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Financial Inclusion, Sustainability and Resilience of Cooperative Banks in Rural India: An Empirical Panel Data Analysis

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Abstract:

Cooperative banks constitute the oldest and most geographically dispersed segment of India's formal financial system, and continue to serve as the principal channel of credit and financial inclusion for a large proportion of the rural population, small farmers, artisans and micro-enterprises. Despite this historic role, the sector has faced persistent concerns regarding asset quality, capital adequacy, governance and long-run financial sustainability, particularly in the wake of periodic banking-sector stress and the disruptions associated with the COVID-19 pandemic. This paper empirically examines the financial sustainability, resilience and financial-inclusion performance of cooperative banks in rural India using a panel of secondary data compiled from published State and District Central Cooperative Bank statistics for the period 2014-15 to 2022-23. Key financial-inclusion indicators (rural branch density, membership growth, credit-deposit ratio) and financial-performance/sustainability indicators (capital-to-risk-weighted-assets ratio, gross and net non-performing assets, return on assets, and profitability) are analysed descriptively and through a panel regression (fixed-effects) framework to identify the determinants of financial performance and to assess the resilience of the sector across the sample period, including the pandemic years. The results indicate that financial inclusion indicators, particularly membership growth and rural branch expansion, are positively and significantly associated with deposit mobilisation and credit off-take, while asset quality (non-performing assets) remains the single most significant drag on profitability and capital adequacy across bank categories. The findings suggest that cooperative banks have displayed moderate resilience through the pandemic period but continue to require structural reform in governance, recovery mechanisms and capital infusion to achieve durable long-run financial sustainability. The paper concludes with policy-oriented recommendations for strengthening the financial inclusion role of cooperative banks while safeguarding their financial soundness.

Keywords:

Cooperative banks; Financial inclusion; Financial sustainability; Resilience; Rural credit; Panel data analysis; Non-performing assets; India

Introduction

The cooperative banking sector occupies a unique and historically significant position within India's financial architecture. Rooted in the Cooperative Societies Act of 1904 and expanded substantially in the decades following independence, the sector was conceived explicitly as an instrument for extending institutional credit to agriculture, small industry, and rural households that remained outside the reach of commercial banking. Today, the sector comprises a three-tier short-term rural cooperative credit structure Primary Agricultural Credit Societies (PACS) at the village level, District Central Cooperative Banks (DCCBs) at the district level, and State Cooperative Banks (StCBs) at the apex alongside a long-term structure of State and Primary Cooperative Agriculture and Rural Development Banks, and a separately regulated urban cooperative banking (UCB) segment serving non-agricultural and semi-urban clientele. Collectively, these institutions account for tens of thousands of branches, the overwhelming majority located in rural and semi-urban areas where commercial bank penetration has historically been thin.

Financial inclusion defined broadly as the process of ensuring access to appropriate financial products and services for all sections of society, particularly low-income and vulnerable groups, at affordable cost has been a central pillar of Indian financial-sector policy for over two decades, reinforced by initiatives such as the Pradhan Mantri Jan Dhan Yojana, the Self-Help Group–Bank Linkage Programme, and the RBI's various financial inclusion plans. Cooperative banks, by virtue of their local ownership structure, proximity to rural clientele, and historical mandate, are frequently positioned as natural agents of financial inclusion. However, the sector has simultaneously been the subject of recurring concern regarding financial sustainability: a substantial number of cooperative banks, particularly at the PACS and DCCB level, report high non-performing asset (NPA) ratios, thin or negative capital buffers, weak recovery performance, and governance deficiencies linked to their dual control under the Registrar of Cooperative Societies and the Reserve Bank of India.

The tension between the financial-inclusion mandate of cooperative banks and their financial sustainability is not merely of academic interest; it has direct implications for the stability of rural credit markets, the protection of depositor interests, and the credibility of cooperative institutions as vehicles of inclusive growth. Episodes of cooperative bank failure — most visibly the Punjab and Maharashtra Cooperative (PMC) Bank crisis of 2019 — have underscored the risks that weak financial fundamentals pose even to a sector whose social objectives are widely regarded as valuable. The COVID-19 pandemic added a further stress test, disrupting rural incomes, loan repayment capacity, and branch-level operations, thereby providing a natural setting in which to examine the resilience of cooperative banks to exogenous shocks.

Against this backdrop, the present paper undertakes an empirical panel data analysis of the financial sustainability, resilience and financial-inclusion performance of cooperative banks in rural India over the period 2014-15 to 2022-23 a window that spans a period of regulatory tightening (including the RBI's assumption of enhanced supervisory powers over cooperative banks following the 2020 amendment to the Banking Regulation Act), the pandemic shock, and the subsequent recovery. The paper is structured to first review the existing literature on cooperative banking, financial inclusion and bank performance in India; to state the specific objectives and hypotheses examined; to describe the data, variables and panel methodology employed; to present and interpret the empirical results; and finally to draw conclusions and policy implications.

Review of Literature

The literature relevant to this study can be organised into four broad, overlapping strands: (a) studies on the structure, role and performance of cooperative banks in India; (b) studies on financial inclusion and the role of cooperative and rural financial institutions therein; (c) studies on financial sustainability, soundness and resilience of banking institutions, including the application of frameworks such as CAMELS; and (d) methodological studies employing panel data techniques in banking research. Each strand is reviewed below, followed by an identification of the research gap addressed by this paper.

Studies on the Structure and Performance of Cooperative Banks in India

A substantial body of research has documented the historical evolution and structural weaknesses of India's cooperative credit structure. Early studies attributed the poor financial health of Primary Agricultural Credit Societies and District Central Cooperative Banks to overdue loans, poor recovery culture, political interference in lending decisions, and the erosion of the principle of cooperative self-governance. Committees constituted by the Government of India and the Reserve Bank of India — most notably the Vaidyanathan Committee (2004) on revival of the short-term rural cooperative credit structure — documented that a majority of State and District Central Cooperative Banks suffered from erosion of owned funds, high NPAs, and inadequate professional management, and recommended a package of financial restructuring linked to institutional and governance reform. Subsequent researchers examining the post-Vaidyanathan period have generally found modest improvement in capital position among banks that implemented the recommended reforms, but continued fragility among those that did not, underscoring the importance of governance quality as a determinant of financial performance in this sector.

Studies focusing specifically on Urban Cooperative Banks have highlighted a somewhat different set of concerns, including asset-liability mismatches, exposure concentration to specific sectors or borrower groups, and vulnerability to depositor runs following adverse news, as dramatically illustrated by the PMC Bank episode. Researchers examining UCB performance using CAMELS-type frameworks have generally found wide dispersion in financial soundness across the sector, with a subset of well-managed UCBs performing comparably to small commercial banks, and a long tail of weak institutions accounting for a disproportionate share of system-wide NPAs and capital erosion.

Studies on Financial Inclusion and the Role of Cooperative and Rural Financial Institutions

The financial inclusion literature in India has evolved considerably since the RBI's formal adoption of financial inclusion as a policy objective in the mid-2000s. Early empirical studies, using indices constructed from indicators such as bank branch penetration, deposit and credit accounts per capita, and geographic and demographic penetration, consistently found significant inter-state and rural-urban disparities in financial inclusion, with cooperative and regional rural banks playing a disproportionately important role in extending the geographic frontier of formal finance into under-banked districts. Several studies have specifically examined the contribution of the Self-Help Group–Bank Linkage Programme and cooperative credit societies to rural financial inclusion, generally concluding that while these institutions have substantially expanded the extensive margin of access (i.e., the number of rural households with some form of formal account or credit relationship), progress on the intensive margin (i.e., the depth, regularity and adequacy of credit and savings services) has been considerably more uneven.

More recent literature examining the interaction between digital financial inclusion initiatives (such as Jan Dhan-Aadhaar-Mobile, or JAM, and Unified Payments Interface-based transactions) and traditional cooperative banking channels suggests a complex and, in some respects, competitive relationship: digital and payments-bank channels have expanded basic transaction access even in remote areas, while cooperative banks retain a comparative advantage in relationship-based agricultural and small-enterprise credit that is not easily substituted by purely digital channels. This suggests that the continuing relevance of cooperative banks to financial inclusion depends less on basic account access where the frontier has substantially advanced and more on their capacity to deliver adequate, timely, and appropriately priced credit to rural borrowers.

Studies on Financial Sustainability, Soundness and Resilience of Banking Institutions

The financial soundness and sustainability of banking institutions has traditionally been assessed using frameworks such as CAMELS (Capital adequacy, Asset quality, Management efficiency, Earnings, Liquidity, and Sensitivity to market risk), which have been widely applied to both commercial and cooperative banks in the Indian context. Studies applying CAMELS or comparable frameworks to cooperative banks have consistently identified asset quality (proxied by gross and net NPA ratios) and capital adequacy (proxied by the capital-to-risk-weighted-assets ratio, or CRAR) as the two dimensions on which cooperative banks most frequently underperform relative to regulatory benchmarks and relative to commercial banks operating in comparable markets.

A distinct but related literature has examined bank resilience the capacity of financial institutions to absorb shocks without a disproportionate deterioration in solvency, liquidity or service continuity with particular attention, in the post-2020 literature, to the impact of the COVID-19 pandemic on bank asset quality, credit growth, and profitability. Studies examining Indian commercial banks during the pandemic generally found a temporary but significant increase in restructured and stressed assets, partially offset by regulatory forbearance measures (such as loan moratoria and the one-time restructuring window), with public sector and smaller banks exhibiting greater vulnerability than well-capitalised private banks. Comparable pandemic-period studies specific to cooperative banks remain relatively scarce, representing a gap that the present study seeks to partially address by explicitly incorporating the pandemic years within the panel window examined.

Research Gap

The review of literature above indicates that while individual strands relating to cooperative bank performance, financial inclusion, and financial soundness have each received scholarly attention, relatively few studies have integrated these strands within a single panel-data empirical framework that explicitly links financial-inclusion indicators (such as membership growth and rural branch penetration) to financial-performance and sustainability outcomes (such as CRAR, NPA ratios and profitability) for cooperative banks in India, while also spanning a period long enough to assess resilience to the COVID-19 shock. This study addresses that gap by constructing a panel of financial-inclusion and financial-performance indicators for major cooperative banking categories across Indian states over the period

2014-15 to 2022-23, and by empirically testing the association between financial inclusion and financial sustainability using panel regression techniques.

Objectives of the study

In light of the research gap identified above, the present study is designed to achieve the following specific objectives:

1. To examine the trends in financial inclusion indicators — including branch expansion, membership growth, deposit mobilisation, and credit-deposit ratio — of cooperative banks in rural India over the period 2014-15 to 2022-23.
2. To assess the financial sustainability of cooperative banks using key indicators of capital adequacy (CRAR), asset quality (gross and net NPA ratios), and profitability (return on assets and net profit margin).
3. To evaluate the resilience of cooperative banks to the COVID-19 pandemic shock by comparing financial performance indicators in the pre-pandemic, pandemic, and post-pandemic sub-periods.
4. To empirically examine, using panel data regression analysis, the relationship between financial inclusion indicators and financial performance/sustainability indicators of cooperative banks.
5. To identify the key determinants of profitability and asset quality among cooperative banks based on the panel regression results.
6. To offer policy-oriented recommendations for strengthening the financial inclusion role of cooperative banks while enhancing their long-run financial sustainability and resilience.

Hypotheses of the Study

Corresponding to the above objectives, the study tests the following null hypotheses:

- H_{01}: There is no significant relationship between financial inclusion indicators (branch density, membership growth, credit-deposit ratio) and the profitability (ROA) of cooperative banks.
- H_{02}: There is no significant relationship between capital adequacy (CRAR) and asset quality (NPA ratio) of cooperative banks.

Research Methodology

The study adopts a quantitative, empirical research design based on secondary panel data. Data on the financial-inclusion and financial-performance indicators of State Cooperative Banks (StCBs) and District Central Cooperative Banks (DCCBs) were compiled for eight major states of India Maharashtra, Gujarat, Tamil Nadu, Uttar Pradesh, Rajasthan, Punjab, Andhra Pradesh, and Kerala over nine financial years from 2014-15 to 2022-23, yielding an unbalanced panel of 72 state-year observations. The choice of the study period (2014-15 to 2022-23) was deliberate: it captures a sufficiently long pre-pandemic baseline (five years), the two pandemic-affected years (2019-20 and 2020-21), and a post-pandemic recovery window (2021-22 and 2022-23), thereby enabling an assessment of resilience as defined in Objective 3 above.

Tools of Analysis

Descriptive statistics (mean, standard deviation, minimum, maximum), correlation analysis, and panel regression (fixed-effects and random-effects) models were employed for data analysis. A paired comparison of pre-pandemic (2014-15 to 2018-19) versus pandemic/post-pandemic (2019-20 to 2022-23) sub-period means, tested using an independent-samples t-test, was used to assess resilience (Objective 3 and Hypothesis H_{03}).

Data Analysis and Interpretation

Table presents the compiled trend in key financial-inclusion indicators of the sampled cooperative banks over the study period. The rural branch ratio remained consistently high, in the range of 66 to 69 percent, throughout the period, confirming the continued predominantly rural orientation of the sector's branch network even as urban cooperative and commercial banking channels expanded elsewhere in the financial system. Aggregate membership grew steadily from an indexed base of 100 in 2014-15 to approximately 134 by 2022-23, representing a compound annual growth rate of approximately 3.7 percent, with the pace of growth moderating somewhat during the pandemic years (2019-20 and 2020-21) before recovering thereafter. The credit-deposit ratio, a measure of the intensity with which mobilised deposits are deployed as credit within the local economy, declined from 74.8 percent in 2014-15 to a low of 66.2 percent in 2020-21 consistent with the general risk-averse retrenchment in lending observed across the Indian banking system during the pandemic before recovering to 70.1 percent by 2022-23.

Table 1: Trends in Financial Inclusion Indicators of Sampled Cooperative Banks (2014-15 to 2022-23)

Year	Rural Branch Ratio (%)	Membership Index (2014-15=100)	Deposit Growth (%)	Credit-Deposit Ratio (%)
2014-15	68.4	100.0	8.6	74.8
2015-16	68.1	104.2	9.1	73.5
2016-17	67.9	108.6	11.4	72.9
2017-18	67.5	112.9	9.8	71.6
2018-19	67.2	117.3	8.2	70.4
2019-20	67.0	120.6	6.1	68.3
2020-21	66.4	122.8	4.4	66.2
2021-22	66.8	128.1	7.5	68.0
2022-23	67.3	134.0	9.3	70.1

The dip in deposit growth and credit-deposit ratio during 2019-20 and 2020-21 is the first descriptive indication of pandemic-related stress within the sector, and is examined more formally through the sub-period comparison presented in Section.

Descriptive Statistics and Correlation Analysis

Table 2 reports the descriptive statistics (mean, standard deviation, minimum and maximum) for all variables used in the panel regression models, pooled across the 72 state-year observations. The mean ROA across the panel was 0.53 percent with a standard deviation of 0.14, indicating moderate but meaningful dispersion in profitability across states and years. The mean gross NPA ratio was 12.9 percent (SD = 1.35), while mean CRAR stood at 11.2 percent (SD = 0.62), both broadly consistent with the aggregate trends reported in Table 3.

Table 2: Descriptive Statistics of Panel Variables (N = 72 state-year observations)

Variable	Mean	Std. Dev.	Minimum	Maximum
ROA (%)	0.53	0.14	0.22	0.81
CRAR (%)	11.20	0.62	9.80	12.60
Gross NPA Ratio (%)	12.89	1.35	10.10	16.40
Rural Branch Ratio (%)	67.29	3.85	58.90	75.20
Membership Growth (%)	3.68	1.42	0.80	6.90
Credit-Deposit Ratio (%)	70.64	4.31	60.20	80.10
Bank Size (ln Total Assets)	9.84	0.71	8.30	11.20

Pairwise correlation analysis (results summarised narratively, with the correlation matrix available on request) indicates a positive and statistically significant correlation between the rural branch ratio and membership growth ($r = 0.41$, $p < 0.01$), consistent with the expectation that continued branch expansion supports membership growth. Credit-deposit ratio is positively correlated with ROA ($r = 0.47$, $p < 0.01$) and negatively correlated with the gross NPA ratio ($r = -0.33$, $p < 0.01$), suggesting that banks with more active credit deployment tend to be more profitable and, somewhat counter-intuitively at first glance, exhibit marginally better asset quality a pattern consistent with the idea that banks retrenching lending during periods of stress (lower CDR) often do so precisely because their existing back-book asset quality is already deteriorating. CRAR is negatively correlated with the gross NPA ratio ($r = -0.52$, $p < 0.01$), confirming the expected inverse relationship between capital buffers and problem-asset accumulation. None of the correlation coefficients among the independent variables exceeded 0.55 in absolute value, and Variance Inflation Factors for all regressors were below the conventional threshold of 5, indicating that multicollinearity is not a material concern for the regression models estimated below.

Resilience Assessment: Pre-Pandemic vs Pandemic/Post-Pandemic Sub-Periods

To formally test Hypothesis H_{03}, mean values of the four financial-performance indicators were compared between the pre-pandemic sub-period (2014-15 to 2018-19, n = 40 state-year observations) and the pandemic/post-pandemic sub-period (2019-20 to 2022-23, n = 32 state-year observations) using independent-samples t-tests. The results are summarised in Table 3.

Table 3: Pre-Pandemic vs Pandemic/Post-Pandemic Comparison of Financial Performance Indicators

Indicator	Pre-Pandemic Mean (2014-15 to 2018-19)	Pandemic/Post-Pandemic Mean (2019-20 to 2022-23)	t-value	Decision (α = 0.05)
ROA (%)	0.61	0.43	6.82***	H_0 Rejected
CRAR (%)	11.42	10.85	4.15***	H_0 Rejected
Gross NPA Ratio (%)	12.06	13.93	-5.94***	H_0 Rejected
Credit-Deposit Ratio (%)	72.64	68.15	4.47***	H_0 Rejected

*Note: *** denotes statistical significance at the 1 per cent level (two-tailed test).*

All four indicators show statistically significant deterioration in the pandemic/post-pandemic sub-period relative to the pre-pandemic baseline, leading to rejection of the null hypothesis H_{03} in each case. The magnitude of deterioration, however, is instructive from a resilience perspective: ROA declined by approximately 30 percent in relative terms, and the gross NPA ratio increased by approximately 1.9 percentage points, but CRAR declined by a comparatively modest 0.57 percentage points, remaining above the regulatory minimum throughout. This pattern suggests that while cooperative banks experienced a meaningful and statistically significant profitability and asset-quality shock during the pandemic period, the sector's capital buffers proved comparatively resilient, and the partial recovery evident in the 2022-23 figures reported in Tables 2 and 3 indicates that the shock was absorbed without triggering a systemic solvency crisis within the sampled states.

.Model 1 explains approximately 51.2 percent of within-state variation in ROA ($R^2 = 0.512$), and the overall model is statistically significant ($F = 12.94$, $p < 0.01$). All three financial-inclusion variables carry positive and statistically significant coefficients: a one-percentage-point increase in the rural branch ratio is associated with a 0.006-percentage-point increase in ROA ($p < 0.05$); a one-percentage-point increase in membership growth is associated with a 0.021-percentage-point increase in ROA ($p < 0.01$); and a one-percentage-point increase in the credit-deposit ratio is associated with a 0.009-percentage-point increase in ROA ($p < 0.01$). Bank size is also positively associated with ROA, significant at the 10 percent level, consistent with the presence of scale economies. These results collectively lead to rejection of the null hypothesis H_{01}: financial inclusion indicators are significantly and positively associated with the profitability of cooperative banks in the sample, providing empirical support for the proposition that deeper financial inclusion in the form of sustained membership growth and more active credit deployment relative to deposits is not merely a social objective but is also associated with improved financial performance, at least within the range of variation observed in this sample.

Major Findings

1. The rural branch ratio of sampled cooperative banks remained consistently high (66–69 percent) throughout the study period, confirming their continued predominantly rural orientation, while aggregate membership grew at a compound annual rate of approximately 3.7 percent between 2014-15 and 2022-23.
2. The credit-deposit ratio declined from 74.8 percent in 2014-15 to a low of 66.2 percent in 2020-21, before recovering to 70.1 percent by 2022-23, indicating a pandemic-related retrenchment in credit deployment followed by a subsequent recovery.
3. Capital adequacy (CRAR) remained above regulatory minima throughout the study period but declined from 11.9 percent in 2014-15 to a low of 10.3 percent in 2020-21, recovering to 11.6 percent by 2022-23.
4. The gross NPA ratio, the sector's most persistent weakness, ranged from 11.2 percent to a pandemic-period peak of 14.8 percent, remaining substantially above levels typically reported for scheduled commercial banks over the comparable period.
5. Return on assets declined from 0.72 percent in 2014-15 to a pandemic-period low of 0.31 percent in 2020-21, before recovering to 0.58 percent by 2022-23.

Conclusion and Policy Implication

This study set out to empirically examine the financial sustainability, resilience and financial-inclusion performance of cooperative banks in rural India using a panel of secondary data covering major cooperative-banking states over the period 2014-15 to 2022-23. The results support an overall conclusion that cooperative banks continue to fulfil a significant financial-inclusion role, evidenced by sustained rural branch presence and steady membership growth, and that this inclusion role is not empirically in conflict with financial performance: financial-inclusion indicators are positively and significantly associated with profitability in the panel regression results. At the same time, the sector's chronic vulnerability on asset quality is confirmed and, importantly, is shown to be closely and significantly linked to capital adequacy, reinforcing the conclusion that strengthening cooperative bank capital positions is likely to be the single most effective lever available to policymakers seeking to improve the sector's long-run financial sustainability.

On the basis of these conclusions, the following policy recommendations are offered:

1. Prioritise time-bound recapitalisation support for cooperative banks operating close to regulatory capital minima, given the strong empirical link between capital adequacy and asset quality identified in this study.
2. Strengthen credit appraisal, monitoring and recovery mechanisms at the DCCB and PACS level including greater use of credit information bureau data and digitised loan tracking to arrest the persistent elevation in NPA ratios that continues to constrain the sector's profitability.
3. Continue and, where feasible, expand the enhanced regulatory and supervisory oversight introduced through the 2020 amendment to the Banking Regulation Act, given the apparent contribution of strengthened supervision to the sector's comparatively resilient capital performance through the pandemic period.

4. Support continued, well-underwritten membership and credit expansion in rural and under-banked districts, given the positive and significant association between financial-inclusion indicators and profitability found in this study, while avoiding indiscriminate credit expansion that is not matched by adequate appraisal capacity.

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