

CRAMEL Analysis Evaluating Performance of Select Private Sectors Banks

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Abstract—The banking sector plays a fundamental role in promoting economic development and acts as a key driver of growth. CRAMEL framework has gained importance as a comprehensive approach to analyzing banking performance in a rapidly evolving financial landscape. The present study seeks to address this gap by systematically analyzing the financial efficiency and performance of selected banks in India using CRAMEL-based financial indicators. The objective is to analyse the financial performance of the select Private sectors Banks using CRAMEL variables. Overall, the findings indicate that profitability in private sector banks is driven by a combination of asset quality, operational efficiency, workforce productivity, investment management, and income diversification strategies. The analysis concludes that the financial performance of private sector banks, as measured by Return on Assets (ROA), is significantly influenced by a combination of asset quality, operational efficiency, cost management, investment practices, and income structure. Sustained financial growth in private sector banks depends on a balanced approach that integrates risk control, operational excellence, and diversified revenue generation strategies.

Index Terms—Finance, Banks, Private Sector, CRAMEL, Performance, etc.

I. INTRODUCTION

The banking sector plays a fundamental role in promoting economic development and acts as a key driver of growth. As a core component of the economic system, changes in banking operations can significantly influence a nation's overall progress. Hence, maintaining a stable and robust banking structure is essential for achieving sustainable development over time. Broadly, the financial system provides the platform for capital formation by

channeling savings into productive investments. Within this framework, the stock exchange serves as an important mechanism, facilitating continuous capital mobilization and wealth creation in the economy.

II. CRAMEL METHODOLOGY

A sound financial system is essential for ensuring economic stability and long-term sustainability. Assessing the financial performance of banks is a vital aspect of this system and is commonly evaluated using indicators such as profitability, liquidity, and efficiency in asset utilization. Beyond these conventional measures, the CRAMEL framework has gained importance as a comprehensive approach to analyzing banking performance in a rapidly evolving financial landscape. CRAMEL represents a set of six key financial dimensions used to evaluate the overall effectiveness and stability of banking institutions.

- C – Capital Adequacy
- R – Resource Utilization
- A – Asset Quality
- M – Management Competence
- E – Earnings Performance
- L – Liquidity Position

In summary, the study utilizes the CRAMEL framework to derive financial insights and assess the performance and efficiency of selected public and private sector banks. For the evaluation of private sector banks in India, CRAMEL-based financial ratios are applied as a systematic approach to examine the key factors influencing banking effectiveness and overall financial health.

III. STATEMENT OF THE PROBLEM

The banking sector plays a pivotal role in sustaining economic growth, yet increasing competition, rising non-performing assets, changing regulatory norms, and evolving financial practices have made it essential to continuously evaluate the financial health of banks. Despite the availability of traditional financial indicators, there remains a need for a more comprehensive and structured framework to assess banking performance across multiple dimensions. In this context, the CRAMEL model provides an integrated approach to examine key aspects such as capital adequacy, resource management, asset quality, management efficiency, earnings, and liquidity. However, there is limited empirical evidence comparing the effectiveness and financial performance of private sector banks using this framework. Therefore, the present study seeks to address this gap by systematically analyzing the financial efficiency and performance of selected banks in India using CRAMEL-based financial indicators.

OBJECTIVE OF THE STUDY

To analyse the financial performance of the select Private sectors Banks using CRAMEL model

IV. LITERATURE REVIEW

Barker et al. (1993) reported that the CAMEL framework continues to be an effective and reliable tool for evaluating banks, even when extensive publicly available data on their performance and condition is considered. The composite index was found to function efficiently as a predictive mechanism for identifying potential bank failures, with ratings derived from a combination of quantitative indicators and qualitative judgments.

Mistry and Savani (2015) categorized Indian private sector banks based on their financial characteristics and examined their performance patterns. Their findings indicated that return on assets and interest income are negatively associated with operational efficiency, whereas asset utilization and bank size demonstrate a positive relationship. The study further emphasized that operational efficiency, effective asset management, and the scale of operations play a significant role in determining financial performance.

Balikai, K. B., & Bannigol, K. R. (2019) highlighted the importance of the banking sector within the Indian economy by evaluating the financial stability of selected nationalized banks, including Andhra Bank, Corporation Bank, Oriental Bank of Commerce, Punjab and Sindh Bank, Vijaya Bank, and Punjab National Bank. Applying the CAMEL framework over the period from 2008 to 2018, the study found that Andhra Bank consistently performed better than its counterparts across most of the assessed parameters.

V. METHODOLOGY OF THE STUDY

This study follows an analytical research design and is based entirely on secondary data relating to selected public and private sector banks. The private sector banks included in the study were selected from the list issued by the Reserve Bank of India (RBI). The sample comprises five major private banks—Axis Bank Limited, HDFC Bank Limited, ICICI Bank Limited, IndusInd Bank Limited, and Kotak Mahindra Bank Limited. Relevant data were obtained from secondary sources, including annual reports available through the RBI database, as well as official documents presenting information on asset–liability positions and income–expenditure statements.

The CRAMEL framework is applied to assess the efficiency and financial performance of these selected private sector banks over a ten-year period from 2014–2015 to 2023–2024. For the purpose of analysis, Multiple Regression Analysis is employed to examine the relationship between financial indicators and overall banking performance.

VI. PRIVATE SECTOR BANKS

Multiple regression analysis was performed to identify the financial indicators that significantly influence the CRAMEL framework in private sector banks over the study period. The results demonstrate a strong association between the selected independent variables and the dependent variable, Return on Assets (ROA).

Predictors: (Constant), A2 Ratio of net NPA To net advances, E2 Ratio of operating profits to total assets, A5 Ratio of wage bills to total income, R1. Investment - Deposit Ratio, E3 Ratio of net interest income to total assets (Net Interest Margin).

Table 1: Model Results of Private Sector Banks

R Value	R Square Value	Adj. R Square Value	df – V ₁	df – V ₂	F-Change	Significance	Durbin-Watson
.895 ^e	.801	.779	5	44	35.460	@ 1% level	2.106

Dependent Variable: E1 Return on assets

The model exhibits a high degree of explanatory power, with an R-value of 0.895, indicating a strong positive relationship between the predictors and ROA. The R² value of 0.801 shows that 80.1% of the variation in ROA is accounted for by the selected financial indicators. The Adjusted R² of 0.779 confirms the stability and reliability of the model after adjusting for the number of predictors included. The overall model is statistically significant, as reflected by the F-value of 35.460 ($p < 0.01$), suggesting that the independent variables jointly exert a meaningful influence on profitability. The degrees of freedom (V₁ = 5, V₂ = 44) further support the adequacy of the sample size.

The Durbin-Watson statistic of 2.106 indicates the absence of autocorrelation in the residuals, thereby enhancing the credibility of the regression model. Among the explanatory variables, the Ratio of Net

NPA to Net Advances (A2) plays a crucial role, as higher non-performing assets adversely affect profitability. The Ratio of Operating Profits to Total Assets (E2) reflects operational efficiency, where higher values indicate better utilization of resources. The Ratio of Wage Bills to Total Income (A5) captures the impact of employee-related expenses on profitability. The Investment-Deposit Ratio (R1) represents the effectiveness of investment decisions, while the Ratio of Net Interest Income to Total Assets (E3), or Net Interest Margin (NIM), measures the bank's ability to generate income from its asset base. Stepwise regression analysis was conducted to examine the individual contribution of each independent variable toward ROA. The CRAMEL framework includes twenty-one financial indicators, from which the most significant predictors were identified.

Table 2: Regression Analysis - Results of Private Sector Banks

Variables Name	Un. Std. Co-efficient	Std. Error	Std. Co-efficient	't' Value	Sig.
(Constant)	-2.956	.503		-5.878	.000
Ratio of net NPA To net advances	-.275	.042	-.608	-6.612	.000
Ratio of operating profits to total assets	1.345	.170	.830	7.908	.000
Ratio of wage bills to total income	.137	.028	.561	4.899	.000
Investment - Deposit Ratio	.021	.005	.275	3.819	.000
Ratio of net interest income to total assets (Net Interest Margin)	-.339	.142	-.339	-2.390	.021

Dependent Variable: Return on assets

The regression results indicate that the constant term (-2.956) is statistically significant ($p < 0.001$), suggesting that in the absence of explanatory variables, ROA would be negative. However, the inclusion of financial indicators substantially explains variations in profitability.

The Ratio of Net NPA to Net Advances shows a strong negative and significant effect on ROA ($\beta = -0.608$, $p < 0.001$). The unstandardized coefficient (-0.275) implies that an increase in NPAs leads to a considerable decline in profitability. This highlights

the importance of maintaining asset quality through effective credit appraisal and recovery mechanisms.

In contrast, the Ratio of Operating Profits to Total Assets emerges as the most influential variable, exerting a strong positive impact on ROA ($\beta = 0.830$, $p < 0.001$). The coefficient value of 1.345 indicates that improved operational efficiency significantly enhances profitability. This underscores the importance of cost control, efficient revenue generation, and strategic financial management in private sector banks.

The Ratio of Wage Bills to Total Income also demonstrates a positive and statistically significant relationship with ROA ($\beta = 0.561$, $p < 0.001$), with a coefficient of 0.137. This suggests that employee-related expenditure, when aligned with productivity, contributes positively to performance. Skilled and adequately compensated employees can enhance service quality, innovation, and operational effectiveness, thereby supporting profitability.

Similarly, the Investment–Deposit Ratio has a positive and significant influence on ROA ($\beta = 0.275$, $p < 0.001$). The coefficient (0.021) indicates that efficient deployment of deposits into investment avenues contributes to improved financial outcomes. This reflects the importance of sound investment strategies and optimal asset allocation.

However, the Ratio of Net Interest Income to Total Assets (NIM) shows a negative relationship with ROA ($\beta = -0.339$, $p = 0.021$). This finding suggests that a higher dependence on interest income alone may not necessarily lead to higher profitability. Factors such as increased funding costs or competitive pressures may offset the benefits of higher margins. Therefore, diversification of income sources beyond interest-based earnings becomes essential.

Table 3: Stepwise Analysis of CRAMEL predicted with Return on Assets – Results of Private Sector Banks

Variable	R	R ²	Change in R ²	% of contribution
Ratio of net NPA To net advances	.587	.344	.331	34.4
Ratio of operating profits to total assets	.746	.556	.537	55.6
Ratio of wage bills to total income	.822	.676	.655	67.6
Investment - Deposit Ratio	.881	.775	.755	75.5
Ratio of net interest income to total assets (Net Interest Margin)	.895	.801	.779	77.9

The stepwise regression results further highlight the incremental contribution of each variable in explaining ROA. The overall model explains 80.1% of the variance, indicating strong predictive capability.

The Ratio of Net NPA to Net Advances alone accounts for 34.4% of the variation in ROA ($R^2 = 0.344$), making it the most critical determinant. This emphasizes the need for effective risk management practices.

The inclusion of the Ratio of Operating Profits to Total Assets increases the explanatory power to 55.6% ($R^2 = 0.556$), indicating the dominant role of operational efficiency.

When the Ratio of Wage Bills to Total Income is added, the explanatory power rises to 67.6% ($R^2 = 0.676$), reflecting the contribution of human resource-related factors.

The addition of the Investment–Deposit Ratio further improves the model to 75.5% ($R^2 = 0.755$), highlighting the importance of investment decisions. Finally, incorporating Net Interest Margin increases the total explanatory power to 80.1% ($R^2 = 0.801$), confirming the role of income structure in determining profitability.

Overall, the findings indicate that profitability in private sector banks is driven by a combination of asset quality, operational efficiency, workforce productivity, investment management, and income diversification strategies.

VII. SUMMARY OF RESULTS

The regression results for private sector banks indicate a strong and statistically significant relationship between the selected financial indicators and Return on Assets (ROA). The model demonstrates high explanatory power, with 80.1% of the variation in ROA accounted for by the predictors, supported by a strong R-value and significant F-statistic. The absence of autocorrelation further confirms the reliability of the model. Among the variables, asset quality, operational efficiency, cost structure, investment management, and income composition emerge as key determinants influencing profitability under the CRAMEL framework.

In terms of individual contributions, the Ratio of Net NPA to Net Advances exerts a significant negative impact on ROA, highlighting the importance of effective credit risk management. Conversely, the

Ratio of Operating Profits to Total Assets shows the strongest positive influence, emphasizing the role of operational efficiency in enhancing profitability. Wage-related expenses and investment decisions also contribute positively, reflecting the importance of human capital and strategic asset allocation. However, Net Interest Margin exhibits a negative effect, suggesting that reliance on interest income alone may not ensure higher profitability. Overall, the findings indicate that private sector banks achieve better financial performance through a balanced approach involving asset quality maintenance, efficient operations, prudent investment strategies, and diversified income sources.

VIII. SUGGESTIONS

Private sector banks should prioritize strengthening asset quality management to minimize the adverse effects of non-performing assets on profitability. This can be achieved through more rigorous credit appraisal systems, continuous monitoring of loan portfolios, and faster recovery mechanisms. Adoption of advanced risk assessment tools, data analytics, and early warning systems can further help in identifying potential defaults at an early stage. Strengthening internal controls and enhancing borrower evaluation practices will ensure sustainable financial stability.

Improving operational efficiency should remain a central focus, as it has the strongest positive influence on profitability. Banks can achieve this by optimizing cost structures, enhancing process automation, and expanding fee-based services to diversify revenue streams. Investment in employee training and performance-based compensation systems will improve productivity and service quality, thereby supporting long-term profitability. At the same time, maintaining an optimal balance between wage expenses and revenue generation is essential to avoid pressure on financial margins.

Private sector banks should also adopt well-structured investment and income diversification strategies to enhance overall financial performance. Efficient deployment of deposits into high-yielding and low-risk investment avenues can improve returns, while reducing overdependence on interest income. Expanding non-interest income sources such as wealth management, digital banking services, and transaction-based revenues will help sustain

profitability in a competitive environment. A balanced approach combining prudent investment decisions and diversified income streams will ensure resilience and consistent growth.

IX. CONCLUSION

The analysis concludes that the financial performance of private sector banks, as measured by Return on Assets (ROA), is significantly influenced by a combination of asset quality, operational efficiency, cost management, investment practices, and income structure. The findings highlight that while effective management of non-performing assets is essential to prevent erosion of profitability, strong operational performance and efficient utilization of resources serve as the primary drivers of financial success. Additionally, strategic investment decisions and optimal workforce management contribute positively to overall performance, whereas excessive reliance on interest-based income may limit profitability. Overall, sustained financial growth in private sector banks depends on a balanced approach that integrates risk control, operational excellence, and diversified revenue generation strategies.

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