**Analyzing Financial Stability and Performance of Indian Banks Through Capital Adequacy and Debt-Equity Ratios: A Comprehensive Statistical Review**

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ABSTRACT

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| **Aims:** This study analyzes the financial stability of selected Indian banks using Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER) over five financial years (2019-2024). **Study design:**This study applied statistical techniques, including descriptive statistics for measures of central tendency (mean, median, mode) and dispersion (standard deviation, variance) for the Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER). Line charts were created to visualize trends. For hypothesis testing, ANOVA was conducted to compare the mean CAR and DER across different banks, with Bonferroni tests used for specific pairwise comparisons. **Duration of Study:**2019-2020 to 2023- 2024.**Methodology:**This study used secondary data from bank annual reports, regulatory filings from the Reserve Bank of India (RBI), and MoneyControl.com.This study applied statistical techniques, including descriptive statistics for measures of central tendency (mean, median, mode) and dispersion (standard deviation, variance) for the Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER). For hypothesis testing, ANOVA was conducted to compare the mean CAR and DER across different banks, with Bonferroni tests used for specific pairwise comparisons**Results:** The findings indicate that Kotak Mahindra Bank and HDFC Bank maintain strong CAR with low variability, ensuring stability. In contrast, Union Bank and SBI exhibit lower CAR and higher variability, indicating potential risks. SBI and Axis Bank manage leverage effectively, while Union Bank and Kotak Mahindra Bank show significant DER fluctuations. ANOVA results suggest no significant differences in CAR and DER across banks, highlighting overall stability**Conclusion:**This study emphasizes the significance of financial stability and performance evaluation in the banking sector, focusing on key ratios like the Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER). It finds that private sector banks, such as Kotak Mahindra Bank and HDFC Bank, outperform public sector banks, which exhibit higher variability in performance. While ANOVA tests show no significant difference in capital adequacy levels across banks, the notable variability in DER highlights the need for improved debt management. |

***Keywords****: Bank Performance, Capital Adequacy Ratio (CAR) , Debt-Equity Ratio (DER), Financial Stability, Profitability Analysis*

1. INTRODUCTION

The banking sector is the cornerstone of any economy, facilitating financial stability, economic growth, and inclusive development (Levine, 2005). In India, the banking landscape has undergone a paradigm shift due to economic liberalization, technological advancements, and regulatory reforms (Mohan, 2006). This transformation has enhanced efficiency and competitiveness while emphasizing the need for robust financial stability (RBI, 2024). Given the sector’s macroeconomic linkages, assessing banks’ financial health is crucial for policymakers, stakeholders, and researchers. Indian banks face challenges such as maintaining stability amid dynamic economic conditions, rising non-performing assets (NPAs), and global uncertainties (Sengupta & Vardhan, 2017). Two critical financial ratios—Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER)—serve as key indicators of resilience. CAR measures a bank’s ability to absorb losses and meet regulatory standards (Basel Committee, 2010), while DER evaluates leverage and solvency (Rajan & Zingales, 1995). These metrics benchmark financial soundness. This study analyzes the CAR and DER of ten selected public and private Indian banks from 2019-2020 to 2023-2024, identifying trends and sectoral disparities. Statistical tools such as ANOVA and post-hoc tests assess financial performance (ResearchGate, 2017). The findings highlight banks like HDFC and Kotak Mahindra with strong capital adequacy, whereas Union Bank and SBI exhibit higher variability in CAR, signaling potential vulnerabilities (CRISIL, 2025). In terms of DER, SBI and Axis Bank manage leverage effectively, while Union Bank and Kotak Mahindra display significant fluctuations (CARE Ratings, 2024). The study underscores the importance of risk management, regulatory compliance, and capital allocation strategies to strengthen the financial sector. By analyzing public and private banks’ financial health, this research contributes to the discourse on enhancing banking resilience, aligning with India's broader goal of fostering a robust and inclusive financial system (RBI, 2024).

**Review of literature**

Research on bank performance and capital adequacy underscores its pivotal role in ensuring financial stability, operational efficiency, and effective risk management across banking systems globally. In India, numerous studies have explored the application of the CAMELS model and other frameworks to evaluate bank performance comprehensively. For instance, **Moorthy S (2014)** analyzed old-generation private sector banks using the CAMELS model, focusing on metrics such as Capital Adequacy Ratio (CAR), Debt-Equity Ratio, Advances to Assets, and Government Securities to Investments. Employing ANOVA to identify variations in CAR among banks, the study offered valuable insights into the comparative financial stability of these institutions. Similarly, **Seema Mishra (2014)** assessed nationalized banks' performance during their IPO phases (1999–2011) using CAMELS indicators, particularly CAR, Debt-Equity Ratio, and Government Securities to Investments. This study highlighted the role of capital adequacy in risk management and financial health during critical transitions.

**Saji T (2015)** extended this focus by evaluating the Bank of Baroda’s capital adequacy under BASEL I and II accords over a seven-year period (2007–2013). The study employed ratios such as Advances to Assets, Advances to Deposits, and Debt-Equity within the CAMELS framework, using mean calculations to distill key financial trends and providing a detailed understanding of the bank’s operational stability. Similarly, **Sahadevudu (2020)** conducted a regional performance evaluation of Andhra Pradesh Grameena Vikas Bank (APGVB) across 22 districts in Andhra Pradesh and Telangana. By employing statistical methods like regression analysis and ANOVA alongside CAMELS indicators, this study offered critical insights into the bank's financial health and operational effectiveness. Further, **K. Srinivasan (2021)** compared the performance of public and private sector banks over a decade (2007–2017), selecting four banks from each sector and focusing on CAR and other financial metrics to provide a comparative analysis of sectoral dynamics.

International studies have also contributed significantly to understanding the link between capital adequacy and banking stability. **Akinbola Olawale (2024)** investigated Nigerian banks’ performance (2005–2020), finding that CAR and firm size positively influence financial stability, whereas non-performing loans (NPLs) and loans and advances (LA) negatively impact resilience. Using OLS regression, the study emphasized the importance of stricter NPL regulations and Basel III-aligned risk management practices to enhance stability. Similarly, **Meliza et al. (2024)** examined Indonesian banks, exploring the impact of liquidity risks on profitability with CAR serving as a moderating variable. Their findings indicated that liquidity risks significantly enhance profitability, with CAR playing a vital role in moderating this relationship. Robustness tests further validated the deposit risk ratio as a reliable indicator of liquidity risks, contributing valuable insights for policymaking in the banking sector.

Lastly, **Vyas (2024)** conducted a comprehensive study on the financial performance of banks over a decade (2013–2023) using metrics such as the CRA Ratio, Debt-Equity Ratio, and Coverage Ratio. Employing advanced statistical tools like ANOVA, regression analysis, and t-tests, the study provided robust evaluations of bank performance, focusing on capital adequacy and financial resilience.

Collectively, these studies highlight the critical importance of capital adequacy in enhancing the resilience and stability of banking systems. Through the use of frameworks like CAMELS and advanced statistical methodologies, researchers have provided actionable insights into improving risk management, operational efficiency, and regulatory practices, offering valuable guidance for policymakers and financial institutions worldwide.

**Hypothesis**

**For Capital Adequacy Ratio:**

**Null Hypothesis (H0):**There is no significant difference in the Capital Adequacy Ratio (CAR) among the selected banking companies over the study period.

**Alternative Hypothesis (H1):** The selected banking companies' Capital Adequacy Ratio (CAR) significantly differed over the study period.

**For Debt-Equity Ratio:**

**Null Hypothesis (H₀):** There is no significant difference in the Debt-Equity Ratio (DER) among the selected banking companies over the study period.

**Alternative Hypothesis (H₁):** The selected banking companies' debt-equity Ratio (DER) significantly differed over the study period.

2. methodology

The study examines the financial performance of five selected Public Sector and Private Banks based on their Net Profit. This study used secondary data from bank annual reports, regulatory filings from the Reserve Bank of India (RBI), and MoneyControl.com, covering the period from 2019-2020 to 2023- 2024. This study applied statistical techniques, including descriptive statistics for measures of central tendency (mean, median, mode) and dispersion (standard deviation, variance) for the Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER). Line charts were created to visualize trends. For hypothesis testing, ANOVA was conducted to compare the mean CAR and DER across different banks, with Bonferroni tests used for specific pairwise comparisons. The analysis focused on the CAR to evaluate capital adequacy and the DER to assess financial leverage and risk.

Public Sector Banks: State Bank of India, Bank of Baroda, Union Bank , Canara Bank, Bank of India

Private Sector Banks: HDFC, ICICI, AXIS BANK, Kotak Mahindra Bank, IndusInd- -Bank

**OBJECTIVES**

1. To evaluate the trends and variations in the Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER) across selected Indian banks over five financial years (2019–2024).
2. To assess the financial stability of banks through their CAR and DER, highlighting the resilience of these institutions in managing capital requirements and leveraging debt efficiently.
3. To compare the performance of public sector banks with private sector banks in terms of CAR and DER, identifying sector-specific strengths and weaknesses
4. To determine if there are statistically significant differences in CAR and DER across the selected banks using ANOVA tests, validating the hypotheses set for the study.

3. results and discussion

i. cAPITAL aDEQUACY RATIO

**Table 1 Capital Adequacy Ratio**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl no** | **Name of Bank** | **2019-2020** | **2020-2021** | **2021-2022** | **2022-2023** | **2023-2024** | **MEAN** | **SD** | **CV** |
| 1 | SBI | 13.06 | 13.74 | 13.83 | 14.68 | 14.28 | 13.90 | 0.61 | 0.04 |
| 2 | BOB | 13.3 | 15 | 15.68 | 16.24 | 16.31 | 15.22 | 1.24 | 0.08 |
| 3 | UB | 12.81 | 12.56 | 14.52 | 16.04 | 16.97 | 14.37 | 1.94 | 0.13 |
| 4 | CB | 13.65 | 13.18 | 14.9 | 16.68 | 16.28 | 14.81 | 1.55 | 0.10 |
| 5 | BOI | 13.1 | 14.93 | 16.51 | 16.28 | 16.96 | 15.42 | 1.57 | 0.10 |
| 6 | HDFC | 18.52 | 18.79 | 18.9 | 19.26 | 18.8 | 18.85 | 0.27 | 0.01 |
| 7 | ICICI | 16.11 | 19.12 | 19.16 | 18.34 | 16.33 | 17.71 | 1.50 | 0.08 |
| 8 | AXIS BANK | 17.53 | 19.12 | 18.54 | 17.64 | 16.63 | 17.85 | 0.96 | 0.05 |
| 9 | KMB | 19.9 | 22.3 | 22.7 | 21.8 | 20.5 | 21.38 | 1.19 | 0.05 |
| 10 | INDUSIND | 15.04 | 17.38 | 18.42 | 17.86 | 17.23 | 17.10 | 1.28 | 0.07 |

Source : Annual reports of bank

**Graph 1 : Capital Adequcy**

Table 1 provides a comprehensive analysis of the Capital Adequacy Ratio (CAR) for ten selected banks over five financial years, from 2019-2020 to 2023-2024. This analysis highlights the varying performance, consistency, and stability among the banks, offering insights into areas for improvement. Kotak Mahindra Bank (KMB) and HDFC Bank stand out as exemplary performers, achieving the highest average CARs of 21.38% and 18.85%, respectively. Their exceptional stability is noteworthy, with HDFC Bank recording the lowest standard deviation (SD) of 0.27% and a coefficient of variation (CV) of 0.01. This consistency in managing capital adequacy sets a positive benchmark for other institutions. Axis Bank and ICICI Bank also demonstrate robust capital adequacy, with mean CARs of 17.85% and 17.71%. Their moderate variability suggests a solid approach to managing capital standards. Conversely, Union Bank (UB) presents an opportunity for growth, as it recorded the lowest average CAR of 14.37% and the highest variability, with an SD of 1.94 and a CV of 0.13. Addressing these challenges can enhance its capital adequacy management. The Central Bank and Bank of India, with mean CARs of 14.81% with CV of 0.10 and 15.42% and CV of 0.10, respectively, also show variability that indicates potential for improvement in stabilizing their CAR levels. While the State Bank of India (SBI) showcases low variability with an SD of 0.61 and a CV of 0.04, it has one of the lowest average CARs at 13.90%. This presents an opportunity for SBI to strengthen its capital reserves and align closer to its peers. The data indicates that while many banks perform adequately, there is room for improvement in managing capital adequacy ratios (CAR). Top-performing banks like HDFC and KMB serve as useful models, while institutions with greater variability, such as Union Bank, should refine their risk management and capital planning. Promoting best practices across the industry will enhance stability and ensure robust capital buffers for all banks, benefiting the sector overall.

**List 1-ANOVA: Single Factor**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups**  | **Count**  | **Sum**  | **Average**  | **Variance**  |
| Column 1 | 10 | 153.02 | 15.302 | 6.66724 |
| Column 2 | 10 | 166.12 | 16.612 | 10.23782 |
| Column 3 | 10 | 173.16 | 17.316 | 7.416316 |
| Column 4 | 10 | 174.82 | 17.482 | 4.030173 |
| Column 5 | 10 | 170.29 | 17.029 | 2.723966 |

Source: Author’s calculation

**List 2-Anova**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | ***df*** | ***MS*** | ***F*** | ***P-value*** | ***F crit*** |
| 30.497528 | 4 | 7.624382 | 1.226751 | 0.312939 | 2.578739 |
| 279.67961 | 45 | 6.215102 |  |  |  |

**Source: Author’s calculation**

**Hypothesis Testing**

Null Hypothesis (H₀): There is no significant difference in the CARs of the selected banks.

Alternative Hypothesis (H₁): There is a significant difference in the CARs of the selected banks.

**ANOVA Results**

• F-statistic: 1.226751

• P-value: 0.312939

• F critical: 2.578739.

• Conclusion: Since theP-value (0.312939)is greater than the significance level (α = 0.05), we fail to reject the null hypothesis.This implies thatthere is no statistically significant difference in the CARs among the selected banks over the study period.

**List 3-ANOVA: Post Hoc Test ( Bonferroni Corrected )**

|  |  |
| --- | --- |
| **TEST** | **Alpha**  |
| Anova | 0.05 |
| Post hoc test ( Bonferroni Corrected) | 0.005 |

**List 4-t-Test: Paired Two Sample for Means : Post Hoc Test**

|  |  |  |
| --- | --- | --- |
| **Groups** | **P-value ( T-test)** | **Significant?** |
| Region 1 Vs Region 2 | 0.32702772 | NO |
| Region 1 Vs Region 3 | 0.33267148 | NO |
| Region 1 Vs Region 4 | 0.3895085 | NO |
| Region 1 Vs Region 5 | 0.31237747 | NO |
| Region 2 Vs Region 3 | 0.20568431 | NO |
| Region 2 Vs Region 4 | 0.14142451 | NO |
| Region 2 Vs Region 5 | 0.28794403 | NO |
| Region 3 Vs Region 4 | 0.11377451 | NO |
| Region 3 Vs Region 5 | 0.03028746 | NO |
| Region 4 Vs Region 5 | 0.00309431 | YES |

**Source: Author’s calculation**

Post Hoc Analysis (Bonferroni Corrected Test): This step effectively compares groups pairwise to uncover significant differences. By applying a Bonferroni-corrected alpha of 0.005, we maintain rigorous criteria to minimize Type I errors. Notably, a significant difference was identified between Region 4 and Region 5 (P-value = 0.00309431), highlighting a meaningful variation in the CAR. Encouragingly, no other pairs demonstrated significant differences, suggesting a focus on the key areas of interest identified.

**II . Debt Equity ratio**

**Table 2 Debt Equity Ratio**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl no** | **Name of Bank** | **2019-2020** | **2020-2021** | **2021-2022** | **2022-2023** | **2023-2024** | **MEAN** | **SD** | **CV** |
| 1 | SBI | 1.35 | 1.64 | 1.52 | 1.5 | 1.58 | 1.51 | 0.10 | 0.07 |
| 2 | BOB | 1.29 | 0.86 | 1.2 | 1.03 | 0.84 | 1.02 | 0.20 | 0.19 |
| 3 | UB | 1.55 | 0.8 | 0.72 | 0.86 | 0.27 | 0.73 | 0.46 | 0.63 |
| 4 | CB | 1.08 | 0.84 | 0.7 | 0.78 | 0.66 | 0.80 | 0.16 | 0.20 |
| 5 | BOI | 0.9 | 0.71 | 0.48 | 1.1 | 1.17 | 0.83 | 0.28 | 0.33 |
| 6 | HDFC | 0.84 | 0.66 | 0.76 | 0.74 | 1.51 | 0.86 | 0.34 | 0.39 |
| 7 | ICICI | 1.41 | 0.62 | 0.62 | 0.59 | 0.52 | 0.69 | 0.37 | 0.53 |
| 8 | AXIS BANK | 1.74 | 1.4 | 1.6 | 1.49 | 1.31 | 1.50 | 0.16 | 0.10 |
| 9 | KMB | 0.77 | 0.37 | 0.36 | 0.28 | 0.29 | 0.38 | 0.20 | 0.52 |
| 10 | INDUSIND | 1.78 | 1.18 | 0.99 | 0.89 | 0.75 | 1.06 | 0.40 | 0.37 |

 Source : Annual reports of bank

The analysis of the Debt-Equity Ratio (DER) for the selected banks from 2019-2020 to 2023-2024 highlights significant variations in financial leverage, stability, and risk exposure across the institutions. State Bank of India (SBI) demonstrates a relatively high and stable DER, with an average of 1.51, a low standard deviation (SD) of 0.10, and a coefficient of variation (CV) of 0.07, indicating consistent and prudent debt management practices. Axis Bank also stands out with a high average DER of 1.50 and low variability (SD) of 0.16, CV of 0.10, showcasing a balanced approach to leveraging. In contrast, Union Bank (UB) has the most inconsistent performance, with a low average DER of 0.73, a high standard deviation (SD)of 0.46, and the highest CV of 0.63. This high variability indicates significant fluctuations in debt and equity proportions, which may reflect unstable financial management during the study period. Similarly, Bank of India (BOI) andHDFC Bank show moderate DER averages of 0.83 and 0.86, respectively but with relatively higher variability CV of 0.33 and 0.39, respectively, indicating inconsistency. Kotak Mahindra Bank (KMB) exhibits the lowest average DER of 0.38, which, combined with a high CV of 0.52, suggests a conservative approach toward leveraging but with notable fluctuations over time. ICICI Bank, with a low average DER of 0.69 and high variability CV of 0.53, reflects a shift toward lower leverage but with inconsistent trends. Lastly, IndusInd Bank, while maintaining a moderate average DER of 1.06, shows higher variability SD of 0.40, CV of 0.37, signaling some instability in its financial structure. The findings show that banks like SBI and Axis Bank maintain stable and high Debt-to-Equity Ratios (DERs), reflecting effective leverage management. In contrast, Union Bank and Kotak Mahindra Bank experience significant variability in their DERs, indicating a need for better debt-equity balancing strategies. These differences emphasize the importance of consistent financial planning and risk management for achieving financial stability and growth.

Ho: There is no significant difference in the debt-equity ratio of banking companies selected for the study.

HI: There is a significant difference in the debt-equity ratio of banking companies selected for the study

**Anova single factor**

**List 5-Summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Groups**  | **Count**  | **Sum**  | **Average**  | **Variance**  |
| Column 1 | 10  | 12.71 | 1.271 | 0.132632 |
| Column 2 | 10  | 9.08 | 0.908 | 0.149284 |
| Column 3 | 10  | 8.95 | 0.895 | 0.178961 |
| Column 4 | 10  | 9.26 | 0.926 | 0.142271 |
| Column 5 | 10  | 8.9 | 0.89 | 0.230178 |

Source: Author’s calculation

**ANOVA:**

**List 6-Source of Variation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Source of Variation** | **SS** | **df** | **MS** | **F** | **P-value** | **F crit** |
| Between Groups | 1.08086 | 4 | 0.270215 | 1.621303 | 0.185394 | 2.578739 |
| Within Groups | 7.49994 | 45 | 0.166665 |  |  |  |
| Total | 8.5808 | 49 |  |  |  |  |

**Source: Author’s calculation**

Ho: There is no significant difference in the debt-equity ratio of banking companies selected for the study.

HI: There is a significant difference in the debt-equity ratio of banking companies selected for the study

Results:

• F-statistic: 1.62 (calculated) < 2.58 (critical value).

• P-value: 0.185 > 0.05 (α = 0.05).

•Conclusion: Fail to reject H₀. There is no statistically significant difference in the debt-equity ratios across banks for the given years.

The analysis yielded an F-statistic of 1.62, which is lower than the critical value of 2.58. Additionally, the p-value of 0.185 exceeds the significance level (α) of 0.05. Based on these results, we fail to reject the null hypothesis (H₀). This indicates that there is no statistically significant difference in the debt-equity ratios across banks for the given years.

**List 7-ANOVA: Post Hoc Test ( Bonferroni Corrected )**

|  |  |
| --- | --- |
| **Test**  | **Alpha**  |
| ANOVA | 0.05 |
| Post hoc test ( Bonferroni Corrected) | 0.005 |

**List 8-t-Test: Paired Two Sample for Means : Post Hoc Test**

|  |  |  |
| --- | --- | --- |
| **Groups** | **P-value ( T-test)** | **Significant** |
| Region 1 Vs Region 2 | 0.04433607 | NO |
| Region 1 Vs Region 3 | 0.01722515 | NO |
| Region 1 Vs Region 4 | 0.0340813 | NO |
| Region 1 Vs Region 5 | 0.08569843 | NO |
| Region 2 Vs Region 3 | 0.12096261 | NO |
| Region 2 Vs Region 4 | 0.14735765 | NO |
| Region 2 Vs Region 5 | 0.16241324 | NO |
| Region 3 Vs Region 4 | 0.53203318 | NO |
| Region 3 Vs Region 5 | 0.36351205 | NO |
| Region 4 Vs Region 5 | 0.85410854 | NO |

**Source: Author’s calculation**

**Post-Hoc (Bonferroni Test) Analysis**

The post-hoc analysis utilizing the Bonferroni test reveals that all pairwise comparisons between regions (years) resulted in P-values exceeding 0.005 (Bonferroni corrected α). This suggests that, overall, there are no significant differences in debt-equity ratios among the years when examined individually. This finding encourages further exploration into potential factors influencing these ratios over time.

**Findings**

For analysis of Capital Adequacy Ratio (CAR)Kotak Mahindra Bank (KMB) and HDFC Bank exhibited the highest average CAR of 21.38% and 18.85%, respectively, indicating strong capital adequacy and stability.Banks like Union Bank (UB) and State Bank of India (SBI) recorded lower average CARs of 14.37% and 13.90%, respectively, reflecting a need to enhance capital buffers.ANOVA results show no statistically significant difference in CARs among the selected banks with P-value =of 0.312, indicating that variations in CAR are not substantial over the study period.However, post-hoc analysis revealed a significant difference between certain groups (Region 4 and Region 5), highlighting the need for targeted analysis of outlier variations.And for Debt-Equity Ratio (DER)State Bank of India (SBI) and Axis Bank maintained high and stable DERs, averaging 1.51 and 1.50, respectively,suggesting effective financial leverage management.Union Bank (UB) showed the lowest average DER of 0.73 and the highest variability CV of 0.63, indicating inconsistent financial management.Kotak Mahindra Bank (KMB) had the most conservative leverage approach average DER of 0.38 but exhibited significant fluctuations over time with a CV of 0.52.ANOVA results for DER also indicate no statistically significant differences among banks with a P-value of 0.185.Post-hoc analysis showed no significant pairwise differences in DER across the years, affirming general consistency in leverage practices across the sample banks.Statistical Insights shows thatboth CAR and DER exhibit stability across most banks, but outliers like Union Bank and Kotak Mahindra Bank highlight areas needing better capital and leverage management.Public sector banks generally show lower CAR and DER compared to private sector banks, reflecting differences in risk appetite, management strategies, and regulatory compliance.

**Suggestions**

This study presents constructive recommendations aimed at enhancing capital adequacy management in banks. Institutions like Union Bank and the State Bank of India (SBI), which exhibit variability in their Capital Adequacy Ratio (CAR), have the opportunity to foster greater stability in their capital levels by embracing more robust risk management practices. By developing a strategic framework for capital allocation, these banks can more effectively meet regulatory requirements while navigating financial uncertainties with confidence. Moreover, banks that face notable fluctuations in their Debt-Equity Ratio (DER), such as Union Bank and Kotak Mahindra Bank, can solidify their financial positions by implementing effective debt-equity balancing strategies. A focused approach to managing debt levels and optimizing equity financing can greatly enhance financial stability and reduce risk exposure, especially in volatile market conditions. It is essential to promote the integration of advanced risk management frameworks across both public and private sector banks, tailored to their distinct financial profiles. By leveraging tools like stress testing, liquidity management systems, and advanced credit risk analysis, banks can proactively identify and mitigate potential financial challenges. Lastly, as Non-Performing Assets (NPAs) remain a critical issue within the Indian banking sector, banks have a remarkable opportunity to enhance their asset quality. By prioritizing effective loan recovery practices and ensuring the quality of credit disbursements, banks can improve their overall financial health significantly. By strengthening recovery frameworks, monitoring loan quality, and establishing robust provisions for managing potential defaults, banks can contribute to a more resilient and secure banking environment.

4. Conclusion

This study highlights the importance of financial stability and performance evaluation in the banking sector, particularly through the lens of key financial ratios such as the Capital Adequacy Ratio (CAR) and Debt-Equity Ratio (DER). The findings reveal notable differences in the financial performance of public and private sector banks in India, with private sector banks such as Kotak Mahindra Bank and HDFC Bank leading in terms of financial stability. Public sector banks, while demonstrating reasonable performance, show higher variability, which suggests a need for improved capital management practices and debt-equity balancing. The ANOVA tests performed for both CAR and DER indicate that there is no significant difference in the capital adequacy levels across the banks, which suggests a fairly uniform level of capital health in the sector. However, the substantial variability in the DER across banks emphasizes the need for better debt management strategies. By adopting the suggested measures—focusing on improving capital adequacy management, reducing debt levels, enhancing NPA management, and leveraging technological advancements—banks can achieve greater financial resilience. Policymakers and regulators can play a critical role by ensuring that banks adhere to sound risk management practices and meet capital adequacy standards. Ultimately, the banking sector's ability to maintain financial stability is integral to India’s broader economic growth and development, and fostering a healthy, stable banking environment will ensure long-term financial security for the country.

**COMPETING INTERESTS DISCLAIMER:**

**Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.**

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