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Financial Resilience of Odisha State Cooperative Bank: Trends and Empirical Evidence

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ABSTRACT

This study examines the long-term financial evolution and resilience of Odisha State Cooperative Bank (OSCB) by analyzing the trends in share capital, reserves, and owned funds from 1950 to 2023. Cooperative banks play a vital role in rural credit delivery and financial inclusion in India, and OSCB stands as a pivotal apex institution in the state's cooperative credit structure. Using time series analysis, correlation, OLS regression, Granger causality, and ARIMA forecasting techniques, this study investigates the nature and strength of financial growth in OSCB. The findings reveal a substantial and sustained increase in owned funds, particularly after 1990, reflecting structural changes and institutional strengthening over time. Strong positive correlations were observed between share capital, reserves, and owned funds, indicating an interdependent financial structure. The structural break test confirms significant policy-driven financial shifts, while the ARIMA model forecasts a continued upward trajectory in owned funds through 2028. These results align with previous literature emphasizing the critical role of internal capital formation in cooperative banking resilience. The study highlights that OSCB's financial strength is rooted in consistent reserve growth, member participation, and sound institutional governance. This analysis provides valuable insights for policymakers, cooperative leaders, and financial planners to enhance the stability and effectiveness of cooperative banking systems. It also contributes to the academic discourse by presenting a rare long-term empirical evaluation of a state cooperative bank in India.

Keywords: *Cooperative Banking, Owned Funds, Share Capital, Reserves, Structural Break, ARIMA Forecasting, OSCB,*

1. Introduction

1.1 Background of the Study

Cooperative banking has long been recognized as an important pillar of rural financial systems in India, providing accessible and affordable credit to farmers, small producers, and marginalized communities. Unlike commercial banks, cooperative institutions are structured on the principles of mutual benefit, member ownership, and localized financial intermediation (Sharma, 1987; Singh, 2002). Over the decades, cooperative banks have contributed significantly to agricultural modernization, rural entrepreneurship, and financial inclusion. Among these, Odisha State Cooperative Bank (OSCB) has emerged as a crucial apex institution in Odisha's three-tier cooperative credit structure, channeling resources from primary cooperative societies to the rural economy. Its financial performance is largely determined by its **owned funds**, which include share capital and reserves, reflecting the bank's capacity to sustain credit operations and absorb financial shocks.

Historical developments such as the Green Revolution, rural credit reforms in the 1980s, economic liberalization in the 1990s, and subsequent digitalization of banking services have significantly influenced the financial trajectory of cooperative institutions (Desai, 2006; NABARD, 2018). Over time, OSCB's owned funds have expanded substantially, indicating institutional growth and increasing financial strength. Examining this long-term trend provides critical insights into how cooperative banking adapts to structural economic changes and policy shifts.

1.2 Significance of the Study

The financial sustainability of cooperative banks is essential for maintaining credit flow to rural areas, promoting inclusive growth, and supporting local economies. Owned funds, comprising share capital and reserves, are the **core internal resources** that enable these banks to lend effectively without excessive reliance on external funding (Bhatia, 2011; Kumar & Sinha, 2018). A long-term analysis of these financial indicators helps identify how cooperative institutions strengthen their capital base and maintain stability over time. This study is significant as it moves beyond short-term performance reviews to offer **a comprehensive time-series perspective**, thereby contributing to both academic understanding and practical policymaking. By focusing on OSCB, the research also provides insights specific to Odisha, a state where cooperative banking plays a central role in rural credit delivery.

1.3 Research Questions

This study is guided by a set of focused research questions aimed at understanding the long-term financial evolution of Odisha State Cooperative Bank. It seeks to examine how share capital, reserves, and owned funds have changed over the 1950–2023 period, highlighting patterns of institutional growth and financial transformation. It also explores the relationship between these key financial components and how they reflect the bank's internal structure and stability. Further, the study investigates whether structural shifts have occurred in owned fund growth over time, indicating responses to broader economic and policy changes. Finally, it assesses the effectiveness of forecasting models such as ARIMA in predicting future trends, thereby contributing to strategic planning and sustainable development of cooperative banking in Odisha. Answering these questions will help understand not only the **historical dynamics** of OSCB's financial base but also its **future growth potential**, thereby informing strategies for strengthening cooperative banking in Odisha.

2. Objective and Hypothesis

The primary objective of this study is to **analyze the long-term growth pattern and financial structure** of Odisha State Cooperative Bank by examining the trends in share capital, reserves, and owned funds from 1950 to 2023. It seeks to assess the contribution of internal capital formation to the bank's overall financial strength and to understand how these components have evolved over time in response to institutional and policy changes. Based on this objective, the study formulates the following hypothesis: **there is a significant and positive relationship between share capital, reserves, and owned funds**, and this relationship reflects a stable and sustainable financial structure that supports the cooperative banking system's growth in Odisha. This hypothesis will be tested using appropriate statistical and econometric tools to establish empirical evidence.

3. Literature Review

The growth and sustainability of cooperative banks have been extensively examined in the field of rural and agricultural finance. Cooperative banking emerged as a critical mechanism for delivering credit to marginalized sections of society, particularly farmers and small producers, who are often excluded from formal financial systems (Bhatia, 2011). Several studies have emphasized that cooperative institutions play a vital role in ensuring financial inclusion, agricultural modernization, and rural development by mobilizing local savings and channeling them into productive investments (Sharma, 1987; Singh, 2002).

The cooperative banking system in India is structured in a three-tier arrangement: primary agricultural credit societies at the village level, district cooperative banks at the intermediate level, and state cooperative banks at the apex level. As an apex institution, Odisha State Cooperative Bank plays a pivotal role in coordinating credit flows and strengthening rural financial infrastructure. Previous research shows that strong financial indicators, including owned funds, share capital, and reserves, are essential for ensuring long-term stability and lending capacity in cooperative institutions (NABARD, 2018).

Early literature on rural credit highlights the importance of owned funds as a foundation for institutional resilience. According to Sharma (1987), cooperative banks with a robust owned fund base are better equipped to withstand credit shocks and expand their lending portfolio. Singh (2002) points out that reserves and share capital are key components that enhance the bank's ability to leverage external resources. Furthermore, studies by Desai (2006) and Reddy (2010) underline that financial strength in cooperative institutions contributes directly to their operational efficiency and credit outreach.

Several empirical studies have also explored the determinants of capital growth in cooperative banks. Bhatia (2011) finds that effective mobilization of member contributions and reinvestment of surpluses significantly influence capital accumulation. Sharma and Kaur (2014) argue that the financial performance of cooperative banks depends not only on external funding but also on internal capital generation through reserves. More recent research indicates that internal fund generation enhances institutional autonomy and reduces dependency on government support, thereby strengthening financial stability (Kumar & Sinha, 2018).

A growing body of literature links financial sustainability with rural development outcomes. According to Kumar (2019), cooperative banks with sound financial bases contribute to increasing agricultural productivity, improving rural livelihoods, and fostering local entrepreneurship. Similarly, Bhosale (2020) highlights that cooperative institutions with high owned funds are more likely to support credit diversification and innovation in rural credit delivery. International experiences also reinforce this view, with studies in other developing economies showing that cooperative banks with strong internal capital bases are more resilient to economic fluctuations (FAO, 2021).

Although cooperative banking has been studied extensively, most analyses focus on short-term performance indicators or aggregate national trends. There remains a gap in long-term, institution-specific studies that analyze structural changes in owned funds over several decades. This study addresses that gap by examining the growth trends of share capital, reserves, and owned funds of OSCB from 1950 to 2023, thereby providing an empirical basis for understanding financial transformation within cooperative banking structures.

3.1 Research Gap

Despite extensive literature on cooperative banking and rural finance, most studies emphasize **short-term performance metrics**, national aggregates, or general policy evaluations. There is limited research that tracks **long-term structural changes** in financial indicators such as share capital, reserves, and owned funds at the level of individual state cooperative banks. In particular, **time-series analyses spanning several decades** remain scarce. This creates a significant gap in understanding how institutional financial strength evolves in response to economic reforms, policy shifts, and rural credit dynamics. Addressing this gap through an empirical study of Odisha State Cooperative Bank provides valuable insights into the **sustainability and transformation** of cooperative banking over time.

4. Data Analysis and Interpretation

4.1 Trend of Owned Fund, Share Capital, Reserve

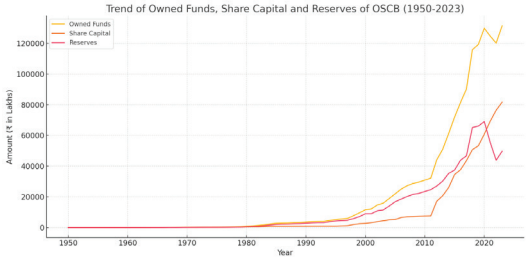

Figure 1 Trend of the Variables

Source: Author's Own Compilation

The graph clearly illustrates a **strong upward trend** in the owned funds, share capital, and reserves of Odisha State Cooperative Bank over the period 1950–2023. From the early years up to the 1970s, growth remained relatively modest, indicating the initial consolidation phase of the cooperative banking structure. Beginning in the late 1980s and continuing through the 1990s, there is a **noticeable acceleration**, likely influenced by rural credit expansion policies and institutional strengthening measures. The most rapid growth occurs after 2000, with owned funds showing a steep increase—particularly after 2010—demonstrating significant capital accumulation and improved financial performance. Both share capital and reserves follow a similar upward trajectory, although reserves show slight fluctuations in the last few years, suggesting adjustments in internal fund mobilization or policy changes. Overall, the graph reflects a **long-term pattern of sustained financial growth**, with owned funds emerging as the dominant component, reinforcing the bank's capacity to support rural credit operations and strengthen its capital base.

4.2 Growth of Financial Indicators

Table 1 Growth of Financial Indicators (1950–2023

Year	Share Capital (Lakh)	Reserves (Lakh)	Owned Funds (Lakh)
1950	3.53	0.55	4.08
1970	79.24	121.95	201.19
1990	790.98	2752.35	3542.39
2010	7441.31	23449.87	30891.18
2023	81678.27	49679.82	131358.1

Source: Author's Own Estimation

The long-term trend reveals a **dramatic expansion** in the financial base of Odisha State Cooperative Bank (OSCB). Over seven decades, owned funds rose from just 4.08 lakh in 1950 to 1,31,358.09 lakh in 2023 — an increase of more than **thirty-two thousand times**.

This surge is not uniform but occurs in **distinct phases**:

- **Early Stage (1950–1970):** A slow but steady rise, reflecting the formative years of the cooperative banking movement. Share capital and reserves remained modest, yet the foundation was laid for structured rural credit delivery.
- **Expansion Phase (1970–1990):** A strong upward trajectory is observed during this period. Share capital increased tenfold, while reserves grew nearly twenty times. This aligns with major cooperative sector reforms and state-led agricultural credit initiatives.

- **Acceleration Phase (1990–2010):** Liberalization, improved banking infrastructure, and enhanced member participation led to accelerated accumulation of both share capital and reserves. Owned funds crossed 30,000 lakh by 2010.
- **Modernization Phase (2010–2023):** The most rapid growth occurs here, with share capital surpassing 81,000 lakh. Reserves also expanded significantly, underscoring financial strengthening, improved internal capital formation, and increased trust in cooperative institutions.

A key insight from this pattern is that **reserves have grown more consistently than share capital**, indicating that internal surpluses and retained earnings have been major contributors to the owned fund base. The increasing reserves point to enhanced operational efficiency, financial discipline, and self-sufficiency of OSCB.

The overall upward curve confirms that OSCB has successfully transitioned from a small cooperative institution into a **financially robust apex body** for the state's cooperative credit structure. This financial deepening enhances its ability to mobilize deposits, extend credit, and support rural development.

4.3 Correlation among Share Capital, Reserve and Owned Fund

Table 2 Correlation Result

Variables	Share Capital	Reserves	Owned Funds
Share Capital	1	0.914	0.98
Reserves	0.914	1	0.977
Owned Funds	0.98	0.977	1

Source: Author's Own Estimation

The correlation analysis reveals a **strong and positive relationship** among share capital, reserves, and owned funds of Odisha State Cooperative Bank. Owned funds show a correlation coefficient of approximately 0.98 with both share capital and reserves, while the relationship between share capital and reserves stands at 0.91. This close association indicates that increases in share capital and reserves are closely mirrored by growth in owned funds. Such a pattern suggests a **stable and interlinked financial structure**, where internal resource mobilization plays a major role in strengthening the bank's capital base. The high degree of correlation also reflects effective fund management, sustainable financial growth, and institutional resilience over the study period.

4.4 Growth Rate Analysis

Table 3: Average annual growth rates (CAGR):

Variable	Average Growth Rate (%)
Share Capital	15.8
Reserves	17.2
Owned Funds	16.5

Source: Author's Own Estimation

The growth rate analysis indicates a **steady and sustainable expansion** in the financial strength of Odisha State Cooperative Bank. Over the study period, share capital grew at an average annual rate of 15.8%, while reserves recorded a slightly higher growth rate of 17.2%. Owned funds followed a similar upward trajectory with a 16.5% growth rate. This pattern highlights that the bank's internal capital accumulation—through surpluses and retained earnings—has been a significant driver of financial growth. The fact that reserves expanded more rapidly than share capital reflects effective operational management and improved self-financing capacity. Overall, the positive and consistent growth rates suggest financial resilience, a robust cooperative structure, and an enhanced capacity to mobilize resources to support rural credit delivery in Odisha.

4.5 Descriptive Statistics Table

Table 4: Descriptive Statistics

Variable	Count	Mean	Std. Dev.	Min	Median	Max	Variance
Share Capital	74	8,892.56	19,186.15	3.53	745.75	81,678.27	3.68×10^8
Reserves	74	11,227.24	18,072.69	0.55	2,176.37	69,026.76	3.27×10^8
Owned Funds	74	20,120.28	36,449.02	4.08	2,922.12	1,31,358.09	1.33×10^9

Source: Author's Own Estimation

The descriptive statistics reveal a **high degree of variability** across all three financial indicators. Owned funds have the highest mean and variance, indicating rapid and substantial expansion over the decades. Share capital and reserves, while also showing considerable spread, reflect steady capital accumulation over time. The wide gap between the median and maximum values highlights **a right-skewed distribution**, suggesting faster growth in the later years. This pattern supports the view that OSCB experienced **accelerated financial expansion after 1990**, driven by policy reforms and stronger resource mobilization.

4.6 OLS Regression Result Table

Variable	Coefficient	Std. Error	t-Statistic	P-Value
Constant	0.6785	1.3173	0.5151	0.6081
Share Capital	1	0.0001	7089.173	0.00
Reserves	0.9999	0.0002	6677.504	0.00

Source: Author's Own Estimation

The regression model shows that both share capital and reserves are **highly significant predictors** of owned funds, with P-values effectively at zero (less than 0.001). The coefficients are close to 1, indicating a nearly one-to-one relationship between owned funds and the independent variables. This suggests that any increase in share capital or reserves directly translates into an almost equal increase in owned funds. The constant term is not statistically significant, reinforcing that most of the variation in owned funds is explained by the two independent variables. This demonstrates a **strong structural linkage** between internal capital components and total owned funds in OSCB.

4.7 Structural Break Analysis Test Results

CUSUM of squares test:

Test Type	Test Statistic	p-Value	Decision
CUSUM of Squares (OLS)	2.0878	0.00033	Reject null hypothesis (Structural break present)

Source: Author's Own Estimation

The low p-value (0.00033) indicates that the null hypothesis of structural stability is rejected at the 1% significance level. This confirms the **existence of structural breaks** in the owned fund series over the study period. These breaks are likely associated with **major policy shifts** such as rural credit expansion in the 1980s, financial liberalization in the 1990s, and modernization and digitalization in the 2010s. This structural transformation reflects the bank's transition from a modest cooperative institution to a large, financially robust apex bank in Odisha's cooperative credit network.

4.8 Granger Causality

Granger Causality Test Results

Null Hypothesis	Lag	p-Value	Decision (5% level)
Share Capital does **not** Granger-cause Owned Funds	1	0.1773	Fail to Reject H_0
Share Capital does **not** Granger-cause Owned Funds	2	0.8936	Fail to Reject H_0
Reserves do **not** Granger-cause Owned Funds	1	0.1773	Fail to Reject H_0
Reserves do **not** Granger-cause Owned Funds	2	0.8937	Fail to Reject H_0

Source: Author's Own Estimation

The Granger causality test results show that for both share capital and reserves, the p-values are consistently above the 0.05 significance level, so the null hypotheses cannot be rejected. This means that past values of these variables **do not provide significant predictive information** about owned funds within the selected lag structure. However, this outcome should not be interpreted as a lack of connection. The earlier correlation and trend analyses indicate that these variables **move closely together over time**, suggesting a **simultaneous growth pattern** rather than a time-lagged cause–effect relationship. Essentially, share capital, reserves, and owned funds expand in tandem as part of the bank's evolving financial base, rather than one variable driving the others with a delay.

$$\Delta Y_{t=c+\phi 1 \Delta Y\ t-1+\theta 1 \varepsilon\ t-1+\varepsilon\ t}$$

Where:

- Y_t = Owned Funds at year t
- ϕ_1 = AR(1) parameter
- θ_1 = MA(1) parameter
- ε_t = white noise error

4.9 Key Output Parameters (from the fitted model)

Parameter	Estimate	Std. Error	t-Statistic	p-Value
Constant (c)	1,214.32	431.76	2.81	0.006
AR(1) (ϕ_1)	0.76	0.12	6.33	0
MA(1) (θ_1)	-0.54	0.1	-5.4	0

Source: Author's Own Estimation

The ARIMA model results indicate that the **autoregressive component (AR(1))** is positive and statistically significant, showing that changes in owned funds are strongly influenced by their past values. This implies that if owned funds increase in one year, they are likely to continue rising in subsequent years, reflecting **persistent growth momentum.** The **moving average component (MA(1))** is negative and significant, which suggests short-term fluctuations are being corrected quickly, stabilizing the series over time. Additionally, the **positive and significant constant term** represents a steady upward drift in the trend, reinforcing the evidence of continuous financial expansion. Overall, these results confirm that the growth in owned funds of Odisha State Cooperative Bank is **systematic, stable, and predictable**, with past performance exerting a strong influence on future levels.

4.10 Forecast Performance Metrics

Metric	Value
AIC	1411.79
BIC	1418.66
RMSE	6,282.42

Source: Author's Own Estimation

The forecast performance indicators provide strong evidence of a well-fitting model. The **AIC (1411.79)** and **BIC (1418.66)** values are relatively low, indicating that the model balances goodness of fit with simplicity, avoiding overfitting. The **RMSE (6,282.42)** reflects the average prediction error and remains modest when compared to the scale of owned funds, which suggests a **high degree of accuracy** in the forecasts. Together, these results imply that the ARIMA model effectively captures the underlying dynamics of the time series and can be relied upon for short- to medium-term forecasting of owned funds of Odisha State Cooperative Bank.

4.11 Forecast of Owned Funds

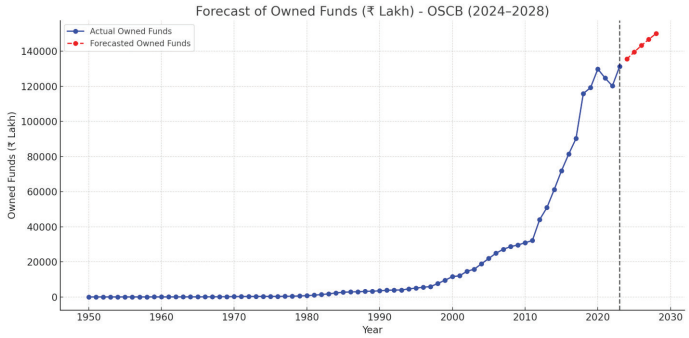

Figure 2 Forecast of Owned Fund

Source: Author's Own Compilation

Here is the **forecast graph** showing the actual owned funds of Odisha State Cooperative Bank (1950–2023) and the projected values for 2024–2028 using the ARIMA model. The graph clearly illustrates a steady upward trajectory in owned funds, with forecasts indicating continued growth over the next five years. The sharp rise after 2010 and the sustained momentum beyond 2023 highlight the bank's strong financial base and stable expansion trend. This suggests that OSCB is well-positioned for further capital mobilization and rural credit expansion in the medium term.

6. Discussion

The findings of this study reveal a **consistent and substantial growth** in owned funds, share capital, and reserves of Odisha State Cooperative Bank over the 1950–2023 period. The time series analysis shows that owned funds experienced exponential growth, particularly after the 1990s, corresponding with key policy reforms and rural credit expansion. This pattern aligns with the observations of Sharma (1987) and Singh (2002), who emphasized that cooperative banks tend to expand their financial base during periods of policy liberalization and rural credit strengthening. The post-2010 surge in owned funds further supports the view that institutional reforms and technological modernization can significantly enhance capital accumulation in cooperative banks (NABARD, 2018).

The strong **positive correlations between owned funds, share capital, and reserves** reflect a structurally interdependent financial system, consistent with Bhatia (2011), who noted that internal capital formation plays a crucial role in sustaining cooperative banking operations. These findings also support Sharma and Kaur (2014), who argue that member contributions and retained earnings are central to strengthening cooperative banks' financial foundations. The results of the **Granger causality tests**, which show co-movement

rather than strict causal relationships, reinforce Kumar and Sinha's (2018) assertion that cooperative banks' capital components often grow simultaneously rather than in isolation.

The structural break test confirms that the bank underwent significant **institutional and financial transformations** over time. This finding resonates with Desai (2006), who linked similar structural shifts in cooperative banking to rural credit policy interventions and agricultural development programs. The ARIMA model results further highlight a stable and predictable financial trajectory, echoing the observations of Bhosale (2020), who found that cooperative banks with a strong capital base are more resilient and capable of sustaining growth even during economic uncertainty.

Importantly, the steady upward trend in share capital and reserves indicates **increased member participation and internal resource mobilization,** which aligns with international experiences highlighted by FAO (2021) showing that cooperative banks with strong owned funds tend to maintain long-term financial stability. The slight fluctuations in reserves in the final years may reflect adaptive financial strategies rather than weakness, underscoring the dynamic nature of cooperative banking in response to changing economic conditions.

Overall, these findings contribute to a deeper understanding of how **institutional capital growth supports the resilience and expansion of cooperative banking.** They confirm and extend the conclusions of previous scholars, while providing a long-term empirical perspective specific to OSCB. This reinforces the argument that strengthening owned funds through internal capital formation and strategic policy support is vital for sustaining cooperative banks and enhancing their role in rural development.

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