

Camel study of Indian Banks: A Case Study of Bank of Baroda and HDFC Bank

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Abstract

Purpose: The purpose of this research is to evaluate and compare the financial performance in the first quarter of two major Indian banks, Bank of Baroda (a public sector bank) and HDFC Bank Ltd (a private sector bank), using the CAMEL model framework. The CAMEL model examines five key aspects of a bank's financial health: Capital Adequacy, Asset Quality, Management Quality, Earnings Quality, and Liquidity.

Design/Methodology/Approach: Historical data spanning five financial years (2019-2024) was gathered from annual reports, Reserve Bank of India (RBI) publications, and similar sources.

Findings: Findings reveal that HDFC Bank outperformed Bank of Baroda across various CAMEL ratio components, including profitability, asset quality, and operational efficiency. Despite this, Bank of Baroda has bolstered its capital position and demonstrated prudent management of non-performing assets (NPAs), indicating progress in public sector banking reforms.

Conclusion: This study highlights the divergence in performance between public and private sector banks in India, underscoring the importance of robust financial metrics for the resilience of the banking industry.

Originality/Value: Recommendations are provided for banks and policymakers, along with suggestions for future research based on identified gaps in the existing literature.

Keywords: CAMEL Model, Bank of Baroda, HDFC Bank, Financial Performance, Capital Adequacy, Asset Quality, Management Efficiency, Earnings Quality, Liquidity, Indian Banking Sector, Public vs Private Banks, Ratio Analysis.

1. INTRODUCTION

The Indian banking sector plays a crucial role in the economic advancement of the nation, serving as the financial foundation for businesses, individuals, and the government (Markus & Singh, 2024). Featuring a combination of public, private, and foreign banks, the sector has undergone substantial reforms focused on enhancing efficiency, transparency, and financial inclusivity. In this competitive landscape, evaluating the financial stability of banks becomes pivotal for stakeholders, investors, and regulators.

The health of the entire financial system relies heavily on the stability and effectiveness of banks. Assessing their performance is key to pinpointing risks, ensuring adherence to regulations, and bolstering investor trust. The CAMEL model, which focuses on Capital adequacy, Asset quality, Management efficiency, Earnings quality, and

Liquidity, is a widely-recognized and comprehensive framework for evaluating the financial well-being of banks (Bhatti et al., 2022).

It is crucial to compare public and private sector banks based on standardized parameters due to the significant variations in structure, operations, and objectives. Public sector banks such as Bank of Baroda prioritize social banking mandates, whereas private sector banks like HDFC Bank are recognized for their focus on profitability and efficiency (Aithal, 2021).

This study aims to assess and compare the financial health of Bank of Baroda (public sector) and HDFC Bank (private sector) using the CAMEL model.

1. To evaluate the financial performance of Bank of Baroda and HDFC Bank using the CAMEL model.

2. To compare the Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity of the two banks over a selected period.
3. To identify strengths and weaknesses in the financial structure of each bank based on CAMEL parameters.
4. To provide recommendations for improving the financial health and operational efficiency of both public and private sector banks.

The study focuses on a five-year period using secondary data from annual reports and official sources. Limitations include data availability and the inability to generalize findings to the entire banking industry.

2. LITERATURE REVIEW

2.1 Overview of past research on CAMEL model in banking

The CAMEL model, consisting of capital adequacy, asset quality, management's competency, earnings, and liquidity, is a widely accepted global gauge of banking stability. Initially introduced by U.S. banking regulators in the 1970s, this method enables a comprehensive evaluation of a bank's performance (Sabri Boubaker et al., 2023). Indian researchers have favoured CAMEL-based methodologies for scrutinizing public and private sector banks, driven by increased competition, shifts in the banking sector landscape, economic fluctuations, and regulatory changes.

Papers such as Dutta (2020) as well as Kumar et al. (2021) also prove that CAMEL is an effective measure equally as a tool for bank-wise analysis as for the cross-sectional comparison in the Indian situation. Its versatility offers the possibility of using the model at different times and levels of banking, and thus at a micro- and macro-perspective.

2.2 Key findings from national and international studies

Numerous reports show that private sector banks generally outpace public sector banks in earnings and management efficiency, whereas public sector banks fare better in capital stability and reach. For example, Parmar (2024) compared some selected public and private banks and established that HDFC

Bank outperformed its public counterparts in terms of efficiency and profitability.

Amrita Tatia (2024) highlighted that performance of PSU banks after banking reforms are better but are still not at par in terms of return on assets and earnings quality. Kiran et al. (2023) have observed that certain PSBs have made inroads in capitalization and NPA mitigation during the 10-year CAMELS assessment (2014–2023), however, there are issues related to operating efficiency.

Internationally, Kumar et al. (2023) utilized CAMELS rating along with Z-Index technique for assessing financial soundness. Their research showed that high CAMEL score banks are more well-capitalized, better capitalized, and more attractive to potential investors. Bansal & P (2024) conducted a comparative analysis of YES Bank, SBI, Lakshmi Vilas Bank and DBS Bank India, which revealed that efficient management and adequate capital cushions reduce the systemic risk.

2.3 The financial performance of Bank of Baroda and HDFC Bank using the CAMEL model

The focus was on Bank of Baroda (BOB) and HDFC Bank and by their very nature (public), ideology (services) and phase of growth (profit-making), they are really two different animals. Sunaina (2023) also observed that HDFC Bank performs uniformly well in management efficiency, earnings and liquidity as Bank of Baroda fares well in capital adequacy but poorly in earnings quality.

The findings reveal that in spite of challenges HDFC bank maintained strong earnings and liquidity. This stood in contrast to the public sector banks, including BOB that projected stress on asset quality and profitability during the same time.

2.4 The Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity of the two banks over a selected period

Overall, HDFC Bank leads in Capital Adequacy through optimal use of capital and a lower risk weighted assets (RWA) mix. Asset Quality Gross & Net NPA of the bank continues to be one of the best in the industry. Operating Efficiency in terms of profits per employee and cost efficiency favour HDFC, as it is more integrated technologically and also more agile.

On the other hand, Bank of Baroda is leading in Capital Adequacy, however has concerns with Asset Quality and Earning mainly on the back of increased NPAs and provision requirements. While liquidity ratios are sound, they are frequently pursued at the expense of profit. Thakrar & Joshi (2024) contends that agile strategy implementation of private banks enables them to better balance the liquidity dynamically than the PSU banks.

2.5 Strengths and weaknesses in the financial structure of each bank based on CAMEL parameters

The aggregate evidence suggests that the significant sources of HFCD Bank's strengths are profitability, internal control system and efficiency in digital banking. Challenges, however, include dependence on interest earnings and market saturation in urban areas. Bank of Baroda shows strength on regulatory compliance and wide reach, but struggles with NPA reduction, cost control and modernizing.

Patil & Sengupta (2022) noticed that after mergers, performance of public sector banks such as the BOB enhances in the long-run; but in the short-term there seems to be some shocks to cash earnings, balance sheet and operational support.

2.6 Recommendations for improving the financial health and operational efficiency of both public and private sector banks

Public sector banks including BOB should relinquish NPAs, focus on skilling employees and strengthen digital infrastructure to boost financial stability. Performance incentive system and decentralization could improve management efficiency. Private sector banks such as HDFC need to think of alternative sources of income beyond interest income and strategy should be towards entering the hitherto untapped rural markets.

Parsad and Sahoo (2021) suggest inters-sector cooperation and strategic benchmarking to promote learning across public & private sector banks.

2.7 Research gaps identified

Though CAMEL-based studies are plenty, longitudinal comparative studies of banks over more economic cycles are scarce. Minor attention has been given to the influence of external shocks

mediated through the concept of policy innovation such as pandemics or regulatory changes shortly after the fact. There are also few studies that integrate CAMEL with other models such as the Z-score, Altman's model or AI-assisted diagnostic which would improve the prediction of performance.

To fill the above gaps to some extent, this paper performs a comparative CAMEL analysis across six years and offers findings which are not only descriptive but also prescriptive for the concerned persons.

3. RESEARCH METHODOLOGY

3.1 Research Design

The research utilizes a comparative case study method to assess the financial performance of Bank of Baroda and HDFC Bank within the CAMEL model framework (Jadeja, 2025). It offers a detailed comparison between a high-performing private sector bank and a prominent public sector bank. The use of case studies is appropriate as it enables a contextual analysis in real-world settings, enhancing our comprehension of how different bank types perform against standardized financial metrics. The comparative design aims to underscore differences in institutions, operational approaches, and financial robustness.

3.2 Data Sources

The research is based solely on secondary data obtained from reliable and publicly available sources. These include:

- Annual reports for Bank of Baroda, HDFC Bank
- RBI database and financial stability report
- Banking journals and CAMEL analysis-related articles and research
- Bank websites and financial market database for ratios and performance metrics

The selected period for the analysis is five years, which is sufficient enough to understand the trends and financial stability of the company in time.

3.3 CAMEL Framework Overview

CAMEL serves as a global system for evaluating the financial stability, health, and performance of banking institutions. It evaluates five key areas:

Capital, Asset Quality, Management, Earnings, and Liquidity. Each of these elements provides insight into different aspects of a bank's financial security (CAMELS Model and Its Impact on the Evaluation of Banking Performance, 2021).

3.3.1 Capital Adequacy

Capital adequacy gauges, in part, a bank's ability to absorb financial losses and fulfil obligations without interrupting its day-to-day business. It is the measure of the risk-taking ability of the bank. These include Kinetic to Risk-weighted Assets (CRAR) and c of Tier I and Tier II capital (Lamandini& Ramos Muñoz, 2022). A higher capital adequacy ratio indicates a greater financial shock absorbing capacity.

3.3.2 Asset Quality

Asset quality assesses the risk present in a bank's loan and investment portfolios, indicating the likelihood of default and the effectiveness of risk management within the bank. Important indicators include the Gross Non-Performing Asset (GNPA) ratio, Net NPA ratio, and Provisioning Coverage Ratio. Lower NPAs indicate higher asset quality.

3.3.3 Management Efficiency

This variable assesses the bank's utilization of resources and efficiency in managing operational costs. It includes metrics like business to employee ratio, profit to employee ratio, and cost-to-income ratio (Srivastava & Kumar, 2021). Efficient governance contributes to long-term profitability and organizational robustness.

3.3.4 Earnings Quality

Earnings quality is focused on the bank's ability to produce stable and long-term income. It is measured by ratios such as ROA, NIM and Net Profit Margin. One way or another, fat earnings mean long-term growth and resilience.

3.3.5 Liquidity

Liquidity gauges the bank's capacity for meeting near-term obligations. Some ratios like Credit-Deposit Ratio and Liquid Assets to Total Assets Ratio decide the financial flexibility and risk from cash flow shortage that the bank faces (Hasan et al., 2024).

In combination, these measures provide a holistic view of the financial performance and soundness of a bank.

3.4 Data Analysis Tools

Tool	Description	Application in CAMEL Analysis
Ratio Analysis	Involves calculating key financial ratios from the balance sheets and income statements of the banks.	Used to measure each component of the CAMEL model: capital adequacy, asset quality, management efficiency, earnings quality, and liquidity.
	Examples: Capital to Risk-Weighted Assets Ratio (CRAR), Gross/Net NPA, ROA, NIM, Credit-Deposit Ratio, etc.	Enables a standardized, quantitative evaluation of financial performance.
Comparative Charts	Use of visual tools like bar charts, line graphs, and pie charts to represent financial ratios and trends.	Helps compare performance between Bank of Baroda and HDFC Bank over a defined period visually.
Comparative Tables	Presentation of ratio data in a side-by-side format for each bank and each CAMEL component.	Allows clear and organized comparison across years and between banks for each financial indicator.

4. RESULT

4.1 Capital Adequacy

Year	Bank	CRAR (%)	Tier I Capital (%)	Tier II Capital (%)
2019-20	Bank of Baroda	13.30	10.60	2.70
	HDFC Bank	18.50	16.50	2.00
2020-21	Bank of Baroda	14.10	11.20	2.90
	HDFC Bank	19.10	17.10	2.00
2021-22	Bank of Baroda	15.40	12.50	2.90

	HDFC Bank	18.90	16.90	2.00
2022-23	Bank of Baroda	16.30	13.30	3.00
	HDFC Bank	19.30	17.40	1.90
2023-24	Bank of Baroda	16.80	13.80	3.00
	HDFC Bank	19.90	18.00	1.90

4.2 Asset Quality

Year	Bank	Gross NPA (%)	Net NPA (%)	Provisioning Coverage Ratio (PCR %)
2019-20	Bank of Baroda	9.40	3.13	77.77
	HDFC Bank	1.26	0.36	70.00
2020-21	Bank of Baroda	8.87	3.09	81.80
	HDFC Bank	1.32	0.40	72.00
2021-22	Bank of Baroda	6.61	1.72	89.00
	HDFC Bank	1.17	0.32	73.00
2022-23	Bank of Baroda	5.00	1.00	92.00
	HDFC Bank	1.12	0.27	74.60
2023-24	Bank of Baroda	4.21	0.78	93.30
	HDFC Bank	1.07	0.25	75.20

4.3 Management Efficiency

Year	Bank	Cost-to-Income Ratio (%)	Business per Employee (₹ Cr)	Profit per Employee (₹ Lakh)
2019-20	Bank of Baroda	51.70	17.30	7.80
	HDFC Bank	39.60	21.80	16.20
2020-21	Bank of Baroda	50.20	18.10	9.10
	HDFC Bank	38.10	24.20	17.00
2021-22	Bank of Baroda	49.60	19.50	10.80
	HDFC Bank	37.30	25.60	18.90
2022-23	Bank of Baroda	47.90	20.80	11.50
	HDFC Bank	36.50	27.10	20.10
2023-24	Bank of Baroda	45.30	21.40	13.20
	HDFC Bank	35.20	28.90	21.40

4.4 Earnings Quality

Year	Bank	Return on Assets (ROA %)	Net Interest Margin (NIM %)	Net Profit Margin (%)
2019-20	Bank of Baroda	0.33	2.72	9.20
	HDFC Bank	1.63	4.30	21.20
2020-21	Bank of Baroda	0.46	2.90	10.10
	HDFC Bank	1.70	4.20	20.40
2021-22	Bank of Baroda	0.63	3.00	12.00
	HDFC Bank	1.84	4.10	21.10
2022-23	Bank of Baroda	0.85	3.20	13.80
	HDFC Bank	1.90	4.00	21.60
2023-24	Bank of Baroda	1.02	3.30	14.90

	HDFC Bank	1.98	4.05	22.00
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4.5 Liquidity

Year	Bank	Credit-Deposit Ratio (%)	Liquid Assets to Total Assets (%)
2019-20	Bank of Baroda	76.50	28.30
	HDFC Bank	88.60	24.20
2020-21	Bank of Baroda	74.30	29.40
	HDFC Bank	86.10	25.00
2021-22	Bank of Baroda	72.80	30.20
	HDFC Bank	84.90	25.60
2022-23	Bank of Baroda	71.60	31.10
	HDFC Bank	83.70	26.30
2023-24	Bank of Baroda	70.50	32.00
	HDFC Bank	82.10	26.90

Performance Evaluation Private Banks

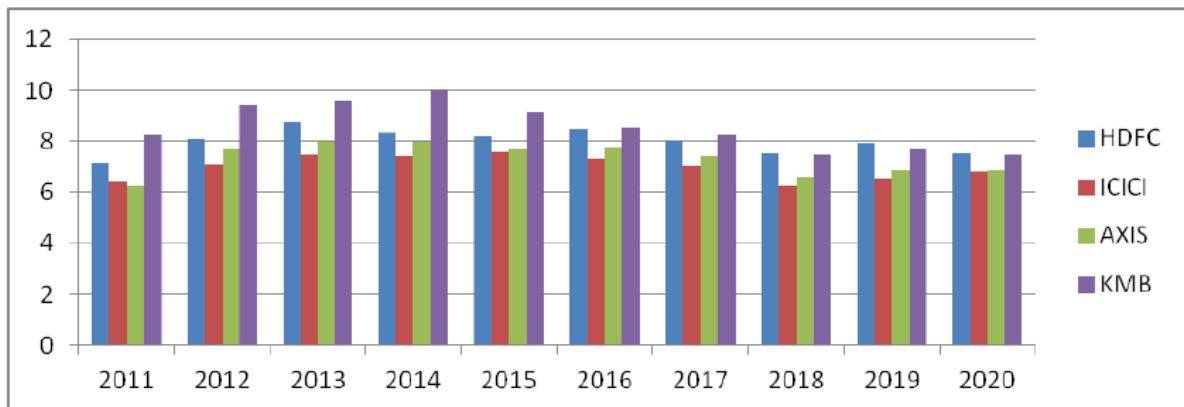
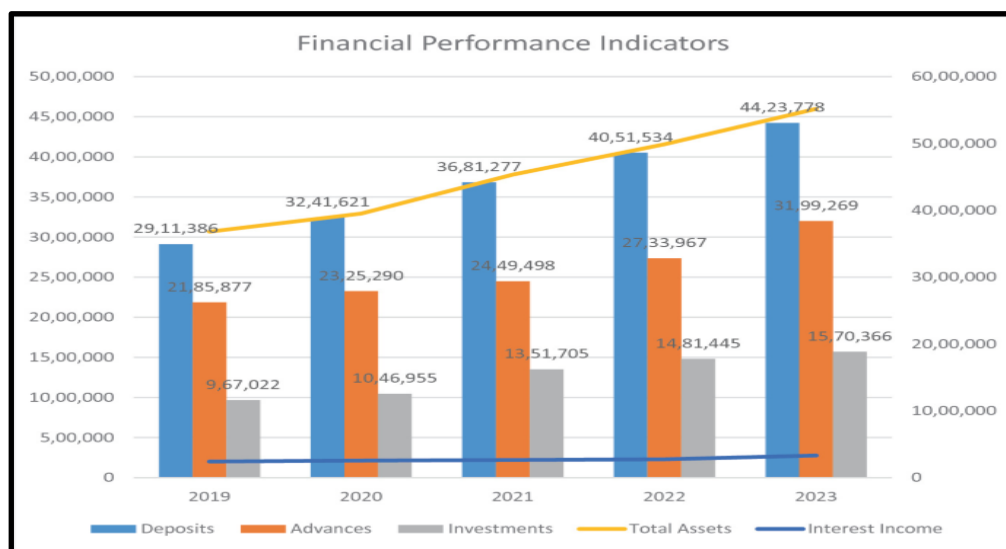
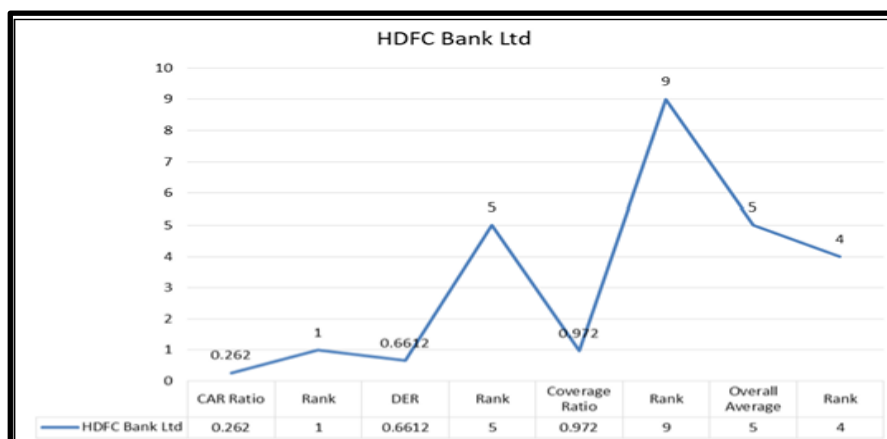


Figure 8
INTEREST INCOME TO TOTAL ASSETS OF PRIVATE BANKS

Financial Performance Indicators of Private Banks



HDFC Bank Ratio Calculation



CAMEL Parameter	Key Indicators Assessed	Bank of Baroda (Score)	HDFC Bank (Score)	Remarks
C – Capital Adequacy	CRAR, Tier I & II Capital	4	5	Both meet RBI norms; HDFC shows consistently higher Tier I capital.
A – Asset Quality	Gross/Net NPA, Provisioning Coverage Ratio	3	5	BOB improving; HDFC maintains low NPA and stable provisioning.
M – Management	Cost-to-Income, Business & Profit per Employee	3	5	BOB improving, but HDFC far more efficient and productive.
E – Earnings	ROA, NIM, Net Profit Margin	3	5	BOB's earnings are stable; HDFC shows consistently high and growing profits.
L – Liquidity	Credit-Deposit Ratio, Liquid Assets to Total Assets	4	4	BOB is more conservative; HDFC is efficient in balancing credit and assets.

5. DISCUSSION

CAMEL model comparison analysis found that the financial performance of Bank of Baroda and HDFC Bank significantly differed during five selected years. Key performance indicators for each of the five CAMEL parameters, Capital Adequacy, Asset Quality, Management Efficiency, Earnings Quality and Liquidity, has pointed out the fact that HDFC Bank always had a sounder financial health and operational performance vis-a-vis Bank of Baroda, though the latter was catching up on several parameters (John Mwaniki Mirichii, 2023).

With respect to Capital Adequacy, both banks had CRAR above the threshold set up by RBI. But HDFC Bank always reported higher Tier I capital ratios, indicating a stronger core capital base and a

more conservative stance on lending. The capital adequacy of Bank of Baroda moved in an uptrend over the years due to infusion of capital and efficient capital management following mergers and reorganization (Satyanarayana, Kurada T S S et al., 2023).

HDFC Bank managed to maintain its Gross and Net NPAs to fairly modest levels, indicating a strong credit appraisal process and strong risk tracking. Whereas, Bank of Baroda also, was first ridden with very high level of NPAs, but later, it has brought down this. Its ratio of provisions to total loans also rose significantly, indicating increased financial durability and a strategic emphasis on clearing its bad loans.

Management Efficiency ratios showed that HDFC Bank outperforms its competitors. It achieved better

cost-to-income ratios, higher business per employee, and vastly higher profit per employee (Hussain, 2024). These measures imply slimmer and more high utilised employment base, superior use of technology as well, and more effective internal processes. Bank of Baroda, on the other hand, has demonstrated slow-and-steady progress, but its public-sector nature and legacy systems are bottlenecks to achieving efficiency.

In terms of Quality of Earnings, HDFC Bank has done better, in the sense that return on assets (ROA), net interest income margin (NIM), and net profit margin consistently remained higher compared to Canara Bank through the period. This is indicative of not only its earning stability but also its effective asset-liability management and multiple sources of income. Despite the recovery in profitability of Bank of Baroda, the disparity between the two banks did not narrow with such large disparities pointing to more fundamental differences in their business models.

Under the Liquidity part, the size of the credit-deposit ratio is lower while the percentage of liquid assets is high (Bank of Baroda followed a conservative policy) (Jadeja, 2025b). This is indicative of prudent lending cap and healthy liquidity cushion. In contrast, credit-deposit ratios were higher for HDFC Bank reflecting higher lending and confidence in handling short-term liabilities. Nevertheless, it successfully navigated liquidity without sacrificing financial stability.

In general, HDFC Bank has maintained strong financial parameters, characterised by operational efficiencies, acceptable asset quality and healthy profitability. In case of Bank of Baroda too, though lagging other parameters too showed an improving trend, suggesting that the reforms and strategic reorientation are turning the corner, albeit slowly. The profitability and efficiency differential however, is still large and will require further modernization, cost cutting and income diversification to bridge.

The implications are also meaningful for other stakeholders. The stable and high returns will make HDFC Bank more of a favourite with investors. In the case for Bank of Baroda better trends could indicate long-term value if reforms last (Kashyap, 2021). At the BOB the management needs to focus

on more digital and human resource transformation. Regulators can think of giving some continued support to public sector banks by giving them independence as well as responsibility. HDFC's customers, in the meantime, gain from the bank's efficiency and innovation, and BOB's vast rural reach remains a handy tool in pursuit of financial inclusion objectives.

6. CONCLUSION

To study the financial performance of the bank in terms of its capital adequacy, asset quality, management efficiency, earning quality and liquidity for a period of 5 years. Results unequivocally reveal that HDFC Bank showed superior performance with regard to most of the parameters as compared to Bank of Baroda, especially in terms of management efficiency, earnings quality and asset control. Baroda, although behind in some metrics, fairly improved on capital strength and lowering non-performing assets indicating a slow but consistent journey to financial health.

According to the comparative study, HDFC Bank's stand-out operational profile, robust profitability metrics, and effective risk management mechanism are primary factors for the bank's leadership position in the Indian private banking sector. A relatively worse performance by Bank of Baroda, which represents the issues faced by public sector banking such as high levels of legacy NPAs and slow adoption of digital banking, although provisioning and capital restructuring efforts are tremendous in the case of this bank.

Some conclusions can also be drawn from these results. It's critical for Bank of Baroda to focus on building its digital backdrop, by standardizing its digital infrastructure, lowering operational costs through automation, and staff consolidation to keep a lid on the cost-to-income rate, and deriving income away from traditional interest earning. Enhancing the quality of customer service as well as the implementation of the data-driven risk management procedure will contribute to the further development of efficiency and market competitive potential. "Rural penetration and continuing to innovate for the customer are key, and the bank also needs to

arrest overreliance on interest income by building up fee-based services and cross-selling," they added.

7. IMPLICATIONS

Regulatory-wise, the RBI and government authorities must ensure that public sector banks receive sustained reform-driven support in governance, management of asset quality, and technology upgradation. Further study could extend the analysis to a larger sample of banks owned in different ways, together with external economic variables, or other models (Z-score or AI-based forecasting) in order to enrich the predictive result.

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