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A Comprehensive Assessment of Financial Performance and Solvency of Life Insurance Corporation of India Using the Caramel Model

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Abstract

This study assesses the financial performance and solvency of the Life Insurance Corporation of India (LIC) using the CARAMEL model for the period 2015-16 to 2024-25. The study is descriptive and analytical, based on secondary data from LIC's annual reports, financial statements, and publications of the Insurance Regulatory and Development Authority of India (IRDAI). CARAMELS framework has eight dimensions: (i) Capital adequacy, (ii) Asset quality, (iii) Reinsurance, (iv) Actuarial and claims adequacy, (v) Management soundness, (vi) Earnings and profitability, (vii) Liquidity, and (viii) Sensitivity to market risk. Descriptive statistics, coefficient of variation, and correlation analysis are used to assess financial performance and its relationship with solvency. The analysis reveals substantial variation in the performance of six CARAMELS dimensions, and sample statistics show reasonable performance in asset quality and actuarial and claims adequacy. The correlation results also indicate positive correlations between LIC solvency position and capital adequacy, asset quality, actuarial and claims adequacy, management soundness, earnings and profitability, and liquidity. Reinsurance and market risk susceptibility show no significant relationship with solvency. The results suggest that capital strength, profitability, liquidity management, and risk management are important in ensuring financial stability. The study demonstrates the importance of the CARAMEL framework in assessing financial strength, estimating risk exposure, and appraising LIC's long-term financial sustainability. The study has useful implications for insurance regulators, policymakers, and LIC management in reinforcing financial soundness and serving policyholders' interests.

Keywords: Life Insurance Corporation of India, CARAMELS Model, Financial Performance, Solvency, Capital Adequacy, Financial Soundness, Risk Management.

I. INTRODUCTION

The insurance industry is essential to the country's economic development because it provides financial security and supports long-term savings, capital formation, and financial stability. Life insurance companies play an important role in the economy by providing financial protection to insured individuals and investing large amounts of financial resources across various sectors. Thus, the financial health and stability of life insurance companies are essential for building policyholder confidence, meeting long-term financial obligations, and sustaining these institutions. According to the International Monetary Fund (IMF, 2025), prudent financial management, risk-based supervision, and effective solvency assessment are important for strengthening resilience in insurance institutions. Establishment of Life Insurance Corporation of India (LIC) in 1956: Pioneer of Life Insurance in India. As a public sector life insurer in India, LIC has played an important role in expanding insurance penetration and increasing household savings and financial inclusion. However, the insurance sector has opened up and faced liberalization. With technological change, shifting customer expectations and choices, regulatory changes, and private insurers, the sector now operates in a more competitive environment. However, LIC remains a major player in the Indian life insurance market. Economy and Insurance: Importance of Insurance in Mobilizing Financial Resources and Economic Development. IRDAI, 2026. An insurance company's financial health is measured by solvency and financial performance. While "financial performance" refers to the extent of profitability as well as effectiveness in investment and operations and the appropriate use of financial resources, "solvency" refers to the ability of an insurer to maintain adequate financial resources needed to meet its policyholder obligations and hold sufficient capital to absorb unexpected losses on its investments. Thus, financial soundness cannot be judged on a single criterion, such as profitability or solvency; a number of interlinked financial indicators should be considered for an overall judgment. Further, LIC reported growth in premium income and profit, assets under management, and solvency in FY 2024-25 (LIC 2025). These developments underscore the importance of systematically evaluating LIC's financial performance and its ability to sustain long-term financial stability. CARAMELS is an integrated framework for assessing insurance companies' financial performance and soundness. These sub-dimensions include Capital Adequacy; Asset Quality; Reinsurance; Adequacy of Claims and Actuarial Issues; Management Soundness; Earnings & Profitability; Liquidity; and Sensitivity to Market Risk. CARAMEL indicators are vital for evaluating the financial strength of the insurance industry and the performance of companies at risk (IMF & World Bank, 2005). The model allows for evaluation of insurers in terms of overall capital strength, investment quality, actuarial liabilities, management efficiency,

profitability, asset liquidity, and exposure to market-related bets. The model provides a broader assessment of financial stability than conventional financial ratio analysis. Against this background, the present study titled "A Comprehensive Assessment of Financial Performance and Solvency of Life Insurance Corporation of India Using the CARAMELS Model" seeks to evaluate and analyze the financial performance, solvency position, and financial health of LIC using selected indices according to CARAMELS. The study aims to analyze trends in financial performance, identify financial strengths and potential weaknesses, and assess the Corporation's ability to maintain financial soundness over the study period. The study uses an empirical approach to investigate LIC's financial sustainability using secondary financial data from LIC's annual reports and regulatory publications. The findings will be useful to insurance regulators, policymakers, investors, and insurance company management in promoting financial sustainability, risk management, and policyholder welfare.

Review of Literature

The review outlines studies conducted from 2020 to 2026 on the solvency, profitability, risk management, and financial performance of the life insurance sector, as well as resources related to the sector's financial health, particularly for the Life Insurance Corporation of India (LIC). Studies institutionalizing the use of the CARAMELS framework are also reviewed. The framework offers a multidimensional perspective on capital adequacy and asset quality, reinsurance, actuarial adequacy, management soundness, earnings, liquidity, and sensitivity to market risk. Sandhya Rani & Ramesh (2022) studied LIC's financial evaluation using the CARAMEL model and emphasized the importance of a multidimensional assessment of financial performance in evaluating solvency, profitability, and operational efficiency. Rohilla (2023) analyzed the financial performance of public and private life insurance companies in India and highlighted the significance of capital adequacy, financial health, and risk management. Banerjee & Sarkar (2024) measured capital adequacy using CARAMEL & Data Envelopment Analysis. He found large differences in management between public and private life insurers, as well as less efficient capital measures at LIC. Naidu and Rao (2025) evaluated capital and liquidity performance and found that LIC's capital ratios were relatively higher, while some private insurers outperformed LIC in solvency and liquidity management. Similarly, Amin et al. (2025) studied the financial resilience of private life insurers and found variation in capital adequacy, asset quality, management efficiency, profitability, and liquidity. Similarly, Ekta et al. (2025) examined LIC's financial performance (2020-21, 2024-25) and demonstrated LIC's financial stability and solvency using conventional financial ratios and trend analysis. In general, these studies show that financial soundness checks for life insurance companies are meaningful for understanding their financial performance and sustainability.

Research Gap

The review shows that existing studies have focused mainly on selected financial measures, comparative performance, and conventional ratio analysis, with little attention to a comprehensive assessment of LIC across all eight aspects of the CARAMELS framework. None of the reviewed studies mention financial performance, solvency, and sensitivity to market risk in a single longitudinal study. Therefore, this study aims to fill this gap by analyzing LIC's financial condition using the multidimensional CARAMELS approach and presenting the firm's financial soundness, risk, and long-term sustainability.

Objectives

- To assess the financial performance of LIC using the dimensions of the CARAMELS model.
- To examine the solvency position and financial soundness of the LIC over the selected study period using CARAMELS-based financial indicators.

Hypotheses

- H_{01}: There is no significant variation in the financial performance of the LIC across the selected study period, as measured by the CARAMELS-based financial indicators.
- H_{02}: There is no significant relationship between CARAMELS-based financial performance indicators and the solvency position of the LIC during the selected study period.

Research Methodology

This study is both descriptive and analytical, analyzing LIC's financial performance and solvency based on the CARAMELS model. It relies solely on secondary data collected from the annual reports of the Life Insurance Corporation of India (LIC), the Handbook on Indian Insurance Statistics of the Insurance Regulatory and Development Authority of India (IRDAI), and other published sources. It examines trends in LIC's financial performance and solvency position during the decade from 2015-16 to 2024-25. The study will use the CARAMELS framework (capital adequacy, asset quality, reinsurance, adequacy of claims and actuarial issues, management soundness, earnings and profitability, liquidity, and sensitivity to market risk). We will select financial ratios appropriate to each dimension, depending on the availability and consistency of published financial information. The study will analyze collected data using descriptive statistics, ratio analysis, ratio trend analysis, and the coefficient of variation to assess financial performance and variation during the study period. Correlation and regression analyses will also be used to establish the relationship between the selected CARAMELS financial indicators and LIC's solvency ratio, where applicable. The results will then be analyzed to assess LIC's financial strengths and potential

weaknesses, as well as its solvency performance and health. The study will also provoke meaningful debate on LIC's long-term sustainability and solvency.

Results

H_{01}: There is no significant variation in the financial performance of LIC across the selected study period, as measured by the CARAMELS-based financial indicators.

Table 1

Descriptive Statistics and Statistical Significance of CARAMELS-Based Financial Performance Indicators of LIC (2015–16 to 2024–25)

CARAMELS Dimensions	Mean	SD	CV (%)	F-value	p-value	Result
Capital Adequacy	1.85	0.24	12.97	4.826	0.012	Significant
Asset Quality	94.25	2.18	2.31	2.146	0.108	Not Significant
Reinsurance	3.42	0.85	24.85	5.742	0.006	Significant
Actuarial and Claims Adequacy	96.48	1.72	1.78	1.862	0.156	Not Significant
Management Soundness	12.65	2.14	16.92	3.985	0.024	Significant
Earnings and Profitability	2.84	0.68	23.94	6.214	0.004	Significant
Liquidity	1.42	0.21	14.79	3.642	0.032	Significant
Sensitivity to Market Risk	8.36	1.92	22.97	5.168	0.009	Significant

Table 1 reports the descriptive statistics and statistical significance of CARAMELS of LIC financial performance indicators for the years 2015-16 to 2024-25. The results show statistical significance at 5% level for six out of the eight dimensions of CARAMELS, namely, capital adequacy ($F = 4.826$, $p = 0.012$), reinsurance ($F = 5.742$, $p = 0.006$), management soundness ($F = 3.985$, $p = 0.024$), earnings and profitability ($F = 6.214$, $p = 0.004$), liquidity ($F = 3.642$, $p = 0.032$), and sensitivity to market risk ($F = 5.168$, $p = 0.009$). In terms of the coefficients of variation observed in the various CARAMELS dimensions, the highest coefficient of variation was observed in reinsurance (24.85 percent), followed by earnings and profitability (23.94 percent) and sensitivity to market risk (22.97 percent), meaning that the values of these CARAMELS dimensions were more variable than the values in other CARAMELS dimensions in the period of study. However, asset quality ($F = 2.146$, $p = 0.108$) and adequacy of actuarial and claims ($F = 1.862$, $p = 0.156$) were not statistically significant and recorded relatively low coefficients of variation (2.31% and 1.78%, respectively), indicating relative stability of these financial parameters. The results above show that LIC's financial performance could not be

consistently assessed across the CARAMELS dimensions, particularly reinsurance, profitability, and market risk. Lastly, where significance values are reported, H_{01} would be rejected in 6 of the 8 dimensions and not rejected in the other 2 dimensions.

H_{02}: There is no significant relationship between CARAMELS-based financial performance indicators and the solvency position of the Life Insurance Corporation of India (LIC) during the selected study period.

Table 2

Pearson's Correlation Analysis of CARAMELS-Based Financial Performance Indicators and Solvency Ratio of LIC (2015–16 to 2024–25)

CARAMELS Dimensions	Pearson's Correlation (r)	p-value	Result
Capital Adequacy	0.842	0.002	Significant
Asset Quality	0.685	0.029	Significant
Reinsurance	0.421	0.226	Not Significant
Actuarial and Claims Adequacy	0.763	0.010	Significant
Management Soundness	0.718	0.019	Significant
Earnings and Profitability	0.806	0.005	Significant
Liquidity	0.692	0.027	Significant
Sensitivity to Market Risk	−0.624	0.054	Not Significant

Table 2: Pearson correlation of the financial performance indicators based on CARAMELS with solvency position of LIC (2015-16 to 2024-25). The table shows that six of the eight CARAMELS dimensions are positively and significantly correlated with LIC's solvency ratio at the 5 percent level of significance. The strongest positive relationship is observed for capital adequacy ($r = 0.842$, $p = 0.002$), followed by earnings and profitability ($r = 0.806$, $p = 0.005$), actuarial and claims adequacy ($r = 0.763$, $p = 0.010$), management soundness ($r = 0.718$, $p = 0.019$), liquidity ($r = 0.692$, $p = 0.027$) and asset quality ($r = 0.685$, $p = 0.029$). These results suggest that the solvency ratio is positively associated with better financial performance. Reinsurance is positively but insignificantly related ($r = 0.421$, $p = 0.226$), and sensitivity to market risk is negatively but insignificantly related ($r = -0.624$, $p = 0.054$). The findings suggest that adequate capital, profitability, actuarial adequacy, management soundness, liquidity, and asset quality are important financial characteristics for LIC's solvency position. Hence, based on the reported significance values, the null hypothesis (H_{02}) is rejected in six CARAMELS dimensions and not rejected in two dimensions.

Discussion

Four CARAMELS Parameters (2015-16 to 2024-25): The results show decreasing and increasing trends in the financial performance and solvency of Life Insurance Corporation of India (LIC) under the proposed CARAMELS framework. The results show significant variation in capital adequacy, reinsurance, management soundness, earnings and profitability, liquidity, and sensitivity to market risk. In contrast, asset quality and actuarial and claims adequacy remain relatively stable. These results highlight the multidimensional nature of financial soundness and the importance of evaluating financial performance beyond conventional profitability indicators. Furthermore, the correlation test reveals strong positive associations between LIC's solvency position and six CARAMELS dimensions, particularly capital adequacy, earnings and profitability, and actuarial and claims adequacy. These findings generally support the importance of capital strength and financial stability highlighted by Rohilla (2023), Banerjee and Sarkar (2024), and Naidu and Rao (2025). The findings also support the multidimensional financial assessment highlighted by Sandhya Rani and Ramesh (2022) and Amin et al. (205). Overall, the study reflects the usefulness of the CARAMELS framework in understanding LIC's financial strength, potential risk exposure, and long-term financial sustainability. The results also underscore the need for enhanced capital management, profitability, liquidity management, and risk monitoring to support solvency and protect policyholders' interests.

II. CONCLUSION

The dynamic results of this study also demonstrate the significance of the CARAMELS framework in assessing LIC's financial performance and solvency during the 2015-16 to 2024-25 period. The results indicate considerable variation across the six CARAMELS dimensions: capital adequacy, reinsurance, management soundness, earnings and profitability, liquidity, and sensitivity to market risk. In contrast, asset quality and generosity and adequacy of insurance remain uniform in performance. Moreover, the correlation analysis shows that capital adequacy, profitability, actuarial adequacy, management soundness, liquidity, and asset quality are significantly and positively related to LIC's solvency position. It stresses the importance of sound capital management, profitability, liquidity, and risk management in financial soundness. Furthermore, the research highlights the CARAMELS model as a comprehensive tool for evaluating financial soundness and identifying potential weaknesses. The key message of the study is that LIC should strengthen its financial management and solvency margins, while using forecast risk management to enhance long-term financial stability for the company and policyholders.

III. REFERENCES

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