

3.3.1. Model Equation

To avoid multicollinearity issues and ensure a clear interpretation of each market structure proxy, three separate model specifications are estimated. Each model includes one measure of market structure (Lerner Index, Boone Indicator, or HHI), alongside the same set of control variables.

The empirical models are specified as follows:

Model 1 (Market Power – Lerner Index):

$$Z_{\text{Score}_{it}} = \beta_0 + \beta_1 \text{Lerner}_{it} + \gamma X_{it} + \alpha_i + \varepsilon_{it} \quad (7)$$

Model 2 (Competition – Boone Indicator):

$$Z_{\text{Score}_{it}} = \beta_0 + \beta_1 \text{Boone}_{it} + \gamma X_{it} + \alpha_i + \varepsilon_{it} \quad (8)$$

Model 3 (Concentration – HHI):

$$Z_{\text{Score}_{it}} = \beta_0 + \beta_1 \text{HHI}_{it} + \gamma X_{it} + \alpha_i + \varepsilon_{it} \quad (9)$$

Model 4 (Full Model – HHI + Lerner Index):

$$Z_{\text{Score}_{it}} = \beta_0 + \beta_1 \text{HHI}_{it} + \beta_2 \text{Lerner}_{it} + \gamma X_{it} + \alpha_i + \varepsilon_{it} \quad (10)$$

Where:

$Z_{score_{it}}$ represents financial stability for bank i at time t

X_{it} is the vector of control variables

α_i captures bank fixed effects

ε_{it} is the error term

3.3.2. Estimation Technique

The models are estimated using Fixed Effects with robust standard errors clustered at the bank level (vce(cluster id_banco)). This approach accounts for potential heteroskedasticity and serial correlation within banks, which are common features in panel data. The use of clustered standard errors ensures that statistical inference remains valid even in the presence of within-group dependence over time.

Prior to estimation, the Hausman specification test was conducted separately for each country panel to determine the most appropriate estimator. The null hypothesis of the Hausman test assumes that the unobserved individual effects are uncorrelated with the regressors, in which case Random Effects would be both consistent and efficient. For Colombia, the test yielded chi-squared statistics of 62.21, 58.93, and 73.04 for Models 1, 2, and 3 respectively (all $p < 0.001$), leading to a strong rejection of the null hypothesis and confirming that FE is the required specification. For Portugal, the test produced chi-squared statistics below 0.03 across all three models (all $p > 0.99$), suggesting that RE would be the efficient estimator for that panel.

Nevertheless, to ensure methodological consistency and direct comparability across both banking systems, Fixed Effects is applied uniformly to both panels. This choice is further justified by the fact that the Fixed Effects estimator remains consistent regardless of whether individual effects are correlated with the regressors — it discards the between-bank variation and focuses on within-bank variation over time, which is particularly relevant for capturing the dynamics of financial stability in both.

The FE estimator is preferred over Random Effects as it controls for unobserved, time-invariant heterogeneity across banks, such as differences in management practices, risk profiles, or business models. This allows analysis to focus on within-bank variation over time, which is particularly relevant for capturing the dynamics of financial stability in both the Colombian and Portuguese banking sectors.

4. Empirical Results and Discussion

The Colombian and Portuguese banking sectors exhibit notable dynamics in concentration, market power, and financial stability over the period 2014–2024.

4.1. Consolidated Descriptive Statistics

The following table provides a summary of the calculated indicators for both banking systems. This overview allows for an initial comparison of the structural and behavioural differences between Colombia and Portugal.

Table 3. Summary Statistics of Banking Indicators (2014-2024)

Country	Variable	Obs	Mean	Strd Dev.	Min	Max
Colombia	HHI (Concentration)	55	0.0526	0.0583	0.0047	0.2010
	Lerner Index (Power)	55	0.3735	0.1912	0.0600	0.6568
	Z-score (Stability)	55	4.3876	1.7949	0.2995	7.7870
Portugal	HHI (Concentration)	55	0.0449	0.0319	0.0085	0.1041
	Lerner Index (Power)	55	0.43230	0.2073	0.0600	0.7437
	Z-score (Stability)	55	0.7803	1.5983	-3.373	5.6552

Source: Author's own elaboration based on banks' financial statements and official data.

The statistical summary reveals fundamental differences in the banking architectures of both nations. In terms of market concentration (HHI), both countries show relatively low average levels (0.0526 for Colombia and 0.0449 for Portugal), though Colombia exhibits nearly double the volatility in its structure (Std. Dev. = 0.0583) compared to the more stable Portuguese market.

Regarding market power, the Lerner Index indicates that Portuguese banks exercise greater pricing power over marginal costs, with a mean of 0.4323 compared to Colombia's 0.3735. This suggests that despite a similar concentration index, Portuguese institutions maintain a more dominant behavioural stance in the market.

The most significant divergence appears in financial stability (Z-score). Colombia exhibits a substantially higher average stability level, suggesting a stronger capital buffer relative to asset volatility. In contrast, Portugal shows lower average stability and greater variability, indicating periods of increased vulnerability during the analysed decade.

While these descriptive statistics suggest potential differences in how market structure relates to stability across countries, they do not provide causal evidence. Therefore, these patterns must be interpreted with caution and complemented by the econometric analysis presented in subsequent sections.

4.2. Evolution of Competition and Stability

4.2.1. Evolution of Competition and Stability in Colombia

To analyse the temporal dynamics of the Colombian banking sector, Table 4 presents the annual averages of the computed indicators. This longitudinal perspective allows for the identification of changes in market structure and financial stability over time, particularly during periods of economic stress such as the COVID-19 pandemic.

Table 4. Annual Evolution of Calculated Indicators - Colombia (Average of Top 5 Banks)

Year	HHI	Lerner Index	Z-score
2014	0.0505	0.2877	4.9265
2015	0.0567	0.4101	4.9757

2016	0.0572	0.4241	4.6429
2017	0.0544	0.4406	4.3423
2018	0.0547	0.4064	4.4151
2019	0.0549	0.3932	4.4301
2020	0.0536	0.3549	2.7370
2021	0.0478	0.3699	4.7632
2022	0.0493	0.3822	4.9866
2023	0.0493	0.3275	4.1337
2024	0.0499	0.3117	3.9106

Source: Author's own elaboration based on banks' financial statements and official data.

The evolution of the Colombian banking sector reflects the influence of macroeconomic conditions on both market structure and financial stability. Between 2014 and 2019, the Z-score remains relatively stable, indicating a consistent level of financial resilience. During this period, the Lerner Index shows moderate fluctuations, suggesting some variation in market power without major structural changes in competition. The COVID-19 pandemic in 2020 represents a clear shock, with a significant drop in the Z-score, reflecting increased financial vulnerability. This decline is followed by a rapid recovery in 2021 and 2022, where stability indicators return to pre-pandemic levels.

In the final years of the sample (2023–2024), the Z-score shows a slight downward trend, while the Lerner Index declines, suggesting a potential reduction in market power. Overall, the descriptive evidence indicates that financial stability in Colombia is sensitive to macroeconomic shocks, while changes in market structure appear more gradual over time. However, these patterns are purely descriptive and do not establish a causal relationship between competition, concentration, and financial stability, which is addressed in the econometric analysis.

4.2.2. Evolution of Competition and Stability in Portugal

To analyse the temporal dynamics of the Portuguese banking sector, Table 5 presents the annual averages of the computed indicators.

Table 5. Annual Evolution of Calculated Indicators - Portugal (Average of Top 5 Banks)

Year	HHI	Lerner Index	Z-score
2014	0.0443	0.4340	0.0472
2015	0.0458	0.4297	0.0565
2016	0.0467	0.3616	0.0460
2017	0.0462	0.3946	0.0453
2018	0.0456	0.3901	0.0452
2019	0.0455	0.4210	0.0455
2020	0.0452	0.4064	0.0456
2021	0.0453	0.4444	0.0462
2022	0.0460	0.4878	0.0467
2023	0.0482	0.5113	0.0458
2024	0.0472	0.5027	0.0443

Source: Author's own elaboration based on banks' financial statements and official data

The Portuguese banking sector shows a relatively stable evolution of financial stability over the analysed period. The Z-score remains constant, suggesting limited variation in overall solvency conditions across time. The Lerner Index displays a gradual increase, particularly in the later years of the sample, indicating a rise in market power. This may reflect structural adjustments within the banking sector, including consolidation processes and changes in competitive dynamics. Unlike Colombia, the Portuguese banking system does not exhibit strong fluctuations in stability during the pandemic period, as the Z-score remains relatively stable. Despite the observed increase in market power and variation in concentration levels, these descriptive trends do not provide evidence of a direct relationship between market structure and financial stability. As shown in the econometric analysis, market structure variables are not statistically significant in explaining stability in Portugal.

4.2.3. Individual Bank Performance: Colombia vs. Portugal

While aggregate indicators provide a macro-level perspective, the relationship between market structure and financial stability may also depend on the behaviour of individual systemic institutions. Table 6 presents the average Lerner Index (market power) for the five largest banks in each country over the period 2014–2024.

Table 6. Average Lerner Index by Institution (2014-2024)

Rank	Colombia	Avg. Lerner	Portugal	Avg. Lerner
1	Bancolombia	0.55	CGD	0.47
2	Banco de Bogotá	0.13	Millenium BCP	0.21
3	Davivienda	0.26	Novo Banco	0.43
4	BBVA Colombia	0.37	Santander Totta	0.59
5	Banco de Occidente	0.55	Banco BPI	0.46

Source: Author's own elaboration based on banks' financial statements and official data.

The comparison reveals differences in the distribution of market power across institutions in both countries. In Portugal, the Lerner Index values are relatively clustered, with most banks exhibiting similar levels of market power. In contrast, the Colombian banking sector shows greater dispersion, with some institutions displaying significantly higher market power than others. These differences suggest that market power in Portugal is more evenly distributed among leading institutions, while in Colombia it is more concentrated in specific banks.

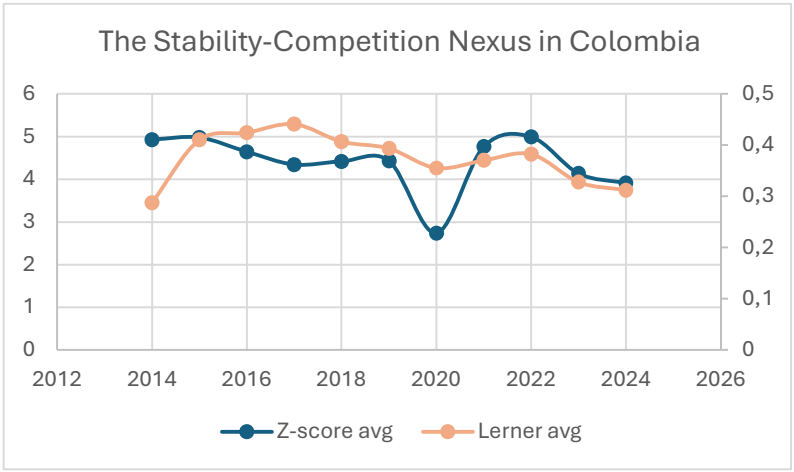
However, it is important to note that these observations are purely descriptive. Although Portugal exhibits relatively high and homogeneous levels of market power, the econometric results presented in the previous section do not find a statistically significant relationship between market power and financial stability. Therefore, no causal inference can be drawn from these patterns.

4.3. Comparative analysis and discussion

The comparative analysis of Colombia and Portugal reveals important differences in the relationship between market structure and financial stability. While descriptive

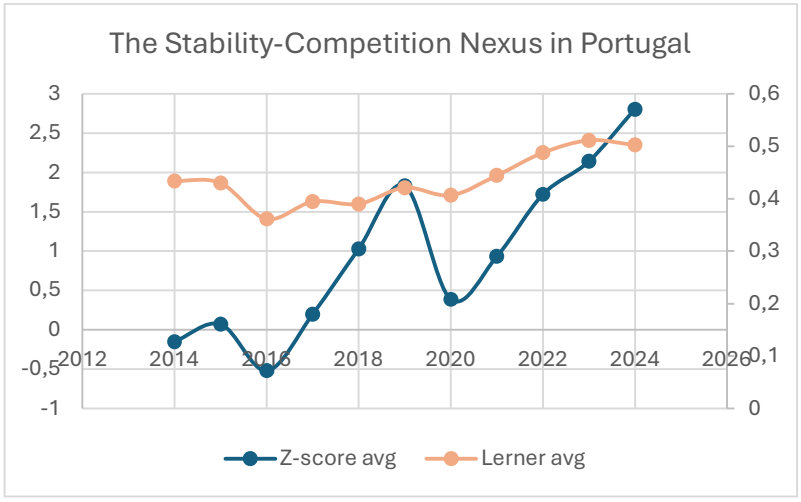
patterns suggest distinct structural dynamics in both banking systems, the econometric results indicate that these relationships are not uniform.

Figure 1. Z-score vs. Lerner Index: The Stability-Competition Nexus in Colombia



Source: Author's own elaboration based on banks' financial statements and official data.

Figure 2. Z-score vs. Lerner Index: The Stability-Competition Nexus in Portugal



Source: Author's own elaboration based on banks' financial statements and official data.

Figures 1 and 2 illustrate the evolution of financial stability (Z-score) and market power (Lerner Index) in both countries.

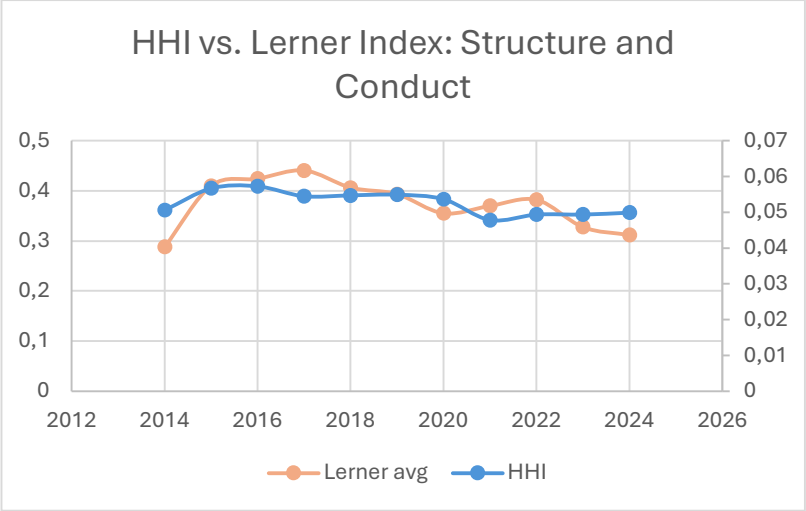
In Colombia, financial stability exhibits greater sensitivity to macroeconomic shocks, particularly during the COVID-19 period, followed by a strong recovery. In contrast, the Portuguese banking sector shows a more stable Z-score over time, suggesting less pronounced fluctuations in systemic risk.

Regarding market power, the Lerner Index displays moderate variation in both countries. While Portugal shows a gradual increase in market power in recent years, Colombia exhibits more fluctuation and a slight downward trend toward the end of the period. However, these descriptive patterns do not provide sufficient evidence to establish a direct relationship between market power and financial stability.

The divergence between the Colombian and Portuguese descriptive trends highlights the complexity of the stability-competition nexus. While the Z-score fluctuations in Colombia suggest a banking system more exposed to external economic volatility, the relative stability in Portugal may reflect a more consolidated market structure or different regulatory buffers. However, the relationship between market power (Lerner Index) and actual market structure (HHI) is not always linear.

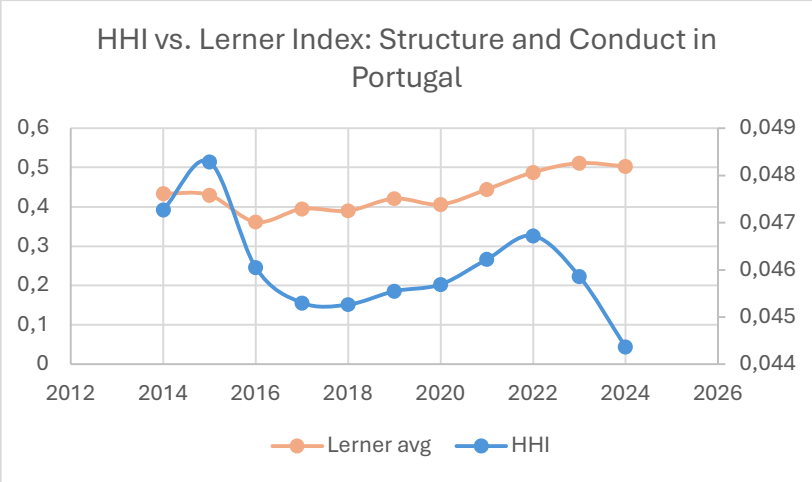
To better understand whether the observed market power is a result of high concentration or specific bank behavior, **Figure 3** presents a comparison between the Herfindahl-Hirschman Index and the Lerner Index for Colombia. This allows for a preliminary assessment of whether "structure" (concentration) directly dictates "conduct" (market power) within the Colombian banking landscape.

Figure 3. HHI vs. Lerner Index: Structure and Conduct in Colombia



Source: Author's own elaboration based on banks' financial statements and official data.

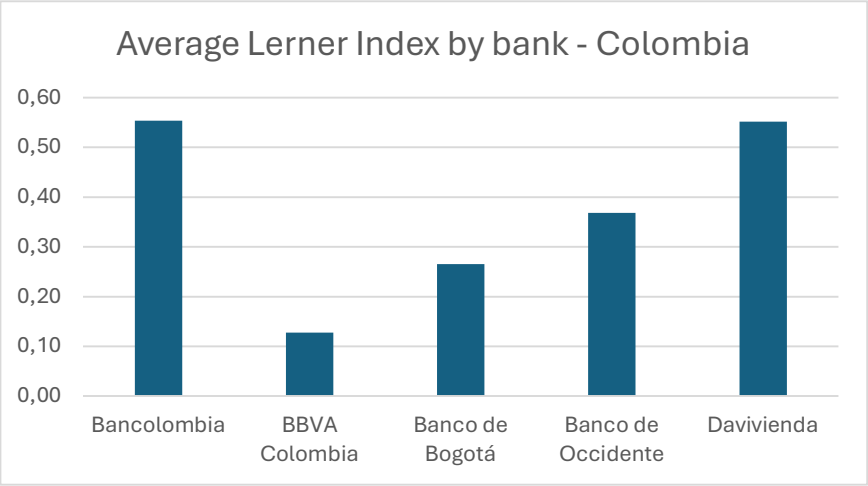
Figure 4. HHI vs. Lerner Index: Structure and Conduct in Portugal



Source: Author's own elaboration based on banks' financial statements and official data.

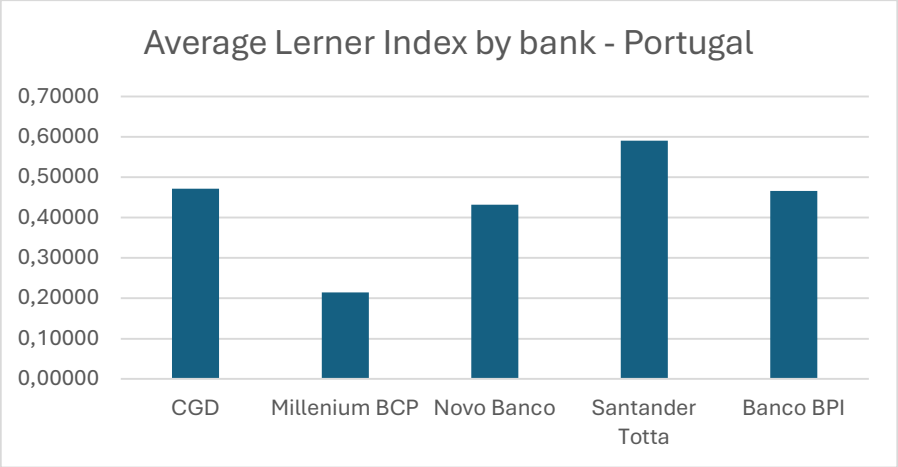
Figures 3 and 4 present the relationship between market structure (HHI) and bank conduct (Lerner Index). In Colombia, both indicators show moderate co-movement over time, suggesting some alignment between concentration and market power. In Portugal, this relationship appears less consistent, indicating that changes in concentration do not necessarily translate into proportional changes in pricing power.

Figure 5. Average Lerner Index by Institution – Colombia



Source: Author's own elaboration based on banks' financial statements and official data.

Figure 6. Average Lerner Index by Institution - Portugal



Source: Author's own elaboration based on banks' financial statements and official data.

Figures 5 and 6 further highlight differences in the distribution of market power at the institutional level. In Colombia, market power is more dispersed, with certain banks exhibiting significantly higher Lerner values than others. In Portugal, market power appears more evenly distributed across leading institutions, although some variation remains.

From a descriptive perspective, these patterns suggest that the Colombian banking sector may exhibit greater heterogeneity in competitive behaviour, while the Portuguese sector shows more uniformity among major banks. However, these observations remain descriptive and should not be interpreted as causal relationships.

Descriptive Evidence. Financial stability, as measured by the Z-score, exhibits different patterns across the two banking systems. In Colombia, stability is clearly affected by the COVID-19 shock, with a marked decline in 2020 followed by a strong recovery in subsequent years. In contrast, the Portuguese banking sector shows relatively stable Z-score values over the analysed period, indicating lower variability in financial stability.

Regarding market power, the Lerner Index displays different dynamics in each country. Colombia shows greater fluctuation and a slight downward trend in recent years, while Portugal presents a gradual increase in market power over time. However, these trends are descriptive and do not imply a direct relationship between market power and financial stability.

In terms of market structure, the HHI indicates some variation over time in both countries. Colombia remains relatively stable, while Portugal shows changes consistent with structural adjustments in the banking sector. Nevertheless, these patterns should be interpreted with caution, as descriptive statistics do not provide evidence of causality.

Econometric Evidence. The econometric results provide a more rigorous assessment of the relationship between market structure and financial stability. In Colombia, the Herfindahl-Hirschman Index (HHI) is negative and statistically significant, indicating that higher levels of concentration are associated with lower financial stability. This finding supports the concentration-fragility hypothesis in the Colombian context.

The Lerner Index is not statistically significant when estimated in isolation (Model 1, $p = 0.140$), nor is the Boone Indicator significant in any specification. However, in the

full model (Model 4), which includes both HHI and the Lerner Index simultaneously, the Lerner coefficient becomes positive and highly significant ($\beta = 3.07$, $p < 0.01$), suggesting that market power has a stabilising effect when controlling for sector-wide concentration. This result should be interpreted with caution given the potential multicollinearity between HHI and the Lerner Index.

For Portugal, the results show that none of the market structure variables (Lerner, Boone, or HHI) are statistically significant. This indicates that financial stability in Portugal is not directly explained by competition or concentration measures, but rather by financial and macroeconomic conditions, such as funding costs and interest rates.

Overall Summary. The comparison between both countries highlights an asymmetric relationship between market structure and financial stability. In Colombia, concentration appears to play a significant role, with higher concentration associated with lower stability. In Portugal, however, no statistically significant relationship is found, suggesting that stability is driven by other structural and macroeconomic factors.

These findings indicate that the link between competition, concentration, and financial stability is context-dependent and cannot be generalized across different banking systems.

4.4. Empirical Results: Fixed Effects Regression Analysis

A distinction emerges when comparing the econometric results across both countries. While the Colombian results provide statistically significant evidence that market concentration negatively affects financial stability, the Portuguese estimations do not show any significant relationship between market structure and stability.

This divergence highlights the importance of country-specific factors, such as institutional frameworks, regulatory environments, and macroeconomic dynamics, in shaping the relationship between competition, concentration, and financial stability.

4.4.1. Fixed Effects Regression Analysis for Colombia

This section presents the findings from the Fixed Effects estimation for the Colombian banking sector. The model evaluates the impact of market structure—measured through alternative proxies of competition and concentration (Lerner Index, Boone Indicator, and HHI)—on the financial stability of the analysed banking entities.

The results show that the Herfindahl-Hirschman Index (HHI) is negative and statistically significant across specifications, indicating that higher levels of market concentration are associated with lower financial stability. This provides empirical support for the concentration-fragility hypothesis in the Colombian context (Model 2: $\beta = -16.024$, $p = 0.019$; Model 3: $\beta = -33.781$, $p = 0.074$).

Regarding market power, the Lerner Index is not statistically significant when estimated in isolation (Model 1: $\beta = 2.148$, $p = 0.140$), nor is the Boone Indicator significant in any specification.

However, in the full model (Model 4), which includes both HHI and the Lerner Index simultaneously, the Lerner coefficient becomes positive and highly significant ($\beta = 3.070$, $p = 0.002$). This suggests that individual market power exerts a stabilising effect on bank solvency once sector-wide concentration is controlled for — a result consistent with the charter value hypothesis (Keeley, 1990). Among control variables, GDP growth (var_pib) exhibits a positive and highly significant effect across all model specifications ($p < 0.01$), highlighting the dominant role of macroeconomic conditions in explaining banking stability in Colombia.

Table 7. Results Model 1 — Lerner Index (Market Power)

Dependent variable: Z-score | 55 obs. | 5 banks | R^2 within = 0.3340

Variable	Coef.	Robust Std. Err.	t	p-value	[95% Conf.	Interval]
lerner	2.148	1.168	1.84	0.140	-1.096	5.392
ln_activos	-2.312	1.677	-1.38	0.240	-6.969	2.345
cosfond	-1.016	2.117	-0.48	0.656	-6.894	4.861

var_pib	0.115	0.023	4.92	0.008***	0.050	0.180
tib	0.049	0.077	0.64	0.557	-0.164	0.262
trm	0.0005	0.0008	0.64	0.559	-0.0017	0.0027
_cons	43.927	29.406	1.49	0.210	-37.718	125.573
Observations: 55		**R² (within): 0.3340**		Groups: 5 banks | FE clustered by bank		

*Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered by bank.*

Source: Stata output.

In the Colombian model, market power (Lerner Index) is not a statistically significant determinant of financial stability. Instead, banking stability is primarily driven by macroeconomic conditions, with GDP growth showing a strong pro-cyclical effect. The low R^2 further indicates that market power explains only a limited portion of the variation in bank-level stability.

Table 8. Results Model 2 — Boone indicator (Competition)

Dependent variable: Z-score | 55 obs. | 5 banks | R² within = 0.3340

Variable	Coef.	Robust Std. Err.	t	p-value	[95% Conf.	Interval]
boone	0.402	0.346	1.16	0.310	-0.559	1.363
ln_activos	−2.863	1.885	−1.52	0.204	-8.097	2.372
cosfond	−1.075	2.354	−0.46	0.672	-7.612	5.462
var_pib	0.098	0.030	3.24	0.032***	0.014	0.183
tib	0.023	0.073	0.32	0.768	-0.180	0.226
trm	0.001	0.001	0.69	0.527	-0.002	0.003
Observations: 55		**R² (within): 0.3072**		Groups: 5 banks | FE clustered by bank		

*Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered by bank.*

Source: Stata output.

Table 9. Results Model 3 — HHI (Market Concentration)

Dependent variable: Z-score | 55 obs. | 5 banks | R² within = 0.3204

Variable	Coef.	Robust Std. Err.	t	p-value	[95% Conf.	Interval]
ihh	-16.024	4.236	-3.78	0.019**	-27.783	-4.264
ln_activos	-1.429	1.726	-0.83	0.454	-6.221	3.363
cosfond	-1.241	2.224	-0.56	0.607	-7.416	4.935

var_pib	0.107	0.021	5.10	0.007***	0.049	0.165
tib	0.047	0.070	0.67	0.538	-0.148	0.242
trm	0.0002	0.0008	0.21	0.842	-0.0022	0.0025
_cons	30.506	29.851	1.02	0.365	-52.373	113.385
Observations: 55		**R^2 (within): 0.3204**		Groups: 5 banks | FE clustered by bank		

*Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered by bank.*

Source: Stata output.

The HHI is negative and significant at the 5% level (β = −16.024, p = 0.019), providing support for the concentration-fragility hypothesis: higher sector-wide concentration is associated with lower financial stability. GDP growth remains significant (β = 0.107, p < 0.01). Bank size, funding costs, interest rates, and the exchange rate are all non-significant, suggesting their effects are absorbed by the fixed effects or are of secondary importance in this specification.

Table 10. Results Model 4 — Full Model (HHI + Lerner + Controls)

Dependent variable: Z-score | 55 obs. | 5 banks | R^2 within = 0.5743

Variable	**Coef.**	**Robust Std. Err.**	**t**	**p-value**	**[95% Conf.**	**Interval]**
hhi	-33.781	14.027	-2.41	0.074*	-72.727	5.164
lerner	3.070	0.436	7.04	0.002***	1.859	4.281
cosfond	-1.253	1.883	-0.67	0.542	-6.482	3.976
ln_activos	-1.242	1.338	-0.93	0.406	-4.957	2.472
cartdep	0.981	1.445	0.68	0.534	-3.031	4.994
cartactiv	-2.434	1.812	-1.34	0.250	-7.466	2.598
var_pib	0.120	0.023	5.23	0.006***	0.056	0.184
tib	0.082	0.088	0.93	0.406	-0.162	0.326
trm	-0.0002	0.0007	-0.29	0.783	-0.0020	0.0016
_cons	28.290	23.427	1.21	0.294	-36.752	93.332
Observations: 55		**R^2 (within): 0.5743**		Groups: 5 banks | FE clustered by bank		

*Note: *** p<0.01, ** p<0.05, * p<0.1. Robust strd errors clustered by bank. Main reported model.*

Source: Stata output.

This is the main specification. When HHI and Lerner are included simultaneously, two results emerge. First, the HHI remains negative and marginally significant (β = −33.781, p = 0.074), reinforcing the concentration-fragility finding. Second, and importantly, the Lerner Index becomes positive and highly significant (β = 3.070, p < 0.01), suggesting that individual market power acts as a stabilising buffer even when overall concentration increases risk. GDP growth (β = 0.120, p < 0.01) is again the strongest macroeconomic driver. The R^2 within rises to 0.574, indicating that this combined specification explains substantially more within-bank variation than either model alone.

4.4.2. Fixed Effects Regression Analysis for Portugal

This section presents the results of the Fixed Effects estimation for the Portuguese banking sector over the period 2014–2024. Three separate models were estimated using different measures of market structure: the Lerner Index, the Boone Indicator, and the Herfindahl-Hirschman Index (HHI).

The results indicate that none of the variables capturing competition or concentration are statistically significant across the different model specifications. This suggests that, for Portugal, there is no robust empirical evidence supporting either the competition-stability or concentration-stability hypotheses.

In contrast, control variables display strong and consistent effects. The cost of funding is negatively associated with financial stability, while interest rates show a positive and highly significant relationship with the Z-score. These findings suggest that financial and macroeconomic conditions play a more relevant role than market structure in explaining bank stability in Portugal.

Econometric Results (Fixed Effects, Clustered by Bank)

Table 11. Results Model 1 — Lerner Index (Market Power)

Dependent variable: Z-score | 55 obs. | 5 banks | R^2 within = 0.4574

Variable	Coef.	Robust Std. Err.	t	p-value	[95% Conf.	Interval]

lerner	1.018	1.298	0.78	0.477	-2.585	4.621
activos	5.00e-12	1.34e-11	0.37	0.729	-3.23e-11	4.23e-11
cosfond	-87.205	22.372	-3.90	0.018**	-149.321	-25.089
var_pib	0.050	0.024	2.07	0.107	-0.017	0.117
tib	0.653	0.071	9.15	0.001***	0.455	0.851
_cons	0.676	1.478	0.46	0.671	-3.428	4.780
Observations: 55		**R^2 (within): 0.4574**		Groups: 5 banks | FE clustered by bank		

*Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered by bank.*
Source: Stata output.

The Lerner Index is not statistically significant (β = 1.018, p = 0.477), indicating that individual market power does not explain financial stability in Portugal. In contrast, funding costs (cosfond) are negative and significant (β = −87.205, p = 0.018), and the interbank interest rate (tib) is positive and highly significant (β = 0.653, p < 0.001). This suggests that in the Portuguese context, monetary conditions and liability-side costs are the determinants of bank solvency, rather than competitive dynamics.

Table 12. Results Model 2 — Boone Indicator (Competition)

Dependent variable: Z-score | 55 obs. | 5 banks | R^2 within = 0.4625

Variable	Coef.	Robust Std. Err.	t	p-value	[95% Conf.	Interval]
boone	-0.021	0.017	-1.27	0.274	-0.067	0.025
activos	4.07e-12	1.28e-11	0.32	0.766	-3.15e-11	3.96e-11
cosfond	-81.553	17.099	-4.77	0.009***	-129.028	-34.079
var_pib	0.059	0.019	3.05	0.038**	0.005	0.113
tib	0.629	0.063	9.99	0.001***	0.454	0.804
_cons	1.228	1.015	1.21	0.293	-1.591	4.047
Observations: 55		**R^2 (within): 0.4625**		Groups: 5 banks | FE clustered by bank		

*Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered by bank.*
Source: Stata output.

The Boone Indicator is not statistically significant (β = −0.021, p = 0.274). As in Model 1, the dominant explanatory variables are funding costs (β = −81.553, p < 0.01) and the interbank rate (β = 0.629, p < 0.001), with GDP growth also becoming significant

(β = 0.059, p = 0.038). The consistency of these control variables across specifications reinforces the conclusion that Portuguese bank stability is driven primarily by macroeconomic and financial conditions rather than by market structure

Table 13. Results Model 3 — HHI (Market Concentration)

Dependent variable: Z-score | 55 obs. | 5 banks | R^2 within = 0.4736

Variable	Coef.	Robust Std. Err.	t	p-value	[95% Conf.	Interval]
ihh	64.798	41.454	1.56	0.193	-50.296	179.891
activos	-5.69e-11	4.36e-11	-1.30	0.262	-1.78e-10	6.42e-11
cosfond	-92.842	14.791	-6.28	0.003***	-133.908	-51.775
var_pib	0.054	0.024	2.31	0.082*	-0.011	0.120
tib	0.705	0.060	11.79	0.000***	0.539	0.872
_cons	2.299	1.337	1.72	0.161	-1.413	6.012
Observations: 55		**R^2 (within): 0.4736**		Groups: 5 banks | FE clustered by bank		

*Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors clustered by bank.*
Source: Stata output.

The HHI coefficient is positive but not statistically significant (β = 64.798, p = 0.193), providing no support for either the concentration-stability or concentration-fragility hypothesis in Portugal. Funding costs remain the most negative significant predictor (β = −92.842, p < 0.01), and the interbank rate reaches its highest significance level across all specifications (β = 0.705, p < 0.000). The R^2 within of 0.474 is the highest among the Portuguese models, yet this explanatory power is driven entirely by financial and macroeconomic controls rather than by market structure variables.

4.5. Discussion of Findings

The econometric results provide a nuanced perspective on the relationship between market structure and financial stability, revealing important differences between Colombia and Portugal.

For Colombia, the results provide empirical support for the concentration-fragility hypothesis. The HHI is negative and statistically significant across specifications (Model 2: $\beta = -16.024$, $p = 0.019$; Model 3: $\beta = -33.781$, $p = 0.074$), indicating that higher sector-wide concentration is associated with lower financial stability. Additionally, in the full model, the Lerner Index is positive and highly significant ($\beta = 3.070$, $p = 0.002$), suggesting that individual market power acts as a stabilising buffer even when concentration increases systemic risk. This dual result — fragility at the market level, stability at the institutional level — is consistent with the charter value hypothesis (Keeley, 1990) and highlights the importance of distinguishing between structural concentration and individual pricing power.

For Portugal, none of the market structure variables are statistically significant across any specification, indicating that competition and concentration do not drive financial stability in this context. Instead, funding costs (cosfond) are consistently negative and significant, while the interbank interest rate (tib) is positive and highly significant across all three models ($p < 0.001$), suggesting that Portuguese bank stability is primarily shaped by the broader monetary environment rather than domestic market structure.

Overall, the findings confirm that the relationship between market structure and financial stability is context-dependent. In an emerging market like Colombia, competitive dynamics and concentration exert measurable effects on solvency. In a developed, ECB-regulated system like Portugal, macroeconomic and financial conditions dominate, rendering market structure secondary.

5. Conclusions, Policy Implications, and Limitations

5.1. Conclusions

This research examined the relationship between banking concentration, competition, and financial stability in Colombia and Portugal from 2014 to 2024 using a Fixed Effects panel model.

The results reveal a clear divergence between both countries. In Colombia, market concentration plays a significant role in explaining financial stability, with higher

concentration associated with lower stability, supporting the concentration-fragility hypothesis. In contrast, no statistically significant relationship between market structure and stability is found for Portugal.

These findings suggest that financial stability is shaped by different factors depending on the economic and institutional context. A particularly notable finding for Portugal is the dominant role of the interbank interest rate (tib), which is positive and highly significant across all three model specifications ($p < 0.001$). This suggests that in the Portuguese context, systemic stability is more closely tied to the broader monetary environment — specifically, the ECB rate cycle — than to domestic market structure. Similarly, funding costs (cosfond) exert a consistently negative and significant effect, indicating that liability-side pressures remain a primary vulnerability for Portuguese banks, irrespective of their competitive position.

5.2. Policy Implications

The findings offer critical insights for financial regulators in emerging and developed economies:

Nuanced Regulation: Regulators should not focus solely on limiting concentration (HHI) but should also monitor individual bank profitability and pricing power. In Colombia, the evidence suggests that while sector-wide concentration can increase systemic risk, individual market power (Lerner Index) simultaneously acts as a stabilising force — implying that policies aimed at reducing margins across the board could inadvertently erode the solvency buffers of well-capitalised institutions. In Portugal, stability appears more closely tied to funding conditions and the interest rate environment than to market structure, suggesting that macroprudential tools calibrated to the ECB rate cycle are more relevant than concentration limits.

Promoting Contestability: In markets like Colombia, policies that lower entry barriers and encourage competition can improve systemic health without necessarily increasing fragility, provided the supervision remains rigorous.

Macro-Prudential Coordination: Given the significant impact of GDP growth on the Z-score in both nations, stability policies must be synchronized with macroeconomic cycles to prevent pro-cyclical risk-taking.

5.3. Limitations of the Study

Despite the robustness of the Fixed Effects model, several limitations must be acknowledged: The study focused on five major banks per country. While these represent the majority of market share, the exclusion of smaller, specialized niche banks may limit the generalizability of the findings to the entire credit ecosystem. The use of annual data may smooth over short-term liquidity shocks or intraday volatility that occurred during the 2023 banking turmoil or the height of the COVID-19 pandemic. Finally, while the Z-score is a standard measure of stability, it relies on accounting data which may not always capture the real-time market sentiment or "shadow banking" risks.

Future academic inquiries could expand upon this work by analysing how the entry of Neobanks and Fintechs in Colombia and Portugal affect the Lerner Index and traditional bank stability. Future research could also incorporate a larger set of EU and Latin American countries to test whether the divergent relationship between market structure and stability observed here holds across broader geographic regions.

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