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Comparative Analysis of Non-Performing Assets and Their Impact on Financial Performance of Public and Private Sector Banks in Kerala

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Abstract

This study examines whether asset quality and profitability differ by ownership among banks operating in Kerala, and whether weaker asset quality is linked to lower profitability. Using a secondary, cross-sectional design for the latest completed financial year, a set of scheduled commercial banks was analysed. Gross non-performing assets, defined as the proportion of impaired advances, and return on assets, defined as net income over average assets, were taken directly from bank disclosures. Sector differences were tested with Welch's tests, and the asset-quality–profitability link was estimated using Pearson correlation and a simple linear model. All analyses were conducted in EDUSTAT. Private sector banks showed higher profitability than public sector banks, while the gap in gross non-performing assets, though directionally larger for public sector banks, was inconclusive. Across banks, poorer asset quality related strongly and negatively to profitability, consistent with higher credit costs and lost interest income. The narrow scope and unbalanced sample warrant caution, and an annualised quarterly profitability figure for a merged institution may affect comparability. Even so, the evidence supports early risk detection, disciplined provisioning, and timely resolution, and offers a baseline for future multi-year extensions.

Keywords: Non-Performing Assets; Return on Assets; Kerala Banks.

Introduction

Bank intermediation is central to Kerala's growth and household welfare, and the quality of banks' loan books remains a defining driver of their performance. In India, a loan is classified as a non-performing asset when interest and/or principal remain overdue for more than ninety days, with specific provisions for overdrafts, bills, and certain agricultural advances; this ninety-day norm has guided regulatory reporting and supervision since the early 2000s (Reserve Bank of India, 2004). In recent years, India's banking system has undergone visible balance-sheet repair, with profitability strengthening and gross non-performing assets declining to multi-year lows, even as supervisors continue to flag pockets of emerging risk in select retail and unsecured segments (Reserve Bank of India, 2024; Reuters, 2024, 2025).

A large empirical literature links weaker asset quality to lower bank profitability through lost interest income, higher credit costs, and resource diversion to resolution (Das & Uppal, 2021). Evidence on ownership differences—public sector versus private sector banks—is more nuanced: performance gaps often reflect differences in efficiency, business mix, and risk profiles rather than ownership alone, and findings on which group leads can vary by period, metric, and method (Gupta & Mahak, 2020; Patra et al., 2023). Kerala provides a pertinent setting for examining these questions: it is a financially deep state with a dense branch network and high formal-sector participation, making bank performance macro-relevant as well as distributionally salient (Kerala State Planning Board, 2025).

Against this backdrop, the present study asks whether asset quality and profitability differ by ownership among banks operating in Kerala and whether weaker asset quality is associated with lower profitability in the most recent completed financial year. Relying exclusively on primary, bank-published disclosures ensures definitional fidelity and replicability while keeping the design compact. The contribution is twofold: a clean one-year cross-section that speaks to current conditions, and a simple test of the asset-quality–profitability linkage with immediate managerial and policy relevance for Kerala's banking ecosystem.

Research Questions

1. Do public sector banks and private sector banks in Kerala differ in their average Gross Non-Performing Assets ratio?
2. Do public sector banks and private sector banks in Kerala differ in their average Return on Assets?
3. What is the association between the Gross Non-Performing Assets ratio and Return on Assets among banks in Kerala?

Research Objectives

1. To compare the Gross Non-Performing Assets ratio of public sector banks and private sector banks in Kerala.
2. To compare the Return on Assets of public sector banks and private sector banks in Kerala.
3. To assess the relationship between the Gross Non-Performing Assets ratio and Return on Assets among banks in Kerala.

Hypotheses

1. The mean Gross Non-Performing Assets ratio differs between public sector banks and private sector banks in Kerala.
2. The mean Return on Assets differs between public sector banks and private sector banks in Kerala.
3. The Gross Non-Performing Assets ratio is negatively associated with Return on Assets among banks operating in Kerala.

Methodology

Research design

The study adopted a secondary, cross-sectional comparative design focused on bank-level outcomes in a single period (FY 2023–24). The unit of analysis is the bank (standalone entity where applicable). Ownership sector (public vs private) served as the grouping factor for comparative tests, and asset-quality (Gross Non-Performing Assets ratio) served as the predictor for profitability (Return on Assets) in association tests.

Population, sampling frame, and sample

The population comprised scheduled commercial banks operating in Kerala. The sampling frame included banks with a demonstrable branch presence in Kerala and publicly available FY 2023–24 disclosures for the variables of interest. The final analytic sample contained eight banks: three public sector banks (State Bank of India, Punjab National Bank, Canara Bank) and five private sector banks (HDFC Bank—standalone, ICICI Bank—standalone, Axis Bank, Federal Bank, South Indian Bank).

Period of study

The analysis used the latest completed financial year at the time of compilation, FY 2023–24 (year ended 31 March 2024). Because only one year was analysed, the design is strictly cross-sectional.

Data sources

All data were drawn from original bank disclosures (audited annual reports, investor presentations/press releases, and Basel/Pillar-3 notes). Figures were extracted exactly as reported by the banks to preserve definitional fidelity; where a bank published more than one definition, the clearly labelled headline ratio was retained. No third-party databases were used for the core variables.

Variables and operational definitions

1. Gross Non-Performing Assets ratio (GNPA, %): [GNPA ratio = (Gross NPAs ÷ Gross Advances) × 100]. When banks disclosed multiple dates, the end-year value (as at 31 March) was recorded, consistent with standard reporting.
2. Return on Assets (ROA, %): [ROA = (Net Profit after Tax ÷ Average Total Assets) × 100], using the bank-disclosed ratio. For HDFC Bank, the ROA disclosed for Q4 FY 2023–24 (annualised) was used because a strictly comparable full-year standalone ROA figure was not presented alongside merger effects; this is flagged in the dataset.
3. Ownership sector: public sector bank vs private sector bank (categorical; grouping variable).

Inclusion, exclusion, and harmonisation rules

• Banks were included if (a) they operated in Kerala and (b) disclosed GNPA and ROA for FY 2023–24.

• Standalone figures were preferred over consolidated to maintain comparability across banks.

• For GNPA, point-in-time values as of 31 March 2024 were used where banks reported quarterly snapshots.

• For ROA, the bank-reported ratio was accepted; if only a quarterly annualised ROA was available (HDFC Bank), it was used with an explicit note.

• Banks lacking either GNPA or ROA for FY 2023–24 were excluded.

Data collection procedure

Original PDF/HTML disclosures were downloaded from each bank's investor relations or regulatory disclosure pages. Relevant tables/notes were identified and double-entered into a spreadsheet (bank, sector, financial year, GNPA %, ROA %, source note). A second pass verified (i) stand-alone vs consolidated basis, (ii) date basis (point-in-time vs FY average), and (iii) any merger/comparability caveats. Discrepancies were resolved by returning to the primary document.

Data preparation and quality checks

Continuous variables were typed as numeric (percentages retained on a 0–100 scale). Range checks ensured GNPA ≥ 0 and plausible ROA bounds. Consistency checks matched the sector tag with official ownership status. A brief harmonisation review ensured that GNPA ratios reflected gross advances and that ROA reflected the bank's stated definition (average assets basis, unless the bank explicitly used working funds).

Analytical strategy

All analyses were conducted in EDUSTAT. The analysis proceeded in three steps aligned to the research questions:

1. Descriptive profiling by sector for GNPA and ROA (n, mean, standard deviation). For transparency in test choice, distribution shape indicators (skewness, kurtosis) were computed but were only referenced when informative, given small group sizes.
2. Sectoral comparisons for GNPA and ROA using Welch's independent-samples t-tests (two-tailed, $\alpha = .05$) to accommodate unequal variances and unequal group sizes. Effect sizes were reported as Hedges' g with small-sample correction, and 95% confidence intervals for mean differences were presented.
3. Association between GNPA and ROA across all banks using Pearson's correlation (r, exact p-value, 95% CI via Fisher's z) and simple ordinary least squares regression [ROA = a + b × GNPA] with slope standard error, p-value, and R^2.

Assumptions and diagnostics

Normal-approximation methods were used with caution given the small group sizes (public n = 3, private n = 5). Welch's tests mitigate the impact of unequal variances. Numeric distribution checks indicated mild to moderate asymmetry in some variables; results were interpreted with corresponding caveats.

Ethical considerations

The study relied exclusively on publicly available audited financial disclosures; no human participants were involved, and no confidential data were accessed. Proper attribution of sources is maintained in the dataset notes.

Limitations of method

The cross-sectional design restricts causal interpretation and is sensitive to year-specific conditions (e.g., mergers, write-backs, or provisioning cycles). Small, unbalanced group sizes reduce power for sectoral tests. One bank's ROA is quarterly annualised rather than a full-year average, which may introduce minor comparability bias; this is disclosed and considered in interpretation. Kerala-specific breakouts of NPAs and ROA are not uniformly published at the bank level; the study therefore analysed bank-level totals for banks with presence in Kerala.

Reproducibility

A structured spreadsheet (bank, sector, FY 2023–24 GNPA %, FY 2023–24 ROA %, source note) underpins all calculations. The analysis flow in EDUSTAT is: (i) compute descriptives; (ii) perform Welch's t-tests for GNPA and ROA; (iii) compute Pearson's r with 95% CI; (iv) fit OLS ROA ~ GNPA and report slope, standard error, p-value, and R^2. The reported numbers in the Results section replicate directly from this dataset and procedure.

Data Analysis and Interpretation (FY 2023–24)

Scope and variables

The analysis covers eight scheduled commercial banks with operations in Kerala: three public sector banks (State Bank of India, Punjab National Bank, Canara Bank) and five private sector banks (HDFC Bank—standalone, ICICI Bank—standalone, Axis Bank, Federal Bank, South Indian Bank). The key variables are the Gross Non-Performing Assets ratio (GNPA; % of gross advances) and Return on Assets (ROA; %). Note: HDFC Bank's ROA is the Q4 FY 2023–24 annualised figure; other ROA figures are full-year. All analyses were conducted in EDUSTAT.

Descriptive statistics (by sector)

Table 1

GNPA ratio (%)

Sector	n	Mean	Standard Deviation
Public sector banks	3	4.067	1.751
Private sector banks	5	2.292	1.301

Table 2

Return on Assets (%)

Sector	n	Mean	Standard Deviation
Public sector banks	3	0.863	0.280
Private sector banks	5	1.686	0.575

Table 3

Distribution shape indicators (FY 2023–24)

Variable (Sector)	Skewness	Kurtosis
GNPA — Public	−0.416	−1.500
GNPA — Private	1.695	3.152

Variable (Sector)	Skewness	Kurtosis
ROA — Public	−1.710	−1.500
ROA — Private	−0.356	−1.038

In FY 2023–24, public sector banks show a higher average GNPA and a lower average ROA than private sector banks. Private-bank GNPA is right-skewed; public-bank ROA is left-skewed. Given small, unequal group sizes and visible asymmetry, Welch's *t*-tests are used for sector comparisons.

Hypotheses testing

H1. The mean Gross Non-Performing Assets ratio differs between public sector banks and private sector banks in Kerala.

Test: Welch's independent-samples *t*-test (two-tailed)

Table 4

Sector difference in GNPA (Welch's t)

Statistic	Value
Mean GNPA (Public)	4.067
Mean GNPA (Private)	2.292
Mean difference (Public − Private)	1.775
Welch *t*	1.522
df (Welch)	3.360
p-value	0.216
95% CI for difference	[−1.722, 5.271]
Hedges' *g*	1.052

Although public sector banks exhibit a higher average GNPA, the difference is not statistically significant at α = .05. With the present small sample and variability, the null cannot be rejected.

H2. The mean Return on Assets differs between public sector banks and private sector banks in Kerala.

Test: Welch's independent-samples *t*-test (two-tailed).

Table 5

Sector difference in ROA (Welch's t)

Statistic	Value
Mean ROA (Public)	0.863
Mean ROA (Private)	1.686
Mean difference (Public − Private)	−0.823
Welch *t*	−2.707
df (Welch)	5.934
p-value	0.036
95% CI for difference	[−1.568, −0.077]
Hedges' *g*	−1.440

ROA is significantly higher for private sector banks than for public sector banks in FY 2023–24, with a large effect size.

H3. The Gross Non-Performing Assets ratio is negatively associated with Return on Assets among banks operating in Kerala.

Tests: Pearson correlation; simple OLS regression (ROA on GNPA).

Table 6

Association between GNPA and ROA (n = 8)

Statistic	Value
Pearson correlation (*r*)	−0.803
p-value (for *r*)	0.016
Regression slope (ROA on GNPA)	−0.307
Standard error of slope	0.093
p-value (slope)	0.016
Intercept	2.285
R-squared	0.645

There is a strong, statistically significant negative association between GNPA and ROA. On average, a 1-percentage-point increase in GNPA corresponds to about a 0.31-percentage-point reduction in ROA.

Assumptions, robustness, and limitations (concise)

1. Welch's *t*-tests are used due to unequal variances and small, unequal group sizes.
2. Some skewness is present; with n = 3 for public banks, higher-moment estimates are unstable and are reported only to justify test choice.
3. ROA definitions are mostly full-year; HDFC Bank uses Q4 annualised ROA, which may slightly affect comparability. A brief sensitivity check (e.g., harmonising ROA definitions or excluding merger-affected banks) can be added if required.
4. Findings reflect FY 2023–24 conditions; generalisation to other years should be cautious.

For FY 2023–24, private sector banks report significantly higher Return on Assets than public sector banks, while the sectoral difference in Gross Non-Performing Assets is not statistically significant in this small sample. Across banks, higher Gross Non-Performing Assets are strongly associated with lower Return on Assets, underscoring the adverse link between asset-quality stress and profitability.

Discussion of the Results

The results indicate a clear profitability gap between ownership groups in FY 2023–24: private sector banks reported significantly higher Return on Assets than public sector banks, while the difference in Gross Non-Performing Assets ratio was directionally higher for public sector banks but statistically inconclusive in this small cross-section. Taken together, this pattern suggests that the profitability advantage of private banks in the period cannot be attributed solely to a visibly worse asset-quality position among public banks. It more plausibly reflects differences in operating efficiency, business mix, pricing power, and the speed of NPA recognition and resolution cycles. The strong and statistically significant negative association between the Gross Non-Performing Assets ratio and Return on Assets across all banks reinforces a core banking regularity: asset-quality stress is costly and tends to compress profitability through higher credit costs, foregone interest, and management attention diverted to resolution.

The non-significant GNPA difference (despite higher public-bank means) should be read cautiously. The group sizes are small and unbalanced, and one bank's ROA is based on an annualised quarterly figure due to merger-related disclosure, which may slightly affect comparability. Even so, the consistent negative slope linking GNPA to ROA suggests that, within this set of banks, marginal increases in stressed assets carried material earnings penalties in FY 2023–24. In short, the cross-section supports the view that better asset quality and stronger profitability tend to go together, irrespective of ownership label.

The Kerala lens in this study is institutional rather than geographic because bank-level Kerala-only GNPA and ROA splits are not uniformly disclosed. The findings therefore speak to banks with an operating presence in Kerala rather than to state-specific portfolios. Interpreting results for the Kerala market should thus focus on managerial levers that improve asset quality and efficiency within these institutions, many of which have deep local exposure.

Implications of the Study

For bank management, the results emphasise that improving asset quality is not merely a compliance goal but a profitability imperative. Early-warning systems, tighter underwriting, and proactive restructuring or recovery strategies can reduce slippages and credit-cost drag. Strengthening provision coverage for identified stress cushions earnings volatility and can moderate the GNPA–ROA penalty observable in the estimates. On the

revenue side, a balanced asset mix, disciplined risk-adjusted pricing, and growth in stable fee income can help offset cyclical credit-cost pressures.

For regulators and state-level stakeholders concerned with the banking ecosystem serving Kerala, the evidence underlines the continued importance of robust resolution channels, time-bound recovery frameworks, and borrower-level information quality (for example, granular cash-flow verification for MSMEs). Policies that improve collateral enforcement and expedite legal recovery can indirectly support bank profitability by shortening the duration of non-performing exposures. Given that the study finds a strong GNPA–ROA linkage even in a small cross-section, interventions that lower the stock and flow of NPAs are likely to have near-term earnings benefits.

For researchers, the study points to several useful extensions without changing the central question. A short three-year panel on the same banks would allow year fixed-effects and help separate one-off events from systematic differences. Including additional controls—such as Capital Adequacy Ratio, Cost-to-Income ratio, and Net Interest Margin—would clarify whether the GNPA–ROA relationship remains robust after accounting for capital strength, operating efficiency, and margin structure. Finally, testing Net NPA and Provision Coverage Ratio as moderators could show whether better provisioning measurably softens the profitability impact of gross stress.

Conclusion

In FY 2023–24, private sector banks operating in Kerala reported significantly higher Return on Assets than public sector banks, while the inter-sector difference in Gross Non-Performing Assets ratio was not statistically significant in this small sample. Across all banks studied, higher Gross Non-Performing Assets were strongly and negatively associated with Return on Assets, indicating that asset-quality pressure materially depressed profitability during the year. These results align with established theory and practice in commercial banking: profitability is tightly linked to the quality of the loan book, and operational discipline around credit risk pays off in earnings. The evidence supports prioritising asset-quality management, timely resolution, and efficiency improvements as practical levers for strengthening performance in banks that serve the Kerala market.

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