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Bank Competition in India: Empirical analysis using Price and Efficiency channel

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Abstract

This paper examines the relationship between bank competition and credit risk in India using two non-structural measures of competitions which are the Lerner Index and the Boone Indicator. The analysis is conducted using an unbalanced panel of 38 scheduled commercial banks covering the period from 2004-05 to 2024-25. Two-way fixed effects, two-step GMM and a difference-in-difference empirical methodology have been used in this study. After controlling for endogeneity and dynamic persistence, neither of the competition measures provides robust evidence for the occurrence of NPA accumulation. However, efficiency-based competition significantly lowers NPAs within ownership sub-groups, indicating that the competition–risk relationship is moderated by bank ownership. Sub-period analysis reveals divergence in the pre-GFC period, weakening during the NPA crisis and COVID disruption, and convergence following consolidation. Post-merger effects operate primarily through the efficiency channel, suggesting that PSB consolidation improved scale economies without strengthening competitive discipline. Across specifications, asset quality is consistently driven by profitability and bank size. The study contributes by jointly evaluating price and efficiency-based competition measures, highlighting their differential effects in an emerging economy context. The findings suggest that at polict level, regulators should prioritise efficiency-enhancing competition and carefully assess the risks associated with consolidation policies.

Keywords: *Bank Competition, Lerner Index, Boone Indicator, Trans log Cost Function, Indian Banking, NPA Crisis.*

JEL Classification: *G21, G28, D40, L11*

1. Introduction

Economists have been trying to untangle the relationship between market structure and competitive conduct since the pioneering contributions of Mason (1939) and Bain (1951). This relationship is especially important in banking, where Berger et al. (1999) showed that competitive conditions differ fundamentally from those in other industries, because banks simultaneously produce credit, bear systemic risk, and transmit monetary policy. This research is in the context of the "competition-stability" vs. "competition-fragility" debate. The paper intends to answer the question of whether greater bank market power (lower competition) or higher bank efficiency (higher competition) reallocates the credit risk in the banking system. Specifically, this study tests whether pricing-based market power (captured by the Lerner Index) and efficiency-based competition (captured by the Boone Indicator) significantly determine non-performing asset accumulation in Indian scheduled commercial banks. This study also tests whether these competition effects vary across economic cycles and ownership groups.

Banking competition shapes pricing behaviour, risk-taking incentives and credit allocation in ways that reach far beyond individual firm performance and to the macroeconomy as a whole (Beck et al., 2013; Vives, 2019). The findings of Allen and Gale (2004) indicate that an increase in bank concentration can lead to an increase in financial system fragility. Meanwhile, Keeley (1990) notes that banks' loss of market power will cause them to take excessive risks. Together, these studies suggest that the competitive environment of banking is an active determinant of financial stability and not a mere background condition. Boyd and De Nicolo (2005) showed that the picture is more complicated, wherein competition strengthens bank solvency by reducing loan rates and improving borrower repayment capacity. This finding is also shown in a multi-country setting by Schaeck et al. (2009). In the

Indian context, this debate takes on particular urgency given the unprecedented accumulation of non-performing assets during the period 2015-2019, when the RBI Asset Quality Review forced banks to recognise legacy bad loans, raising the system-level net NPA ratio to historic highs and exposing the fragility embedded in a banking system characterised by weak competitive discipline and governance constraints. Consequently, the interplay between bank competition, market power, and financial stability remains a critical area of inquiry, with implications for regulatory policy and economic resilience (Trad, 2023). Specifically, the relationship between bank competition and credit pricing mechanisms, often referred to as the price channel, is a foundational element in understanding how market structure influences economic outcomes (Huynh, 2023).

In emerging economies, like India, these relationships are additionally complicated by the interaction of structural transformation, regulatory intervention and heterogeneity of ownership with competitive dynamics in ways that are not fully accounted for by models of developed economies (Claessens & Laeven, 2004). India is perhaps the most instructive example in this regard, due to the co-existence of a dominant public sector bank along with private sector banks (Rakshit & Bardhan, 2019). Understanding competition within this environment is not a trivial issue, since the same shapes the credit policy that offers relief to thousands of marginalised people in India and low- and middle-income countries (Prasad & Ghosh, 2007). Indeed, the influence of banking competition extends to crucial aspects of economic welfare, including the cost of credit and accessibility to financial services for individuals and small businesses (Adhamovna, 2016). The recent policy-driven consolidation of public sector banks, which resulted in the reduction of Government-owned banks from 27 to 12 through a series of mergers between 2017 and 2021, has further reshaped the competitive landscape, raising important questions about whether consolidation strengthens or weakens competitive discipline and its implications for credit risk. The Indian banking sector, having undergone significant reforms including nationalisation, deregulation, and consolidation, presents a unique case study for examining the intricate connections between market structure, competition, and financial stability (Bishnoi & Mallik, 2024). Against this backdrop, this study examines whether bank competition measured through both the pricing channel (Lerner Index) and the efficiency channel (Boone Indicator) determines credit risk accumulation in Indian scheduled commercial banks, and whether this relationship is moderated by economic cycles and ownership structure.

It is worth mentioning that competition in banking can never be seen directly. It must be inferred from market behaviour by suitable empirical measures. The dominant approach in the modern literature is the non-structural method, which deduces competitive behaviour from pricing and cost behaviour (efficiency) rather than from proxies of market structure such as concentration ratios. Within the non-structural tradition, two measures have come to particular prominence: the first one is the Lerner Index (LI) (Lerner, 1934), and the second one is the Boone Indicator (BI) (Boone, 2008). One of the indicators, which is the Lerner Index, is a direct measure of pricing power. Conversely, the Boone indicator is a more sophisticated metric that gauges the extent to which efficient firms gain market share at the expense of less efficient ones (Bishnoi & Mallik, 2024). This study employs both measures simultaneously to test four hypotheses: whether each competition channel independently affects NPA accumulation, whether the effects of both measures differ across economic cycles, and whether public and private sector banks exhibit structurally different competitive behaviour as captured by both indices.

This paper specifically applies these indices to a robust panel dataset of banks in India to provide insights into how competition has evolved, particularly in response to various policy changes and economic fluctuations. Despite the theoretical complementarity of these two measures, they have rarely been used and directly compared in the same study on Indian banking. There are a few existing Indian studies, that usually use one measure or the other, leaving open the question of whether they tell a consistent story, where they differ, and what more the joint application offers. This paper fills that gap.

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This study draws on data from 38 Indian commercial banks, which represent over 90% of total banking assets, to calculate the Lerner Index and Boone Indicator from an annual panel dataset covering 2004 to 2025. We compute annual bank-level values for both indices and compare them across major economic cycles, shedding light on competitive dynamics amid structural reforms and consolidations. Annual trend lines for each measure visualise competitive dynamics across six economic phases. The economic phases outlined in the paper move from the pre-GFC to the NPA crisis, PSB consolidation, COVID-19 disruption, and post-COVID normalisation. Four hypotheses are tested using Two-Way Fixed Effects regression and two-step System GMM estimation with Windmeijer-corrected standard errors, and a Difference-in-Differences framework is applied to identify the causal effect of PSB consolidation on competition.

The paper is organised as follows. Section 2 reviews the theoretical foundations, and Section 3 outlines the literature review. Section 4 presents research objectives and hypotheses emerging from the literature review. Section 5 briefs out the data and empirical methodology. Section 6 presents results and analysis, followed by robustness checks in Section 7. Section 8 discusses the results, followed by a conclusion and policy implications in Section 9. Section 10 provides the limitations of this research.

2. Theoretical Background

Lerner Index

The Lerner Index, introduced by Lerner (1934), is a static measure of monopoly power, defined as the proportional gap between price and marginal cost. In a perfectly competitive market, price equals marginal cost, yielding the value of the index as zero. Conversely, a pure monopolist maximises profit where this gap is greatest, giving a value close to 1. For banking applications, the output price is typically proxied by total revenue per unit of total assets, while marginal cost is derived from an estimated cost function. Berger et al. (2009) formalised the application of the Lerner Index to banking using a trans-log cost function estimated on a cross-country panel. This approach has since become standard, with numerous studies applying Lerner-based competition measures to banking systems in Asia, Europe, Latin America, and Africa (Trad, 2023). In the Indian context, Prasad and Ghosh (2007) documented monopolistic competition using related approaches, while Rakshit and Bardhan (2019) applied the Lerner Index specifically and found that competition in Indian banking increased after 2010, but the same is still below international benchmarks.

An important strength of the Lerner Index is the bank-level and time-specific nature of the index. Since it is calculated based on cost and revenue data of individual banks, it reflects the differences in pricing power of banks over time. This makes it possible to capture firm-level heterogeneity that aggregate measures such as concentration ratios miss. However, it is concerned only with price-cost margins and thus measures competition based mainly on pricing behaviour. As a result, it may not capture other dimensions of competition that are important, particularly those involving efficiency improvements, innovation or cost advantages rather than direct pricing strategies.

Boone Indicator

Another indicator used in the paper is the Boone Indicator. The Boone Indicator, in contrast, assesses competition by examining the sensitivity of a firm's profits or market share to its marginal costs, thereby reflecting the extent to which more efficient firms expand at the expense of less efficient ones (Delis, 2010; Kotz & Schäfer, 2018). The Boone Indicator, introduced by Boone (2008), addresses the efficiency limitations of the Lerner Index. Building on the theoretical model of Vickers (1995) and Boone et al. (2005). Boone showed that in a more competitive market, profits are reallocated more aggressively from inefficient to efficient firms. Formally, the Boone Indicator is estimated from the regression equation, which is :

$$\ln(\pi_i) = \alpha + \beta \ln(MC_i) + \varepsilon_i \quad (1)$$

where π is profit and MC is marginal cost. A more negative β means that a given improvement in efficiency translates into a larger profit gain, signalling that the market is more competitive. van Leuvensteijn et al. (2011) introduced the Boone Indicator to the banking literature through an application to European banks, finding wide cross-

country variation in competitive intensity. Schaeck and Cihak (2014) used the Boone Indicator to examine competition-efficiency links in a multi-country panel. For India, systematic application of the Boone Indicator is rare, making this study among the first comprehensive applications.

The Boone Indicator's advantage is its ability to capture competitive dynamics through the efficiency channel. It detects the market discipline even when price margins are compressed by factors other than competition (such as regulation or risk). Its limitation is its sensitivity to the profit measure chosen and potential conflation of efficiency differences with product differentiation. But the product differentiation in the bank is almost negligible.

Comparison between the Boone Indicator and the Lerner Index

Several studies have provided comparative evaluations of non-structural competition measures, particularly the Lerner Index(LI) and Boone Indicator (BI). Bikker and Bos (2008) provided a comprehensive evaluation of non-structural competition measures and found that the Lerner Index and Boone Indicator are generally consistent in sign, but they measure genuinely different aspects of competition. Delis (2010) elaborates on these differences, noting that while the LI primarily captures profit-maximising pricing behaviour, the BI more comprehensively accounts for shifts in banks' objectives toward efficiency and product substitutability. This makes the BI particularly sensitive to efficiency-driven competition dynamics.LI and BI can yield divergent competition assessments across countries, such as high competition per LI but low per BI in Finland, attributing this to LI's focus on pricing power versus BI's emphasis on cost efficiency (Kotz & Schäfer, 2018). These comparisons underscore the complementarity of LI and BI. LI excels in measuring markup power, while BI captures relative efficiency pressures, together offering nuanced insights into banking competition.

3. Literature Review

Literature review indicated that various previous approaches to measure bank competition using the concentration ratio was given up after the global financial crisis, since the same was not able to capture the complexity of competition in a heterogeneous banking system. One of the earliest measurements of competition was done by Misra (2003), which further laid the foundation for subsequent India-specific empirical analysis. Arrawatia et al. (2019) introduced a risk-adjusted Lerner Index for the Indian banking sector covering the period of 1996 to 2016, which accounts for non-performing assets. Li et al. (2019) applied a panel data approach across ownership categories and confirmed that private sector banks and larger institutions demonstrated higher competition than public sector banks. The early contributions analysis was made using the Lerner Index as an autonomous measure and pricing power as the sole means through which competition could be understood. At the same time, the limitation of the Lerner Index was identified, which is that it is not capable of indicating whether competitive pressure is leading to an improvement in the efficiency of the firm. Whereas the Boone Indicator is able to detect the transfer of profit from an inefficient firm to an efficient firm during the competition.

Rakshit and Bardhan (2022) looked at how and why the use of different competition indicators led to varying findings. They used the Lerner Index and the Boone Indicator alongside stochastic frontier efficiency scores. They found that while the Indian system showed competition, more competition led to lower profitability through interest margin compression. Public sector banks were found to be more responsive to competition than private ones. Rakshit (2022) has found that intense competition has reduced the profitability of banks in India due to competitive pressure.

Rahman and Misra (2021) used network parameters to examine the evolution of bank competition in India during different economic phases from 2008 to 2019. Poddar et al. (2023)

has extended the network methodology approach to examine the linkage between bank competition, liquidity and loan pricing for 33 banks in India from 2010 to 2020. Srivastava et al. (2023) have used both the Lerner Index and the Boone Indicator with system GMM and have found that government-

owned banks take higher risk during high competition due to implicit sovereign guarantees. Bishnoi and Mallik (2024) have used the Lerner Index, Panzar-Rosse statistic, and Boone Indicator on an unbalanced panel from 1995 to 2021 and found that the 2019 to 2020 government-led merger and consolidation have increased the heterogeneity in the Indian Banking system.

The above literature reveals two important gaps, and individual studies have used the Lerner Index or the Boone Indicator, or used both as robustness checks in a single hypothesis test. However, none has systematically compared the two, as the main focus of analysis, looking at where they converge, where they diverge, and what they uniquely reveal about competitive dynamics in Indian banking. Moreover, studies to date have not jointly extended both measures across the entire post-reform period through 2021-2025, meaning that the competitive consequences of the Indian Bankruptcy Code, the mega-mergers of government-owned banks, and the post-COVID recovery remain largely untested by dual-measure analysis. The current study intends to directly tackle these two gaps.

4. Research Objective and Hypotheses

The study primarily focuses on five research questions. The first one will examine the level and time series evolution of competition in Indian banks from 2004-05 to 2024-25 using the Lerner Index on public sector banks versus private sector banks. Next, it evaluates the Boone Indicator, which captures efficiency-based competitive dynamics, and investigates how far the two indicators are aligned with or divergent. Also, it examines whether these two measures reflect different angles of competition or overlap with each other during various economic cycles from 2005 to 2025. Also, it analyses the impact of competition on non-performing assets (NPAs). It then investigates whether ownership structure alters this relationship, particularly whether public sector banks have systematically different competition NPA dynamics compared to private banks.

Hypotheses

The study focuses on four (4) hypothesis, which explores Bank Competition and NPAs. When banks enjoy greater market power, they charge higher loan rates, which increases borrowers' debt burdens and raises the probability of default, leading to higher NPAs (Keeley, 1990; Hellmann et al., 2000). Conversely, under the competition-stability view, more competitive banks (lower Lerner) may also accumulate NPAs through riskier lending to compensate for compressed margins (Boyd & De Nicolo, 2005). The direction is therefore an empirical question that this study will try to resolve.

H_{10}: Lerner Index has no effect on NPAs.

H_{1A}: Higher market power increases NPAs via the margin-protection fragility channel.

Whereas the Boone indicator captures the competition through the efficiency channel. Therefore, when the competition is strong in the efficiency sense, more efficient banks gain market share and profits, while inefficient banks, which tend to carry poorer loan portfolios, may lose market share. This approach should reduce aggregate NPA accumulation over time (Boone, 2008; Rakshit & Bardhan, 2022). In order to test the efficiency of the reallocation channel that drives the competition and NPA relationship in Indian banking, we propose the following hypothesis.

H_{20}: Boone Indicator has no effect on NPAs.

H_{2A}: More negative Boone reduces NPAs via the efficiency-quality channel.

In times of banking stress like the crisis of 2015-2018, during the NPA crisis, and the crisis caused by COVID-19 in 2020-2021, the two measures might act differently due to differing forces of pricing behaviour and efficiency sorting in a downturn. When they deviate at certain phases of the economy, they are, in fact, complementary, and each of them is required to have a fully-fledged characterisation of Indian banking competition. So the present hypothesis is as follows :

H_{30}: Lerner and Boone show no cyclical differences.

H_{3A}: Lerner and Boone differ across cycles, capturing distinct competition dimensions

In India, Public Sector Banks (PSBs) enjoy implicit sovereign guarantees, government-based lending requirements, and preferential access to government

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and institutional deposits, all of which cushion them against the regular competitive forces in the private sector (Li et al., 2019; Srivastava et al., 2023). The PSB mega-mergers of 2019-2020 that narrowed down on the number of public sector banks to 12 banks further centralised market power to those remaining, which might further increase the competitive gap between PSBs and the private banks in the post-consolidation era (Bishnoi & Mallik, 2024). This hypothesis tests whether ownership-based divergence is statistically significant in both the measures of competition as well as throughout the entire panel of 21 years.

H_{40}: There is no competition difference between PSBs and private banks.

H_{4A}: PSBs show higher market power and weaker efficiency, implying lower competition than private banks.

5. Data and Methodology

(a) Data

Our sample includes 38 commercial banks in operation in India between the period of 2004-05 to 2024-25, resulting in 751 active years of banks after elimination of the years that the banks had ended independent operations because of mergers or shutdowns. There are 21 PSBs, 12 new banks in the private sector, and 5 banks in the old sector, which makes more than 95 per cent of all scheduled commercial bank assets. Data on the financial aspects are obtained through the Statistical Tables Relating to Banks in India of the Reserve Bank of India and the RBI Database on Indian Economy (DBIE), both of which are publicly accessible on the RBI.

Seven variables have been used for the measurement of competition. These are Total Advances- the main output proxy; Total Deposits- used to calculate price of funds; Interest Expense; Staff Expenses; Other Operating Expenses; and Fixed Assets used as the denominator in input prices; and Operating Profit. All the variables are on the scale of Indian Rupees (crore).

(b) Methodology

Both the Lerner Index and the Boone Indicator are constructed using marginal cost estimates obtained from a trans-log cost function. We have used the specifications used by Berger et al. (2009) and van Leuvensteijn et al. (2011). The equation is:

$$\ln\left(\frac{TC_{it}}{P_{3,it}}\right) = \alpha_0 + \alpha_1 \ln Q_{it} + \alpha_2 \ln \tilde{P}_{1,it} + \alpha_3 \ln \tilde{P}_{2,it} + \frac{1}{2}\beta_{11}(\ln Q_{it})^2 + \frac{1}{2}\beta_{22}(\ln \tilde{P}_{1,it})^2 + \frac{1}{2}\beta_{33}(\ln \tilde{P}_{2,it})^2 + \beta_{12} \ln Q_{it} \ln \tilde{P}_{1,it} + \beta_{13} \ln Q_{it} \ln \tilde{P}_{2,it} + \beta_{23} \ln \tilde{P}_{1,it} \ln \tilde{P}_{2,it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (2)$$

where:

- TC_{it}: total cost
- Q_{it}: total advances (output)
- $\tilde{P}_{1,it} = \frac{P_{1,it}}{P_{3,it}}$ (normalised price of labour)
- $\tilde{P}_{2,it} = \frac{P_{2,it}}{P_{3,it}}$ (normalised price of funds)
- $P_{3,it}$: price of physical capital (other operating expenses / fixed assets)
- μ_i: bank fixed effects
- λ_t: year fixed effects

Normalization by P_3 ensures linear homogeneity in input prices.

Marginal cost is obtained analytically as:

$$MC_{it} = \frac{TC_{it}}{Q_{it}} \times \left[\alpha_1 + \beta_{11} \ln Q_{it} + \beta_{12} \ln \tilde{P}_{1,it} + \beta_{13} \ln \tilde{P}_{2,it}\right] \quad (3)$$

All 751 bank-year observations yield positive marginal cost estimates, satisfying regularity conditions of the translog specification.

The Lerner Index is defined as:

$$LI_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \quad (4)$$

where output price is:

$$P_{it} = \frac{\text{Total Revenue}_{it}}{\text{Total Assets}_{it}} \quad (5)$$

Values close to zero indicate competitive pricing, while values approaching one reflect higher market power.

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The Boone Indicator is estimated using both cross-sectional and panel approaches, using Year-wise Cross-Sectional OLS to yield the equation as

$$\ln\left(\frac{\pi_{it}}{Q_{it}}\right) = \alpha_t + \beta_t \ln(MC_{it}) + \varepsilon_{it} \quad (6)$$

Panel two-way fixed effect yields the equations as

$$\ln\left(\frac{\pi_{it}}{Q_{it}}\right) = \mu_i + \lambda_t + \beta \ln(MC_{it}) + \varepsilon_{it} \quad (7)$$

where π_{it}/Q_{it}represents profit per unit of advances.

For bank-level dynamics, a five-year rolling window OLS is employed to obtain time-varying Boone coefficients for each bank, facilitating heatmap visualisation of competitive intensity.

In order to empirically test the relationship between bank competition and asset quality through the pricing channel, the Lerner Index serves as the proxy. We have used a baseline two-way fixed effects model to control for unobserved bank-specific and time-specific heterogeneity. However, given potential endogeneity arising from reverse causality and persistence in NPAs, a dynamic specification using the System GMM estimator is also applied.

Baseline Two-Way Fixed Effects Model

$$NPA_{it} = \alpha_i + \lambda_t + \beta_1 LI_{it-1} + \beta_2 BankSize_{it} + \beta_3 CAR_{it} + \beta_4 ROA_{it} + \beta_5 LoanGrowth_{it} + \varepsilon_{it} \quad (8)$$

System GMM (Endogeneity-Corrected Dynamic Model)

$$NPA_{it} = \alpha + \rho NPA_{it-1} + \beta_1 LI_{it-1} + \beta_2 BankSize_{it} + \beta_3 CAR_{it} + \beta_4 ROA_{it} + \beta_5 LoanGrowth_{it} + \mu_i + \varepsilon_{it} \quad (9)$$

In order to test the second hypothesis, which examines the competition from the efficiency reallocation channel, this study will use the Boone Indicator(BI). This indicator reflects that if competition is increasing, then the more efficient firm gains the market share. So a negative value of the BI indicates stronger competition, since inefficient banks lose their market share more severely. This study uses two-way fixed effects models since the same controls for unobserved heterogeneity across banks and time. In order to account for the possible endogeneity of NPAs with other variables, a dynamic panel model using the System GMM is also estimated.

Baseline Two-Way FE Model

$$NPA_{it} = \alpha_i + \lambda_t + \gamma_1 BI_{it-1} + \gamma_2 BankSize_{it} + \gamma_3 CAR_{it} + \gamma_4 ROA_{it} + \gamma_5 LoanGrowth_{it} + \varepsilon_{it} \quad (10)$$

System GMM (Endogeneity-Corrected Dynamic Model)

$$NPA_{it} = \alpha + \rho NPA_{it-1} + \gamma_1 BI_{it-1} + \gamma_2 BankSize_{it} + \gamma_3 CAR_{it} + \gamma_4 ROA_{it} + \gamma_5 LoanGrowth_{it} + \mu_i + \varepsilon_{it} \quad (11)$$

ROA Mediation equation*:*

$$NPA_{it} = \alpha_i + \lambda_t + \gamma_1 BI_{it-1} + \gamma_2 BankSize_{it} + \gamma_3 CAR_{it} + \gamma_5 LoanGrowth_{it} + \varepsilon_{it} \quad (12)$$

Hypothesis 3 examines whether the Lerner Index (pricing power channel) and the Boone Indicator (efficiency reallocation channel) jointly or differentially influence bank asset quality across economic cycles. Also, in this hypothesis, we will be testing whether these measures are convergent or complementary. The study has employed a joint estimation test, crisis interactions and a sub-period structural test to evaluate whether competition–stability dynamics vary systematically across normal and stress periods.

$$NPA_{it} = \alpha_i + \lambda_t + \delta_1 LI_{it-1} + \delta_2 BI_{it-1} + \delta_3 BankSize_{it} + \delta_4 CAR_{it} + \delta_5 ROA_{it} + \delta_6 LoanGrowth_{it} + \varepsilon_{it} \quad (13)$$

Cycle Interaction Model

$$NPA_{it} = \alpha_i + \lambda_t + \delta_1 LI_{it-1} + \delta_2 BI_{it-1} + \delta_3 (LI_{it-1} \times Crisis_t) + \delta_4 (BI_{it-1} \times Crisis_t) + \delta_5 BankSize_{it} + \delta_6 CAR_{it} + \delta_7 ROA_{it} + \delta_8 LoanGrowth_{it} + \varepsilon_{it} \quad (14)$$

Sub-Period Test

Phase 1 (Pre-GFC): $NPA_{it} = \alpha_i + \delta_1^{P1} LI_{it-1} + \delta_2^{P1} BI_{it-1} + \delta_k X_{it} + \varepsilon_{it}$ (15)

Phase 2 (AQR): $NPA_{it} = \alpha_i + \delta_1^{P2} LI_{it-1} + \delta_2^{P2} BI_{it-1} + \delta_k X_{it} + \varepsilon_{it}$ (16)

Phase 3 (Covid-19): $NPA_{it} = \alpha_i + \delta_1^{P3} LI_{it-1} + \delta_2^{P3} BI_{it-1} + \delta_k X_{it} + \varepsilon_{it}$ (17)

Phase 4 (Post Covid): $NPA_{it} = \alpha_i + \delta_1^{P4} LI_{it-1} + \delta_2^{P4} BI_{it-1} + \delta_k X_{it} + \varepsilon_{it}$ (18)

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Where X_{it} It is a set of control vectors that is used in the study to isolate the competition and NPA relationship from the specification bias. It includes Bank Size, which captures the economies of scale and diversification benefits that decrease the risk in the banks. CAR, which reflects the regulators' defined capital buffers and ROA to control for profitability, mediates the transmission of competition to the asset quality, which is NPA here. The four phases of the economic cycle are defined as Phase 1 from 2004 to 2008, which captures the pre-GFC liberalisation and credit boom period. Phase 2 is from 2015 to 2019, which reflects the Reserve Bank of India Asset Quality Review period. Phase 3 is from 2019 to 2022, which covers PSB consolidation and COVID-19 disruption, and Phase 4 is from 2022 to 2025, which represents the post-pandemic normalisation period.

The study evaluates whether public sector banks exhibit higher pricing power and a weaker efficiency reallocation channel compared to private banks due to the sovereign default guarantees (4th hypothesis). The same is evaluated using a difference-in-differences framework, which captures the shifts in competition dynamics through both pricing channel (Lerner) and efficiency channel (Boone) measures.

$$LI_{it} = \alpha_i + \lambda_t + \phi_1 PSB_i + \phi_2 Post_t + \phi_3 (PSB_i \times Post_t) + \phi_4 BankSize_{it} + \phi_5 CAR_{it} + \phi_6 ROA_{it} + \phi_7 LoanGrowth_{it} + \varepsilon_{it} \quad (19)$$

$$BI_{it} = \alpha_i + \lambda_t + \psi_1 PSB_i + \psi_2 Post_t + \psi_3 (PSB_i \times Post_t) + \psi_4 BankSize_{it} + \psi_5 CAR_{it} + \psi_6 ROA_{it} + \psi_7 LoanGrowth_{it} + \varepsilon_{it} \quad (20)$$

Bank ownership dummy is 1 for a public sector-owned bank, and it is 0 for a private sector bank.

6. Results and analysis

Descriptive Analysis

The descriptive statistics in Table 1 describe significant heterogeneity across the Indian banks. The variables that are related to bank size, such as advances, deposits and assets, show high means and extreme positive skewness. The same reflect the dominance of a few large banks in the Indian banking system. Non-performing assets (NPA) ratios also indicate high skewness, indicating that stress is concentrated in a certain few banks. Competition measures (Lerner and Boone) are relatively stable with negative skewness. Profitability (ROA) is negatively skewed, suggesting downside risks. Capital adequacy and loan growth indicate large dispersion, indicating variability across the financial strength and expansion strategy.

Table 1: Descriptive Statistics

Variable	N	Mean	Std Dev	Min	Max	Skewness
Total Advances (₹ Crore)	751	196892.6	390529	423.7545	4163312	5.2606
Total Deposits (₹ Crore)	751	260429.5	508316	663.0345	5382190	5.4322
Total Assets (₹ Crore)	751	326569.9	643607.5	869.7974	6676053	5.3549
Net NPA (₹ Crore)	751	4327.461	8634.121	0	110854.7	4.9754
Net Advances (₹ Crore)	751	192714.3	384430.3	404.7521	4123634	5.3123
NPA Ratio (%)	751	2.4111	2.6908	0	18.4232	2.3022
Lerner Index	751	0.415	0.0562	0.194	0.573	-0.339
Boone Indicator (−lnMC)	751	2.478	0.1743	1.8606	3.0642	-0.3198
Capital Adequacy Ratio (%)	751	14.0225	3.8717	1.12	56.41	3.9213
Return on Assets (%)	751	0.5495	0.9718	-6.3678	2.3716	-2.4197
Bank Size (ln (Tot Assets)	751	11.6803	1.5158	6.7683	15.714	-0.2924
Loan Growth (%)	713	17.5258	18.0866	-31.2157	216.3152	3.1467

*Author's Calculation

The correlation matrix is shown in Table 2. Both the competition measures (Lerner and Boone) are positively correlated, indicating similarity across the measurement level. Competition, CAR, ROA, and loan growth is negatively correlated with NPA, the same suggest better asset quality with stronger performance. Competition and loan growth ROA

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show a strong positive association. Bank size is moderately related to competition but weakly associated with profitability and capital.

Table 2: Correlation Matrix

Variable	Lerner Index	Boone Indicator	NPA Ratio	CAR	ROA	Bank Size	Loan Growth
Lerner Index	1.000						
Boone Indicator	0.5961	1.000					
NPA Ratio	-0.3271	-0.2864	1.000				
CAR	0.3778	0.2713	-0.3497	1.000			
ROA	0.5534	0.384	-0.7406	0.4197	1.000		
Bank Size	0.3888	0.4721	0.1395	-0.0029	0.0053	1.000	
Loan Growth	0.2216	0.2703	-0.5143	0.1757	0.4591	-0.2315	1.000

*Author's Calculation

Table 3 provides the details of the variance inflation factor(VIF). Its values remain below 1.522, indicating no serious multicollinearity issues in the empirical model specifications. Lerner and Boone jointly remain independent despite correlation. Fixed effects absorb PSB dummy collinearity.

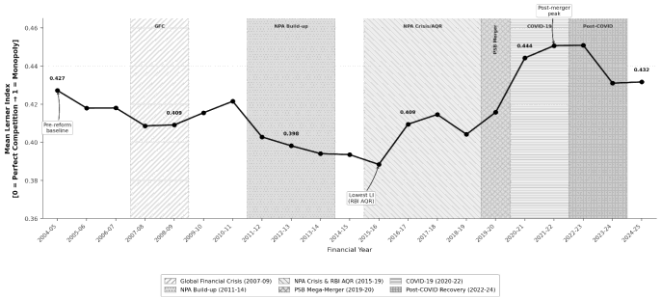
Table 3: VIF

Variable	VIF
Lerner Index (lag)	1.297
Boone Indicator (lag)	1.272
Bank Size	1.423
CAR	1.411
ROA	1.522
Loan Growth	1.251

*Author's Calculation

The translog cost function specifications are provided in Annexure 1, and the model specifications are valid. Figures 1 and 2 provide the trends of the mean Lerner Index and the Boone indicator over the period of the study. The Lerner Index value has an average value of 0.415 over the sample period, indicating moderate market power in Indian banking. The value of the same is declining from 0.427 in 2004-05 to a trough of 0.388 in 2015-16 during the NPA crisis and RBI Asset Quality Review, before recovering sharply to 0.451 by 2021-22 following the merger of a government-owned bank. The Boone Indicator followed a broadly similar trajectory, averaging 2.478, with competitive efficiency weakening during the Global Financial Crisis and value falling to 2.390 in 2008-09 and 2.386 during the NPA build-up period of 2013-14. After that, it reached the peak value of 2.678 during the post covid recovery phase.

Figure 1 : Mean Lerner Index Trend



*Authors Calculation

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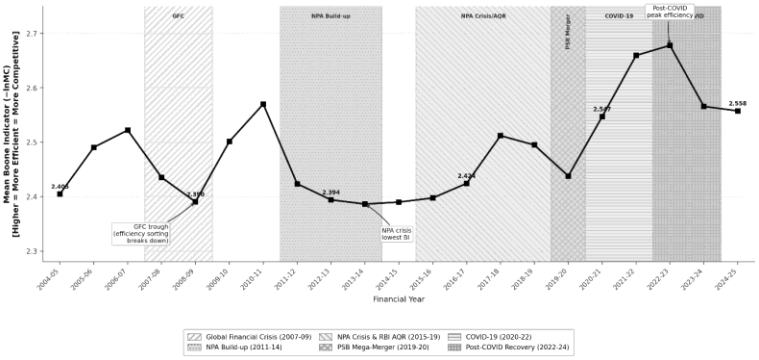
Figure 2: Mean Boone Indicator Trends



*Authors Calculation

Table 4 details the results for the first hypothesis. The result from the fixed effects model suggests that higher market power led to lower NPA, supporting the competition-fragility view in the Indian banking system. Bank Size, Return on assets (ROA) and loan growth are significantly relevant in reducing the NPA level. However, the 2-step System GMM results, which account for endogeneity and dynamic persistence, show that the impact of the Lerner Index on competition becomes statistically insignificant. This indicates that the competition effect is not robust and the same does not impact the credit risk (NPA) of the banks once dynamic adjustments are considered. The lagged NPA ratio is highly significant, confirming strong persistence in asset quality. Loan growth retains a weak negative effect, while other bank-specific controls lose significance. Model diagnostic tests support the validity of the GMM Model, with no presence of second-order autocorrelation.

Table 4 : NPA and Lerner Index

Variables	**Fixed Effects (FE)**	**System GMM**
Lagged NPA Ratio		0.8551 (0.0890)***
Lerner Index (Lag 1)	-3.4420 (1.9247)*	3.7443 (4.4183)
Bank Size (ln)	-0.8345 (0.2249)***	-0.0241 (0.0837)
CAR (%)	-0.0123 (0.0161)	-0.0647 (0.0438)
ROA (%)	-1.2153 (0.1722)***	-0.1300 (0.3239)
Loan Growth (%)	-0.0237 (0.0068)***	-0.0193 (0.0096)*
Constant	13.2901 (2.7344)***	0.3578 (1.0394)
Year Fixed Effects	Yes	Yes
Model Diagnostics		
Observations	713	713
Number of Banks	38	38
R2 (Within)	0.7353	
F-statistic	69.95	979.21
AR(1) p-value		0.009
AR(2) p-value		0.902
Hansen p-value		0.028
Sargan p-value		0
Instruments		13

*Author's Calculation, *** 1%, **5%, *10% Significance level

The first model of fixed effects shows that the Boone indicator has a negative effect on the NPA, but the model results are not significant, suggesting weak evidence that greater competition improves the asset quality (2nd hypothesis, Table 5). Further , the bank size, profitability, and loan growth significantly reduce NPAs, indicating the importance of strong internal risk management. Two-Step system GMM

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results confirm the strong persistence in the NPAs, with the lagged NPA dependent variable being highly significant. But, in this model also, the Boone indicator is not significant, which implies that efficiency-based competition does not robustly influence credit risk, since this model controls for the endogeneity. The model diagnostic confirms the validity of the instrument.

Table 5: NPA and Boone Indicator

Variables	Fixed Effects (FE)	System GMM (2-step)
Lagged NPA Ratio	—	0.8521*** (0.0931)
Boone Indicator (Lag 1)	-0.3781 (0.5346)	0.3986 (0.7840)
Bank Size (ln)	-0.8815*** (0.2681)	0.0206 (0.0847)
CAR (%)	-0.0180 (0.0192)	-0.0764 (0.0607)
ROA (%)	-1.2559*** (0.1657)	-0.1061 (0.2700)
Loan Growth (%)	-0.0225*** (0.0070)	-0.00015228
Constant	13.2722*** (2.9528)	0.4925 (1.4516)
Year Fixed Effects	Yes	Yes
Model Diagnostics		
Observations	713	713
Number of Banks	38	38
R^2 (Within)	0.7337	—
F-statistic	68.23***	1321.90***
AR(1) p-value	—	0.007
AR(2) p-value	—	0.988
Hansen Test (p-value)	—	0.008
Sargan Test (p-value)	—	0
No. of Instruments	—	13

*Author's Calculation, *** 1%, **5%, *10% Significance level

For the third hypothesis, the details of the result are shown in tables 6 and 7. The first model of fixed effect results indicates that the Lerner Index is negatively associated with NPA ratios at the 10% level. This suggests that greater market power reduces credit risk, which is consistent with the competition–fragility hypothesis. But the Boone indicator remains statistically insignificant, suggesting that efficiency-based competition does not systematically affect asset quality.

The crisis interaction model result shows that while the direct effects of competition remain insignificant, the interaction between the Lerner Index and crisis periods is negative and weakly significant, indicating that market power becomes more stabilising during stress episodes and supports the competition fragility hypothesis (Table 6). No such effect is observed for the Boone indicator. Table 7 shows the economic phase-wise results for the impact of competition on NPAs. During the pre-GFC period, the Boone indicator exhibits a negative and significant effect, suggesting that greater competition improves asset quality and supporting the competition–stability hypothesis. In contrast, the Lerner Index yields a negative coefficient, implying that higher market power reduces NPAs, consistent with the competition–fragility view. This divergence highlights the sensitivity of competition–risk relationships to the choice of competition measure. The coexistence of competition–fragility (Lerner) and competition–stability (Boone) effects reflects the multidimensional nature of banking competition in India. While pricing-based competition may compress margins and induce risk-taking, efficiency-based competition enhances screening and allocative efficiency. This divergence is consistent with the institutional structure of Indian banking and highlights that the competition–risk nexus is both measure-dependent and context-specific. During the NPA crisis and COVID phases, competition effects become unstable and insignificant for both the Lerner Index and the Boone Indicator. In the post-COVID period, both competition measures converge in their implications. The negative and significant Boone coefficient and the positive Lerner coefficient jointly indicate that increased competition reduces NPA

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ratios, providing consistent evidence in favour of the competition–stability hypothesis. Overall, the results suggest that the competition–risk relationship is both time-varying and measure-dependent, with bank-specific factors such as profitability and size consistently exerting stronger and more robust effects on NPAs. This convergence in the competition measures reflects the structural reforms in Indian banking, including large-scale bank mergers, which enhanced efficiency, improved balance sheet quality, and strengthened the transmission of competitive forces in the Indian banking system.

Table 6: NPA, Boone Indicator and Lerner Index

Variables	FE Model	Crisis Model
Lerner Index (Lag 1)	−3.343* (1.839)	−1.501 (1.920)
Boone Indicator (Lag 1)	−0.114 (0.492)	−0.210 (0.511)
Crisis Dummy	—	3.055 (3.206)
Lerner × Crisis	—	−5.648* (2.817)
Boone × Crisis	—	0.650 (1.268)
Bank Size (ln)	−0.825*** (0.234)	−0.775*** (0.226)
CAR (%)	−0.012 (0.016)	−0.006 (0.016)
ROA (%)	−1.214*** (0.173)	−1.224*** (0.176)
Loan Growth (%)	−0.024*** (0.007)	−0.023*** (0.007)
Constant	13.415*** (2.811)	12.260*** (2.423)
Year Fixed Effects	Yes	Yes
Observations	713	713
Banks	38	38
R^2 (Within)	0.735	0.738
F-statistic	69.26***	82.04***

*Author's Calculation, *** 1%, **5%, *10% Significance level

Table 7: NPA Boone Indicator and Lerner Index -Crisis Interaction

Variables	Phase 1 (2005–08)	Phase 2 (2016–19)	Phase 3 (2020–22)	Phase 4 (2023–25)
Lerner Index (Lag 1)	−3.229** (1.287)	−2.084 (6.377)	4.331 (4.411)	4.117* (2.112)
Boone Indicator (Lag 1)	−1.013*** (0.265)	1.914 (2.431)	−2.194 (1.573)	−1.807** (0.808)
Bank Size (ln)	0.548 (0.703)	−2.299* (1.289)	0.255 (0.999)	3.092*** (0.711)
CAR (%)	0.002 (0.008)	−0.067 (0.120)	−0.086 (0.200)	0.004 (0.033)
ROA (%)	−1.304*** (0.139)	−0.001 (0.315)	−0.238 (0.261)	−0.435* (0.224)
Loan Growth (%)	−0.001 (0.003)	−0.068* (0.034)	−0.005 (0.007)	−0.018*** (0.006)
Constant	0.594 (6.851)	29.760** (13.258)	5.443 (11.925)	−34.491*** (9.976)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	114	152	94	87
Banks	38	38	36	29
R^2 (Within)	0.785	0.477	0.488	0.695
F-statistic	43.06***	7.24***	12.04***	16.11***

*Author's Calculation, *** 1%, **5%, *10% Significance level

For the fourth hypothesis, the results are given in Table 8. The post-merger interaction is insignificant for the Lerner Index. This supports no meaningful change in the pricing power of government-owned banks. In contrast, the Boone specification shows a negative and significant interaction, implying that increased competition reduces NPAs, supporting the competition–stability hypothesis. This suggests that post-reform improvements in Indian banking are driven primarily by efficiency gains in government owned bank rather than pricing dynamics. Control variables such as profitability, capital adequacy, and

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bank size further reinforce improved competitive conditions.

Table 8: Post PSB Interaction

Variables	Lerner Index	Boone Indicator
Post	−0.025 (0.027)	−0.090 (0.072)
PSB × Post	−0.004 (0.013)	−0.101*** (0.025)
Bank Size (ln)	0.008 (0.008)	0.077*** (0.028)
CAR (%)	0.002 (0.001)	0.008*** (0.001)
ROA (%)	0.024*** (0.006)	0.051*** (0.012)
Loan Growth (%)	0.0001 (0.0001)	0.003*** (0.0003)
Constant	0.299*** (0.081)	1.477*** (0.304)
Year Fixed Effects	Yes	Yes
Observations	713	713
Banks	38	38
R^2 (Within)	0.43	0.674
F-statistic	27.99***	128.99***

*Author's Calculation, *** 1%, **5%, *10% Significance level

7. Robustness Check

Robustness estimates using a winsorized NPA ratio to mitigate the influence of extreme observations during crisis periods is highlighted in Table 8. The Lerner Index remains negative and marginally significant, consistent with the baseline two-way fixed effects results of first hypothesis. In contrast, the Boone Indicator continues to be statistically insignificant. These findings confirm that the main results are robust to outlier adjustment and are not driven by extreme NPA observations. Further, it also shows that longer lag structures of LI and BI do not materially alter results. The Lerner Index remains insignificant, while the Boone Indicator shows weak effects. The overall conclusion that competition measures do not robustly determine NPA or credit risk remain valid.

Table 9: Robustness Check Hypothesis 1st and 2nd

	Winsorized NPA		Lag 2 Competition	
Variables	**H1: Lerner**	**H2: Boone**	**H1: Lerner**	**H2: Boone**
Lerner Index (Lag 1)	−3.214* (1.848)	—	—	—
Boone Indicator (Lag 1)	—	−0.254 (0.534)	—	—
Lerner Index (Lag 2)	—	—	−1.539 (2.262)	—
Boone Indicator (Lag 2)	—	—	—	1.096* (0.578)
Bank Size (ln)	−0.812*** (0.214)	−0.866*** (0.253)	−0.844*** (0.239)	−1.049*** (0.228)
CAR (%)	−0.011 (0.015)	−0.017 (0.018)	−0.018 (0.018)	−0.028 (0.020)
ROA (%)	−1.167*** (0.154)	−1.207*** (0.148)	−1.222*** (0.184)	−1.228*** (0.183)
Loan Growth (%)	−0.023*** (0.006)	−0.022*** (0.007)	−0.028*** (0.008)	−0.029*** (0.007)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	713	713	675	675
Banks	38	38	38	38
R^2 (Within)	0.755	0.754	0.733	0.735
F-statistic	74.45***	67.60***	56.77***	46.36***

*Author's Calculation, *** 1%, **5%, *10% Significance level

Table 9 details the sub-sample estimates by ownership, which is used as a second level of robustness check for the first two hypotheses. LI remains statistically insignificant for both public and private sector banks, supporting the null hypothesis across ownership groups. In contrast, the Boone Indicator is negative and significant in both sub-samples, indicating that efficiency-based competition reduces NPAs within each ownership category. This suggests that ownership moderates the competition–risk relationship, with the efficiency channel becoming more pronounced

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when banks are analysed separately, even though the effect is not robust in the pooled specification.

Table 10: Robustness Check Hypothesis 1st and 2nd

	H1: Lerner Index impact on NPA		H2: Boone Indicator impact on NPA	
Variables	**PSB Only**	**Private Only**	**PSB Only**	**Private Only**
Lerner Index (Lag 1)	−2.262 (3.058)	−0.369 (1.207)	—	—
Boone Indicator (Lag 1)	—	—	−2.624*** (0.893)	−1.180*** (0.381)
Bank Size (ln)	0.179 (0.495)	−0.589*** (0.164)	0.886* (0.469)	−0.536*** (0.182)
CAR (%)	−0.124 (0.083)	−0.008 (0.013)	−0.099 (0.079)	−0.004 (0.013)
ROA (%)	−0.625** (0.228)	−0.989*** (0.171)	−0.596** (0.223)	−0.965*** (0.149)
Loan Growth (%)	−0.036*** (0.012)	−0.013*** (0.002)	−0.040*** (0.014)	−0.010*** (0.003)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	398	315	398	315
Banks	22	16	22	16
R² (Within)	0.856	0.691	0.861	0.699

*Author's Calculation, *** 1%, **5%, *10% Significance level

Robustness check for the third and fourth hypotheses is presented in Table 10. In the empirical model, which excludes merged and closed banks, both the Lerner Index and the Boone Indicator remain statistically insignificant. This indicates that the baseline results are not driven by sample composition effects arising from bank consolidation. This also establishes the stability of the joint model estimates and suggests that the observed divergence between competition measures across economic phases reflects genuine cyclical dynamics rather than changes that are occurring due to structural changes in the sample, thereby supporting the third hypothesis. The placebo analysis further strengthens identification by assigning a false treatment period prior to the actual consolidation episode. The interaction terms between public sector bank status and the placebo period are statistically insignificant for both competition measures. This absence of a pre-trend differential confirms that there were no systematic differences between public and private banks before the consolidation event. Consequently, the parallel trends assumption holds, and the significant results observed in the main specification, particularly for the Boone Indicator, can be credibly attributed to the merger episode rather than to spurious underlying trends.

Table 11: Robustness Check Hypothesis 3rd and 4th

	Exclude Merged Banks test for third hypothesis		Placebo Test for fourth hypothesis	
Variables	**Full Sample**	**Excl. Merged**	**Lerner Index**	**Boone Indicator**
Lerner Index (Lag 1)	−3.343* (1.839)	−1.565 (2.062)	—	—
Boone Indicator (Lag 1)	−0.114 (0.492)	0.252 (0.504)	—	—
Post Placebo (2015-16+)	—	—	0.017 (0.025)	−0.022 (0.083)
PSB × Placebo	—	—	−0.012 (0.012)	−0.058 (0.032)
Bank Size (ln)	−0.825*** (0.234)	−0.717*** (0.180)	0.006 (0.009)	0.071** (0.034)
CAR (%)	−0.012 (0.016)	−0.014 (0.015)	0.001 (0.001)	0.005*** (0.001)
ROA (%)	−1.214*** (0.173)	−1.437*** (0.213)	0.019*** (0.007)	0.045*** (0.013)
Loan Growth (%)	−0.024*** (0.007)	−0.018*** (0.005)	0.000 (0.000)	0.003*** (0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	713	580	568	568
Banks	38	29	38	38
R² (Within)	0.735	0.709	0.36	0.633

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F-statistic	69.26***	244.72***	13.93***	175.69***

*Author's Calculation, *** 1%, **5%, *10% Significance level

8. Discussion

The study examines the relationship between bank competition and credit risk in scheduled commercial banks in India, over a long panel period of 2005 to 2025. The empirical results indicate that pricing-based competition, measured through the Lerner Index, does not exert a robust causal effect on non-performing assets once endogeneity and persistence are controlled, thereby supporting the competition–neutral view in the Indian context. However, credit risk is found to be highly persistent, reflecting structural factors such as governance weaknesses and regulatory constraints rather than competitive intensity playing an important role in the Indian banking system. Similarly, the efficiency-based competition measured by the Boone Indicator remains insignificant at the aggregate level, again supporting a neutral stance. However, within ownership groups, efficiency competition significantly reduces NPAs, providing clear support for the competition stability hypothesis by indicating that more efficient banks experience lower credit risk.

The analysis further shows that competition effects vary across different economic cycles. During stable periods post COVID-19, both competition measures reduce credit risk as competition increases, strongly supporting the competition stability hypothesis. In contrast, during crisis and regulatory intervention phases, their effects weaken, suggesting that structural shocks dominate competitive forces. In the pre-crisis GFC period, the divergence between the two measures reflects the multidimensional nature of the Indian banking system.

Finally, post-merger effects are significant only through the efficiency channel. This confirms that the Post-merger reform improvements in Indian banking are primarily driven by efficiency gains rather than pricing power. Further, the supporting control variables also reinforce improved competitive conditions through the efficiency channel.

9. Conclusion and Policy Implications

This research paper contributes to the debate in the context of the "competition-stability" vs. "competition-fragility". The study investigates the banking system's competition, market power and credit risk in India, using an unbalanced panel of 38 scheduled commercial banks covering the period from 2004-05 to 2024-25. The Lerner Index, which captures the pricing channel of competition, does not robustly determine NPA accumulation once dynamic endogeneity and persistence are accounted for. At the full-sample level, the Boone Indicator appears to have no significant impact on bank NPAs, which account for the efficiency channel. Although the analysis of banks owned by the government and the private sector reveals important within-group effects. It indicates that bank ownership structure influences the competition-risk relationship between banks through the efficiency channel.

The economic cycle sub-period analysis confirms that competition effects are cyclically unstable and both the measures are complementary during the Pre-GFC period, lose significance during the NPA crisis and COVID disruption, and diverge sharply in the post-consolidation phase, with the Lerner and Boone measures moving in opposite directions and supporting the competition stability viewpoint after 2021. According to the difference-in-difference analysis, PSB consolidation weakened efficiency-based competition among public sector banks, whereas pricing-based market power remained unchanged. In other words, PSB mergers resulted in scale economies, but productivity-based competition was hampered.

The results also point to the structural persistence of NPA ratios, confirming that credit risk in Indian banking is deep-rooted and slow to fix, as noted by Acharya et al. (2019). In all models, profitability and bank size are strong determinants of asset quality, while capital adequacy and loan growth effects are more bank-specific and economically cyclical-driven. Overall, the analysis adds to the existing knowledge regarding the relationship between competition and stability in the banking system of an emerging economy. Moreover, it strengthens the

empirical framework for policy discussions on PSB consolidation in India.

The finding also reveals that the PSB consolidation led to a weakening of competition on efficiency grounds without improvement in credit quality, which has direct implications for the ongoing consolidation policy for banks in India. Although the Government of India and the Reserve Bank of India pushed for large scale, PSB mergers mainly on operational efficiency and capital optimisation grounds, the empirical evidences this paper reveals that consolidation has reduced competitive discipline among merged entities a concern echoing finding by Berger et al. (1999) that large scale bank mergers in developed economies exhibit mixed competitive outcomes, depending on the type and scale of consolidations.

Consequently, as an inference, it is recommended that policymakers must assess forthcoming merger proposals not just on efficiency grounds but also on their ability to reduce competitive pressure and increase concentration of systemic risk. In the post-merger scenario in India, a select few large PSBs hold a large share of the market. Consequently, the emergence of the too-big-to-fail phenomenon generates moral hazards in lending activities. This was also documented by Mishkin (1999).

The introduction of differentiated banking licences, which include Small Finance Banks and Payment Banks, by the RBI represents a forward-looking policy response to the competitive contraction caused by the PSB merger (RBI, 2014). The different competition effects over time noted in this study indicate that the new entrants have begun to alter the competition dynamics in the post-consolidation phase. The post-COVID period also saw a renewed strengthening of efficiency-based competition. The evidence suggests that a differentiated licensing framework will help sustain competitive pressure in segments of the credit market that large, consolidated PSBs are less willing to serve. It is in line with the competition, augmenting motivation for niche banking licences, which Claessens and Laeven (2004) have suggested.

It is worth mentioning that NPA ratios are observed to be strongly persistent across all specifications, which indicates the necessity for forward-looking macro prudential frameworks that can identify and limit the accumulation of risk-taking before it becomes embedded. The price effect of competition intensifies during a crisis, leading to frequent variation in its effects. The Basel III macro-prudential framework (BCBS, 2010) shows that counter-cyclical capital buffers that limit risk-taking in credit booms are required.

The RBI started designating Domestic Systemically Important Banks (DSIBs) in 2014 under a framework that imposes extra capital surcharges on banks whose failure would lead to systemic spillovers. Positive association of bank size with NPA accumulation in the NPA crisis and post-crisis period furthers the rationale for this framework. Banking authorities should apply D-SIB surcharges flexibly rather than rely on a fixed-size threshold. In other words, the phase of the competition cycle for efficiency competition on features will be one adjusting variable.

Our analysis and findings indicate ROA and capital adequacy are consistently significant in all specifications, thus underscoring their maintained importance as the main defence against credit risk. Banks that enjoy sound capitalisation and profit retention capability are adept at absorbing credit losses, sustaining lending discipline and overcoming macroeconomic shocks. This bears out the theoretical predictions of the charter value hypothesis (Keeley, 1990) and the empirical evidence of Berger and Bouwman (2013). According to the systemic risk vulnerabilities identified in this study, the Basel III capital adequacy framework will be well-calibrated. This is because it stresses the quality of Tier 1 capital and the capital conservation buffer. However, the evidence that CAR loses significance in dynamic GMM specifications suggests that capital adequacy operates as a structural buffer rather than a short-run risk determinant, implying that regulators should focus on building capital buffers during normal periods rather than responding reactively during stress episodes, consistent with the counter-cyclical buffer rationale of BCBS (2010).

The finding that PSB ownership moderates the competition-risk relationship, with PSBs consistently showing higher NPA ratios and weaker

efficiency competition relative to private banks, points to unresolved governance challenges in public sector banking. The literature consistently documents that state-owned banks face softer budget constraints, political lending pressures, and weaker corporate governance compared to private banks, all of which compromise credit quality (La Porta et al., 2002; Dinc, 2005). Policymakers should therefore complement consolidation and capitalisation efforts with meaningful governance reforms. These include professional board appointments, performance-linked executive compensation, and enhanced RBI supervisory oversight of PSB credit committees. This will also ensure that the efficiency gains from consolidation are not neutralised by persistent governance weaknesses. The international evidence on partial privatisation of state-owned banks suggests that even minority private shareholding with strong governance rights can significantly improve credit discipline and competitive behaviour (Boubakri et al., 2005).

10. Limitations of the Study

This study is subject to several limitations. The first one is that the analysis is restricted to 38 scheduled commercial banks and it excludes foreign banks, small finance banks, and cooperative banks, which limits the generalisability of findings to the broader Indian financial system. Second, the Lerner Index and Boone Indicator are computed measures derived from accounting data and may not fully capture all dimensions of competitive behaviour, particularly non-price competition. Finally, while the 2-step System GMM addresses endogeneity, the mild Hansen test rejection suggests residual instrument constraints in the finite samples.

11. References

1. Acharya, V., Eisert, T., Eufinger, C., & Hirsch, C. (2019). Whatever it takes: The real effects of unconventional monetary policy. Review of Financial Studies, 32(9), 3366–3411. https://doi.org/10.1093/rfs/hhz005
2. Adhamovna, B. G. (2016). Banking competition and stability: Comprehensive literature review. International Journal of Management Science and Business Administration, 2(6), 26–33. https://doi.org/10.18775/ijmsba.1849-5664-5419.2014.26.1002
3. Allen, F., & Gale, D. (2004). Competition and financial stability. Journal of Money, Credit and Banking, 36(3), 453–480. https://doi.org/10.1353/mcb.2004.0038
4. Arrawatia, R., Misra, A., Dawar, V., & Maitra, D. (2019). Bank competition in India: Some new evidence using risk-adjusted Lerner index approach. Risks, 7(2), 44. https://doi.org/10.3390/risks7020044
5. Bain, J. S. (1951). Relation of profit rate to industry concentration: American manufacturing, 1936–1940. Quarterly Journal of Economics, 65(3), 293–324. https://doi.org/10.2307/1882217
6. BCBS. (2010). Basel III: A global regulatory framework for more resilient banks and banking systems. Bank for International Settlements. https://www.bis.org/publ/bcbs189.htm
7. Beck, T., De Jonghe, O., & Schepens, G. (2013). Bank competition and stability: Cross-country heterogeneity. Journal of Financial Intermediation, 22(2), 218–244. https://doi.org/10.1016/j.jfi.2012.07.001
8. Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crises? Journal of Financial Economics, 109(1), 146–176. https://doi.org/10.1016/j.jfineco.2013.02.008
9. Berger, A. N., Demsetz, R. S., & Strahan, P. E. (1999). The consolidation of the financial services industry: Causes, consequences and implications for the future. Journal of Banking and Finance, 23(2–4), 135–194. https://doi.org/10.1016/S0378-4266(98)00125-3
10. Berger, A. N., Klapper, L. F., & Turk-Ariss, R. (2009). Bank competition and financial stability. Journal of Financial Services Research, 35(2), 99–118. https://doi.org/10.1007/s10693-008-0050-7
11. Bikker, J. A., & Bos, J. W. B. (2008). Bank performance: A theoretical and empirical framework for the analysis of profitability, competition and efficiency. Routledge. https://www.routledge.com/Bank-Performance-A-Theoretical-and-Empirical-Framework-for-the-Analysis/Bikker-Bos/p/book/9780415397667
12. Bishnoi, I., & Mallik, N. S. (2024). India's banking market structure: Impact assessment of bank consolidation. Eurasian Journal of Business and Economics, 19(2), 1–18. https://doi.org/10.17015/ejbe.2024.033.06
13. Boone, J. (2008). A new way to measure competition. Economic Journal, 118(531),

1245–1261. https://doi.org/10.1111/j.1468-0297.2008.02168.x
14. Boone, J., Griffith, R., & Harrison, R. (2005). Measuring competition (AIM Research Working Paper No. 022). Advanced Institute of Management Research. https://ssrn.com/abstract=1307004
15. Boubakri, N., Cosset, J. C., & Guedhami, O. (2005). Postprivatization corporate governance: The role of ownership structure and investor protection. Journal of Financial Economics, 76(2), 369–399. https://doi.org/10.1016/j.jfineco.2004.05.003
16. Boyd, J. H., & De Nicolo, G. (2005). The theory of bank risk taking and competition revisited. Journal of Finance, 60(3), 1329–1343. https://doi.org/10.1111/j.1540-6261.2005.00763.x
17. Claessens, S., & Laeven, L. (2004). What drives bank competition? Some international evidence. Journal of Money, Credit and Banking, 36(3), 563–583. https://doi.org/10.1353/mcb.2004.0044
18. Delis, M. D. (2010). Competitive conditions in the Central and Eastern European banking systems. Omega, 38(5), 268–274. https://doi.org/10.1016/j.omega.2008.09.002
19. Dinc, I. S. (2005). Politicians and banks: Political influences on government-owned banks in emerging markets. Journal of Financial Economics, 77(2), 453–479. https://doi.org/10.1016/j.jfineco.2004.06.011
20. Hellmann, T., Murdock, K., & Stiglitz, J. E. (2000). Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough? American Economic Review, 90(1), 147–165. https://doi.org/10.1257/aer.90.1.147
21. Huynh, J. (2023). Is competition good or bad for the price, quantity, and quality of bank lending? PLOS ONE, 18(9), e0287002. https://doi.org/10.1371/journal.pone.0287002
22. Keeley, M. C. (1990). Deposit insurance, risk, and market power in banking. American Economic Review, 80(5), 1183–1200. https://www.jstor.org/stable/2006769
23. Kotz, H. H., & Schäfer, D. (2018). Diversity across EU banking sectors: Poorly researched and underappreciated. Vierteljahrshefte zur Wirtschaftsforschung, 87(4), 153–179. https://doi.org/10.3790/vjh.87.4.153
24. La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). Government ownership of banks. Journal of Finance, 57(1), 265–301. https://doi.org/10.1111/1540-6261.00422
25. Lerner, A. P. (1934). The concept of monopoly and the measurement of monopoly power. Review of Economic Studies, 1(3), 157–175. https://doi.org/10.2307/2967480
26. Li, Z., Liu, S., Meng, F., & Sathye, M. (2019). Competition in the Indian banking sector: A panel data approach. Journal of Risk and Financial Management, 12(3), 136. https://doi.org/10.3390/jrfm12030136
27. Mason, E. S. (1939). Price and production policies of large-scale enterprise. American Economic Review, 29(1), 61–74. https://www.jstor.org/stable/1806955
28. Mishkin, F. S. (1999). Financial consolidation: Dangers and opportunities. Journal of Banking and Finance, 23(2–4), 675–691. https://doi.org/10.1016/S0378-4266(98)00084-3
29. Misra, B. S. (2003). Allocative efficiency of the Indian banking system in the post-reform period: A state level analysis. Reserve Bank of India Occasional Papers, 24(3), 161–186. https://www.rbi.org.in/upload/Publications/PDFs/60610.pdf
30. Poddar, A., Choudhary, S., Tiwari, A. K., & Misra, A. K. (2023). Interlinkages of market power, price and liquidity network in banks: Evidence from an emerging economy. The Journal of Risk Finance, 24(3), 285–315. https://doi.org/10.1108/JRF-01-2023-0006
31. Prasad, A., & Ghosh, S. (2007). Competition in Indian banking: An empirical evaluation. South Asia Economic Journal, 8(2), 265–284. https://doi.org/10.1177/139156140700800205
32. Rahman, M. R., & Misra, A. K. (2021). Bank competition using networks: A study on an emerging economy. Journal of Risk and Financial Management, 14(9), 402. https://doi.org/10.3390/jrfm14090402
33. Rakshit, B. (2022). Does bank competition necessarily contribute to higher profits? The case of Indian banking. Asian Economics Letters, 3(3), Article 35526. https://doi.org/10.46557/001c.35526
34. Rakshit, B., & Bardhan, S. (2019). Bank competition and its determinants: Evidence from Indian banking. International Journal of the Economics of Business, 26(2), 283–313. https://doi.org/10.1080/13571516.2019.1592995
35. Rakshit, B., & Bardhan, S. (2022). An empirical investigation of the effects of competition, efficiency and risk-taking on profitability: An application in Indian banking. Journal of Economics and Business, 118, 106022.

https://doi.org/10.1016/j.jeconbus.2021.106022
36. RBI. (2014). Guidelines for licensing of differentiated banks: Small Finance Banks and Payment Banks. Reserve Bank of India. https://www.rbi.org.in/commonman/Upload/English/Notification/PDFs/NT81A721DA1E8CE745659C469519A38B75FA.PDF
37. Schaeck, K., & Cihak, M. (2014). Competition, efficiency, and stability in banking. Financial Management, 43(1), 215–241. https://doi.org/10.1111/fima.12010
38. Schaeck, K., Cihak, M., & Wolfe, S. (2009). Are competitive banking systems more stable? Journal of Money, Credit and Banking, 41(4), 711–734. https://doi.org/10.1111/j.1538-4616.2009.00228.x
39. Srivastava, V., Bhatt, V., & Oberoi, S. (2023). Bank competition, risk-taking and financial stability: Evidence from an emerging economy. Competitiveness Review: An International Business Journal, 33(5), 959–992. https://doi.org/10.1108/CR-10-2021-0143
40. Trad, K. (2023). Banking competition, efficiency and stability in the MENA region. International Business Research, 16(9), 50–64. https://doi.org/10.5539/ibr.v16n9p50
41. van Leuvensteijn, M., Bikker, J. A., Van Rixtel, A., & Sørensen, C. K. (2011). A new approach to measuring competition in the loan markets of the euro area. Applied Economics, 43(23), 3155–3167. https://doi.org/10.1080/00036840903493234
42. Vickers, J. (1995). Concepts of competition. Oxford Economic Papers, 47(1), 1–23. https://www.jstor.org/stable/2663661
43. Vives, X. (2019). Competition and stability in modern banking: A post-crisis perspective. International Journal of Industrial Organization, 64, 55–69. https://doi.org/10.1016/j.ijindorg.2018.08.011

44. Appendix

Table A: Variable Definition

Variable Name	Symbol	Description	Measurement
Total Cost	TC_{it}	Total operating cost of bank i in year t; the dependent variable in the translog cost function	Sum of interest expenses and operating expenses (staff expenses + other operating expenses)
Output (Advances)	Q_{it}	Bank output quantity; proxy for the scale of banking activity	Total advances (loans and advances) outstanding; in ₹ crore
Price of Labour	P_{1it}	Input price of labour; reflects the cost of human capital per unit of output	Staff expenses divided by total assets (proxy for wage rate)
Price of Funds	P_{2it}	Input price of borrowed funds; reflects the cost of financial intermediation	Interest expenses divided by total deposits and borrowings
Price of Physical Capital (Numeraire)	P_{3it}	Input price of physical capital; used as the numeraire for linear homogeneity normalisation	Other operating expenses divided by fixed assets
Normalised Price of Labour	$\tilde{P}_{1it}$	Price of labour normalised by the price of physical capital to impose homogeneity	P_{1it} / P_{3it}
Normalised Price of Funds	$\tilde{P}_{2it}$	Price of funds normalised by the price of physical capital to impose homogeneity	P_{2it} / P_{3it}
Marginal Cost	MC_{it}	Marginal cost of producing one additional unit of output; key input to both competition measures	Derived analytically from the estimated translog cost function: $MC_{it} = (TC_{it} / Q_{it}) \times [\alpha_1 + \beta_{11} \ln Q_{it} + \beta_{12} \ln \tilde{P}_{1it} + \beta_{13} \ln \tilde{P}_{2it}]$
Output Price	P_{it}	Average revenue per unit of total assets; proxy for the price charged by the bank	Total revenue (interest income + non-interest income) divided by total assets

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Lerner Index	LI_{it}	Measure of pricing power / market power. Values close to 0 indicate competitive pricing; values close to 1 reflect monopoly power	$(P_{it} - MC_{it}) / P_{it}$. Ranges [0, 1]; higher value = more market power = less competition
Operating Profit per Unit Output	π_{it} / Q_{it}	Profit efficiency measure; reflects profitability relative to scale of output	Operating profit (net interest income + non-interest income − operating expenses) divided by total advances
Boone Indicator	BI_{it} (β)	Measure of efficiency-based competition. A more negative β indicates stronger competition as efficient banks gain more from cost advantages	Coefficient β from regression of $\ln(\pi_{it}/Q_{it})$ on $\ln(MC_{it})$. Estimated via: (a) year-wise cross-sectional OLS, (b) two-way fixed effects panel, (c) 5-year rolling window OLS
NPA Ratio	NPA_{it}	Dependent variable across all four hypotheses. Measures credit risk / asset quality of bank i in year t	Net non-performing assets (NPAs) as a percentage of net advances. Source: RBI DBIE
Lagged NPA Ratio	NPA_{it-1}	One-period lag of NPA ratio; captures the persistence / dynamic nature of credit risk in GMM models	NPA ratio (%) of the prior year; used as the autoregressive term in System GMM
Bank Size	$BankSize_{it}$	Controls for scale economies and diversification benefits. Larger banks may have lower NPA ratios due to portfolio diversification	Natural logarithm of total assets (ln(Total Assets)); in ₹ crore
Capital Adequacy Ratio	CAR_{it}	Controls for regulatory capital buffers. Well-capitalised banks are less likely to take excessive risks, reducing NPA accumulation	Total regulatory capital as a percentage of risk-weighted assets (%); Basel III framework. Source: RBI DBIE
Return on Assets	ROA_{it}	Controls for profitability; more profitable banks can absorb credit losses and maintain lending discipline, reducing NPAs. Also used as a mediation variable in H2	Net profit as a percentage of total assets (%); Source: RBI DBIE
Loan Growth	$LoanGrowth_{it}$	Controls for credit expansion speed. Rapid loan growth is associated with deterioration in credit standards and higher future NPAs	Year-on-year percentage change in total advances (%)
Crisis Dummy	$Crisis_t$	Binary indicator capturing stress periods. Tests whether the competition–NPA relationship intensifies during crises	= 1 during crisis/stress phases (2015–2019 NPA crisis; 2020–2022 COVID); = 0 otherwise
LI × Crisis Interaction	$LI_{it-1} \times Crisis_t$	Tests whether pricing-based market power has a different effect on NPAs during crisis periods versus normal periods	Product of lagged Lerner Index and the Crisis dummy variable
BI × Crisis Interaction	$BI_{it-1} \times Crisis_t$	Tests whether efficiency-based competition has a different effect on NPAs during crisis periods versus normal periods	Product of lagged Boone Indicator and the Crisis dummy variable
PSB Dummy	PSB_i	Bank ownership identifier; captures structural differences between public sector and private sector banks	Binary: = 1 if bank i is a Public Sector Bank (government-owned); = 0 if private sector bank. Time-invariant

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Post-Merger Dummy	$Post_t$	Time indicator for the post-PSB consolidation period; captures structural break after the mega-mergers	Binary: = 1 for years 2020–21 onwards (post PSB mega-merger); = 0 for pre-consolidation years
PSB × Post Interaction	$PSB_i \times Post_t$	DiD interaction term; the main coefficient of interest in H4. Identifies the causal effect of PSB consolidation on competitive behaviour relative to private banks	Product of PSB dummy and Post-merger dummy. Coefficient ϕ_3 (for LI) and ψ_3 (for BI) capture the differential post-consolidation effect on market power and efficiency competition

Table B:Translog cost functions Specifications

Variables	**Coefficient (Std. Error)**	**t-statistic**
lnQ	0.757*** (0.036)	20.932
$\ln\tilde{P}1$	0.276*** (0.095)	2.907
$\ln\tilde{P}2$	0.509*** (0.077)	6.608
$\ln Q^2$	-0.001 (0.002)	-0.658
$\ln\tilde{P}1^2$	0.078*** (0.019)	4.171
$\ln\tilde{P}2^2$	-0.061*** (0.008)	-7.381
$\ln Q \cdot \ln\tilde{P}1$	0.015* (0.009)	1.749
$\ln Q \cdot \ln\tilde{P}2$	-0.001 (0.007)	-0.146
$\ln\tilde{P}1 \cdot \ln\tilde{P}2$	0.146*** (0.016)	9.095
Model Diagnostics		
Observations	751	
Banks	38	
Years	21	
Within R^2	0.92	
Marginal Cost Validity	Positive (all observations)	
MC Range	0.041 – 0.156	

Table C:Mean Lerner Index value

Year	**Mean LI**	**Std Dev**	**Interpretation**
2004-05	**0.4272**	0.0691	High market power
2005-06	**0.4179**	0.0587	Moderate competition
2006-07	**0.418**	0.0431	Moderate competition
2007-08	**0.4086**	0.0397	Moderate competition
2008-09	**0.4091**	0.0424	Moderate competition
2009-10	**0.4155**	0.0576	Moderate competition
2010-11	**0.4215**	0.0544	High market power
2011-12	**0.4028**	0.0506	Moderate competition
2012-13	**0.3982**	0.0422	Moderate competition
2013-14	**0.3941**	0.0508	Moderate competition
2014-15	**0.3935**	0.0529	Moderate competition
2015-16	**0.3884**	0.06	Moderate competition
2016-17	**0.4095**	0.0516	Moderate competition
2017-18	**0.4146**	0.0581	Moderate competition
2018-19	**0.4041**	0.0625	Moderate competition
2019-20	**0.4157**	0.0618	Moderate competition
2020-21	**0.4442**	0.0571	High market power

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2021-22	**0.4507**	0.0579	High market power
2022-23	**0.4509**	0.056	High market power
2023-24	**0.431**	0.0568	High market power
2024-25	**0.4316**	0.0517	High market power

Table D: Annual Boone Indicator Value

Year	Boone β	Remarks
2004-05	**0.7283**	Pre-reform baseline
2005-06	**-0.7363**	Post-reform liberalisation
2006-07	**-1.1133**	Credit boom
2007-08	**0.0832**	GFC onset
2008-09	**0.1044**	GFC crisis
2009-10	**-2.093**	Post-GFC recovery
2010-11	**-1.2631**	Credit expansion
2011-12	**-0.5139**	NPA stress emerging
2012-13	**-0.8207**	NPA crisis deepening
2013-14	**-1.4203**	NPA peak
2014-15	**-1.8931**	NPA crisis + RBI scrutiny
2015-16	**-5.52**	RBI AQR — sharpest sorting
2016-17	**-1.2003**	IBC enacted
2017-18	**-1.344**	IBC implementation
2018-19	**-2.2745**	NPA resolution
2019-20	**-1.248**	PSB mergers
2020-21	**-0.6376**	COVID-19
2021-22	**-0.5115**	COVID recovery
2022-23	**-0.8834**	Post-COVID normalisation
2023-24	**-1.552**	Competition strengthening
2024-25	**-1.0696**	Recent period

Table E: Sample Bank List

Bank Name	Ownership
Allahabad Bank	Government Owned
Andhra Bank	Government Owned
Axis Bank	Private
Bank of Baroda	Government Owned
Bank of India	Government Owned
Bank of Maharashtra	Government Owned
Canara Bank	Government Owned
Central Bank of India	Government Owned
City Union Bank	Private
Corporation Bank	Government Owned
CSB Bank	Private
DCB Bank	Private
DENA Bank	Government Owned
Dhanlaxmi Bank	Private
Federal Bank	Private

HDFC Bank	Private
ICICI Bank	Private
IDBI Bank	Private
Indian Bank	Government Owned
Indian Overseas Bank	Government Owned
IndusInd Bank	Private
Jammu & Kashmir Bank	Government Owned
Karnataka Bank	Government Owned
Karur Vysya Bank	Private
Kotak Mahindra Bank	Private
Lakshmi Vilas Bank	Private
Oriental Bank of Commerce	Government Owned
Punjab & Sind Bank	Government Owned
Punjab National Bank	Government Owned
RBL Bank Limited	Private
South Indian Bank	Private
State Bank of India	Government Owned
Syndicate Bank	Government Owned
UCO Bank	Government Owned
Union Bank of India	Government Owned
United Bank of India	Government Owned
Vijaya Bank	Government Owned
Yes Bank	Private