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Credit Risk and Financial Sustainability of Deposit-Taking Savings and Credit Cooperative Societies in Nairobi City County, Kenya

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Abstract

This study examined the relationship between credit risk and return on assets (ROA), used as an indicator of financial sustainability, among deposit-taking Savings and Credit Cooperative Societies (DT-SACCOs) headquartered in Nairobi City County, Kenya. The study covered 48 institutions observed annually over five years, from 2021 to 2025, yielding 240 firm-year observations. A longitudinal panel design was used, with credit risk measured by the non-performing loan (NPL) ratio. Financial and regulatory records were analysed in Stata 17 using descriptive statistics, trends, correlation, and pooled, fixed-effects and random-effects regression. Continuous variables were winsorised at the first and ninety-ninth percentiles. The reported mean NPL ratio was 7.11 per cent, above the 5 per cent prudential benchmark, and declined from 8.01 per cent in 2021 to 4.89 per cent in 2025. The Hausman test supported retaining random effects, $\chi^2(1) = 0.01$, $p = .925$. The final model, with institution-clustered standard errors, showed a positive but statistically insignificant association between NPL and ROA at the 5 per cent level ($B = 0.2110$, $SE = 0.1115$, $p = .060$). The null hypothesis was not rejected. The study contributes recent longitudinal evidence on the contemporaneous NPL–ROA relationship in Nairobi-based DT-SACCOs, rather than establishing a causal effect. The short panel, omitted controls and limitations in firm-level surplus measurement qualify the interpretation. Boards should continue to strengthen credit appraisal, arrears monitoring and recovery, since an insignificant current-year association does not establish that impaired loans are harmless.

Key terms: Credit risk, deposit-taking SACCOs, financial sustainability, Kenya, non-performing loans.

INTRODUCTION

Deposit-taking Savings and Credit Cooperative Societies occupy an important position in Kenya's financial system by mobilising member savings and extending comparatively accessible credit. Their cooperative ownership model links commercial performance to member welfare, making sustained financial viability essential for deposit protection and service continuity. Financial sustainability refers to an institution's capacity to generate adequate returns, absorb losses, and maintain operations without undermining its obligations to members. Return on assets is a useful indicator because it relates the net surplus generated to the asset base employed. For DT-SACCOs, however, this sustainability can be threatened when a growing share of the loan portfolio stops performing.

Credit risk arises when borrowers fail to meet scheduled principal or interest obligations. The NPL ratio captures this exposure by comparing impaired loans with total gross loans. Rising NPLs reduce cash collections, increase recovery costs, require loan-loss provisions, and can constrain new lending. Information asymmetry makes this problem difficult because borrowers possess more information about their willingness and capacity to repay than lenders do (Akerlof, 1970; Stiglitz & Weiss, 1981). Strong appraisal, continuous monitoring, and timely recovery are therefore central to the sustainability of member-owned lenders.

Nairobi-based DT-SACCOs serve members with different occupational and community bonds, but some loan books remain exposed to common employer or business-sector shocks. SASRA supervision reports identify loan quality as an ongoing concern in the Kenyan cooperative sector (SACCO Societies Regulatory Authority [SASRA], 2022, 2023, 2024). Poor loan recovery matters because it can reduce income, increase provisions and restrict funds available for new lending. Existing studies connect credit practices and loan quality to financial outcomes, but their indicators, institutional settings and findings differ (Kwashie et al., 2022; Nyabwari & Kimutai, 2024; Ombati et al., 2023). What remains insufficiently explained is how annual NPL movements relate to contemporaneous ROA within a recent Nairobi-headquartered SACCO panel that recognises persistent institutional differences. To address this gap, the study examined the NPL–ROA relationship over 2021–2025, using one credit-risk predictor and comparing alternative panel estimators. The article presents the theoretical and empirical basis, explains the data and model, and then discusses the findings and their limitations.

DT-SACCOs depend on loans as major earning assets, so persistent repayment problems can weaken earnings and the capacity to serve members. SASRA supervision reports document asset-quality concerns in the sector, providing the regulatory context for this study (SASRA, 2022, 2023, 2024). Uncollected interest, recovery expenses and provisions are plausible channels through which impaired lending may reduce financial returns. Their timing, however, need not coincide with the year in which a loan first becomes non-performing. ROA can therefore give an incomplete picture of the longer-term financial consequences of default. This pre-existing concern justified examining the relationship empirically; the panel averages reported in Section 6 are study findings, not evidence used to establish the original problem.

Previous research does not offer a uniform answer to the specific NPL–ROA question for Nairobi-based DT-SACCOs. Nyabwari and Kimutai (2024) examined credit terms and loan performance in Nairobi, while Ombati et al. (2023) examined several financial risks in the Mt. Kenya region. Maina et al. (2025) studied loan portfolio risk and capital adequacy, an outcome different from profitability. These studies provide useful evidence, but neither a credit-management practice score nor a capital-adequacy outcome is interchangeable with the annual NPL–ROA relationship. The unresolved gap concerns recent longitudinal evidence for the Nairobi-headquartered population, with institutional heterogeneity taken into account. The study objective was therefore to examine the relationship between credit risk, measured by NPL, and financial sustainability, represented by ROA, during 2021–2025.

LITERATURE REVIEW

Information Asymmetry Theory

Information asymmetry theory explains why lenders cannot fully observe borrower quality or behaviour. Akerlof (1970) showed how unequal information can

undermine market quality, while Stiglitz and Weiss (1981) explained why higher interest rates do not necessarily allow lenders to separate safe from risky borrowers. Within a member-owned SACCO, a shared employer, membership history and guarantor network may improve the information available before lending. These relationships do not eliminate hidden debts, unstable income or changes in borrower behaviour after disbursement. Reliance on familiar members may also weaken independent scrutiny when social obligations interfere with appraisal or recovery. The theory therefore offers a reason to examine loan impairment even where lending relationships appear close.

The NPL ratio records the repayment problems that may follow adverse selection or moral hazard, whereas ROA records the surplus recognised from the institution's assets. A negative relationship is plausible when lost interest and provisioning costs reduce surplus. Yet common-bond information, guarantor arrangements and payroll deductions may change the strength or timing of that relationship. The theory also does not predict that all financial consequences must appear in the same accounting year. It is therefore used here to frame an expected risk mechanism, not to claim that the model directly measures information asymmetry or proves causation.

Empirical Review and Hypothesis

Global Evidence

Arifaj and Baruti (2023) examined 26 commercial banks in seven Western Balkan countries over 2010–2022. Their panel analysis distinguished banks by ownership and measured financial performance using ROA and return on equity, with bad loans representing credit risk. They reported an inverse relationship between credit risk and these performance indicators. This provides a useful international comparison because loan impairment and profitability were measured directly. However, commercial-bank ownership, regulation and market conditions differ from those of member-owned Kenyan SACCOs, so the result cannot be transferred without qualification.

African Evidence Outside Kenya

Kwashie et al. (2022) analysed 15 commercial banks in Ghana during 2013–2018 using random-effects estimation. They measured performance with ROA and economic value added and included bank size, age and macroeconomic conditions in their analysis. NPL was negatively related to both performance measures. Unlike a single-predictor model, this specification accounted for several factors that could influence both credit quality and earnings. Its results strengthen the case for testing loan impairment, while the different controls and institutional setting caution against expecting the same estimate in a Kenyan SACCO panel.

Kenyan SACCO Evidence

Nyabwari and Kimutai (2024) used a descriptive design and a census targeting credit managers in 47 Nairobi DT-SACCOs. Their analysis examined credit terms rather than the annual NPL ratio and used loan performance rather than ROA as the outcome. They reported a negative and significant relationship between credit terms and loan performance. The study is geographically relevant and highlights lending conditions as a possible contributor to repayment problems. However, it does not supply a directly comparable NPL–ROA panel coefficient, and its 47-institution frame should not be assumed identical to the present 48-institution frame.

Ombati et al. (2023) targeted 56 DT-SACCOs headquartered in the Mt. Kenya region, receiving 43 questionnaire responses alongside financial-statement information. Their descriptive design examined liquidity, credit and operational risk together. The reported credit-risk coefficient was positive and significant ($\beta = 0.159$, $p = .023$), unlike the negative association reported in the bank studies. The questionnaire-based risk construct and regional sample differ from the annual NPL measure and Nairobi panel used here. The finding therefore demonstrates variation across studies, not evidence that increased non-performing loans necessarily improve profitability.

Maina et al. (2025) examined loan portfolio risk and capital adequacy in 176 Kenyan DT-SACCOs using panel data for 2017–2022. They reported a positive, significant loan-portfolio-risk coefficient for capital adequacy ($\beta = 0.0569$, $p = .012$). Their outcome concerned capital buffers, not ROA, and is therefore relevant to financial resilience rather than a direct replication of this article's profitability question. Ntoiti

and Jagongo (2021), using a desktop review, also identified an underdeveloped evidence base on NPL and SACCO financial stability. Neither study provides a substitute for estimating the specific contemporaneous NPL–ROA relationship in the present population.

Empirical Synthesis and Hypothesis

Across the reviewed studies, impaired lending and credit-management conditions were relevant to financial outcomes, but the reported signs were not uniform. The bank studies associated NPL with weaker performance, while the Mt. Kenya study reported a positive coefficient for its credit-risk construct. Credit terms, realised NPL, capital adequacy and current-year ROA represent different concepts and cannot be compared as if they were the same variables. Geography, ownership, sample composition, observation period and estimator also differ, with the Ghana study including controls omitted from the present model. The specific contribution here is a recent Nairobi-focused longitudinal comparison of NPL and ROA that recognises institution-level variation, while retaining an explicit limitation on causal and fully adjusted interpretation.

The theoretical expectation is that impaired lending will eventually weaken returns, but the reviewed studies do not establish a uniform contemporaneous coefficient for Nairobi SACCOs. The study therefore used a two-sided hypothesis rather than assuming the direction in advance. The null hypothesis (H_0: $\beta_1 = 0$) stated that credit risk had no statistically significant relationship with ROA among DT-SACCOs headquartered in Nairobi City County. The alternative hypothesis (H_1: $\beta_1 \neq 0$) stated that a statistically significant relationship existed. The prespecified decision rule was to reject H_0 only when the preferred model's p-value was below .05.

Conceptual Framework

The conceptual framework links the measured credit-risk indicator to the financial-sustainability indicator. NPL represents realised loan impairment, while ROA represents the current-year return generated by the asset base. The connecting arrow identifies the relationship being examined and does not establish causation. Screening, interest collection, provisioning and recovery are possible mechanisms, not separately estimated variables. Institution-specific variation is represented by μ_i in the panel equation, but the model does not directly measure governance, size, liquidity, operational risk, solvency or macroeconomic conditions.

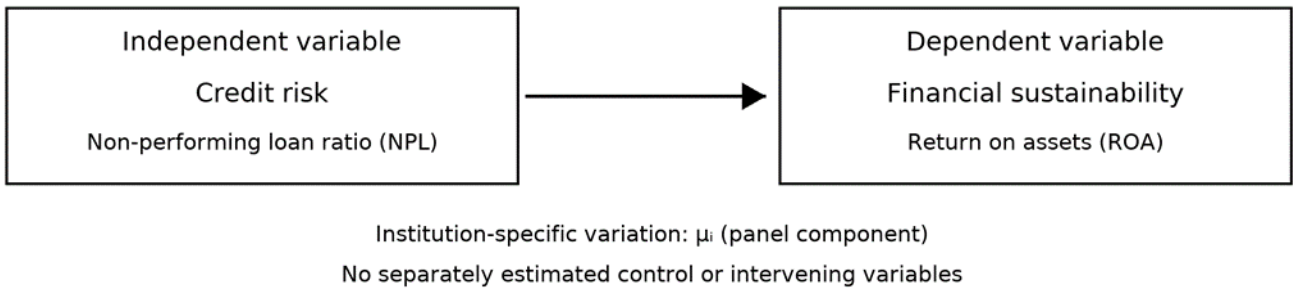

Figure 1: Conceptual Framework

Note. The arrow shows the tested association, not established causation. μ_i represents institution-specific variation; named controls and mediating mechanisms were not separately estimated.

METHODOLOGY

The study adopted an explanatory longitudinal panel design within a positivist approach. Its analytical frame comprised 48 distinct SASRA-licensed DT-SACCOs recorded as headquartered in Nairobi City County. The frame was assembled from the regulatory listing and matched to the names used in the financial-data workbook; "Telepost" and "Teleposta" were treated as naming variants of the same institution, not separate entities. Headquarters determined inclusion

because the unit of analysis was the institution's consolidated annual financial position, not the activity of an individual branch. An institution operating a Nairobi branch but headquartered elsewhere did not belong to this geographical frame. Non-deposit-taking societies were outside the study population.

A census was appropriate because the headquarters-defined population was small enough to include in full, avoiding an additional sampling stage. The completed workbook contained one annual record for each institution from 2021 to 2025, giving 240 firm-year entries. After the name harmonisation, no institution within this final frame was excluded for an empty annual record. This is a statement about the completed dataset, not proof that every input was independently traced to an audited statement. The final regulatory frame and institution-year source schedule should be retained so that the 48-institution count, licensing dates and financial inputs can be checked. Continuous variables were winsorised at the first and ninety-ninth percentiles to reduce outlier influence, rather than to correct source errors.

Credit risk was measured as non-performing loans divided by total gross loans. ROA was defined as net surplus after tax divided by total assets. The supplied workbook also contained a fallback calculation that used total income multiplied by a sector net-margin estimate when firm-level net surplus was unavailable. Such fallback entries are proxy estimates and must not be described as independently verified audited surplus.

The final workbook contained entries for all 48 institutions in each of the five years, but completeness of cells does not by itself establish source validity. The number and identities of any proxy-derived ROA observations should be confirmed against the source records before publication.

NPL ratio = Non-performing loans / Total gross loans
ROA = Net surplus after tax / Total assets
$ROA_{it} = \beta_0 + \beta_1 NPL_{it} + \mu_i + \varepsilon_{it}$

In the panel equation, i denotes the institution, t the year, μ_i the institution-specific component and ε_{it} the remaining error. Both variables entered the model as decimal ratios; multiplying by 100 was used only when displaying percentages. Descriptive statistics, annual trends, Pearson correlation and pooled, fixed-effects and random-effects estimates were produced in Stata 17. A poolability test assessed whether institution-specific intercepts could be ignored, while the Hausman test compared the fixed- and random-effects coefficients. Statistical decisions used $\alpha = .05$, and the final standard errors were clustered by institution. The reported results do not include a numerical Breusch–Pagan Lagrange multiplier test, so no unreported test outcome is claimed here.

The random-effects specification assumes that the institution-specific component is uncorrelated with the NPL predictor. That assumption may be doubtful if stable governance or lending policies affect both loan quality and profitability. Fixed effects address time-invariant institution differences under their own assumptions, but do not remove bias from omitted time-varying factors. In this article, liquidity, operational risk, solvency and macroeconomic controls were not included in the estimated equation. The resulting coefficient is therefore a bivariate panel association and should not be read as an isolated causal effect of credit risk.

The analysis used institution-level financial and regulatory records rather than interviews, borrower files or personal lending records. Publicly released reports do not ordinarily require individual participant consent, but their public status does not establish whether university approval or a research licence was required. The materials available for this revision do not establish an article-specific ethics approval reference or the access permissions for any non-public institutional records.

Where restricted records were used, the author should confirm the applicable university approval, national research authorisation, and written institutional permission before publication. The article does not claim that these permissions were granted without documentary evidence. Sources should be acknowledged, records handled under their access conditions, and confidential or identifying borrower information excluded from the publication dataset.

FINDINGS AND DISCUSSION

Descriptive Statistics

Table 1: Descriptive Statistics for Credit Risk and Financial Sustainability

Variable	n	M	SD	Minimum	Maximum
ROA	240	0.2208	0.3399	0.0179	2.0663
NPL ratio	240	0.0711	0.1209	0.0039	0.8682

Note. ROA = return on assets; NPL = non-performing loan ratio. Variables were winsorised at the 1st and 99th percentiles.

The reported mean ROA was 0.2208, while the mean NPL was 0.0711, equivalent to 7.11 per cent. The average NPL exceeded the study's 5 per cent prudential benchmark, and 42.08 per cent of firm-year observations breached that benchmark. The NPL distribution was strongly right-skewed: three quarters of observations were below 6.88 per cent, while a small number of distressed institutions raised the reported maximum to 86.82 per cent. The standard deviation of 0.1209 indicates substantial variation in loan quality across the panel. Credit risk was therefore concentrated rather than evenly distributed, although extreme ratio values and any proxy-derived ROA entries warrant checking against their source records.

Trend Analysis

Table 2: Annual Mean NPL Ratio and Return on Assets

Year	NPL ratio	ROA
2021	0.0801	0.2208
2022	0.0722	0.2148
2023	0.0820	0.2220
2024	0.0722	0.2265
2025	0.0489	0.2199
Overall	0.0711	0.2208

Note. Values are annual arithmetic means.

The reported annual mean NPL fell from 8.01 per cent in 2021 to 4.89 per cent in 2025. The decline was uneven, with an increase to 8.20 per cent in 2023 before improvement in the final two years. Reported ROA varied less, ranging from 0.2148 in 2022 to 0.2265 in 2024 and ending at 0.2199 in 2025. Lower mean NPL was therefore not accompanied by a similarly pronounced increase in contemporaneous ROA. This descriptive comparison does not establish the direction of an individual institution's relationship or identify the cause of either trend.

Correlation and Panel-Model Selection

The Pearson correlation between NPL and ROA was positive but weak, $r = .060$, $p = .354$. The pooled observations therefore showed little evidence of a strong linear association. The poolability test rejected equal institution-specific intercepts, $F(47, 191) = 395.74$, $p < .001$, supporting the use of a panel estimator. The Hausman test did not detect systematic coefficient differences between fixed and random effects, $\chi^2(1) = 0.01$, $p = .925$. Random effects were retained for the main estimate, with institution-clustered standard errors. Failure to reject in the Hausman test is not proof that the random-effects exogeneity assumption holds, especially with a short panel and omitted controls.

Table 3: Comparison of Credit-Risk Panel Estimates

Model	B	Robust SE	Statistic	p	95% CI
Pooled OLS	0.1691	0.1811	t = 0.93	.352	[−0.1877, 0.5259]
Fixed effects	0.2114	0.1115	t = 1.90	.059	[−0.0085, 0.4313]
Random effects	0.2110	0.1115	z = 1.89	.060	[−0.0087, 0.4307]

Note. Dependent variable = ROA. n = 240; 48 institutions. Standard errors are clustered by institution.

Hypothesis Test

Table 4: Final Random-Effects Model for Credit Risk and Financial Sustainability

Predictor	B	Robust SE	z	p	95% CI
Constant	0.2058	0.0494	4.17	< .001	[0.1085, 0.3031]
NPL ratio	0.2110	0.1115	1.89	.060	[−0.0087, 0.4307]

Note. n = 240; 48 groups. Overall R^2 = .003; within R^2 = .096. Approximately 98.78 per cent of the composite-error variance was attributable to institution effects.

The NPL coefficient was positive but did not reach statistical significance at the 5 per cent level (B = 0.2110, p = .060). Its confidence interval included zero, so the null hypothesis of no statistically significant relationship was not rejected. On the decimal-ratio scale, a 0.01 increase in NPL was associated with an estimated 0.00211 increase in ROA, equivalent to 0.211 percentage points. That point estimate is uncertain and cannot support a firm directional or causal conclusion. Although p = .060 is below .10, the prespecified threshold was .05, and the result should not be relabelled significant by changing the decision rule after estimation. Approximately 98.78 per cent of the composite-error variance was attributed to institution-specific variation; this is a variance decomposition, not a finding that measured institutional characteristics causally explained 98.78 per cent of ROA.

The result does not reproduce the negative NPL–performance relationship reported for Ghanaian banks by Kwashie et al. (2022) or the inverse relationship reported in the Western Balkans by Arifaj and Baruti (2023). It also cannot be treated as confirmation of Ombati et al. (2023), because their significant positive credit-risk coefficient arose from a different regional sample and risk-measurement approach. Differences in institution type, period, controls, provisioning and measurement can produce different estimated signs. Interest income on risky lending and delayed recognition of losses are possible explanations for the present coefficient, but neither mechanism was measured directly. The data therefore support a cautious account of an uncertain contemporaneous association, not a demonstrated explanation for why the coefficient was positive.

Information asymmetry theory predicts that hidden borrower quality and post-lending behaviour can generate impaired loans, which may later reduce financial returns. NPL captures the observed repayment outcome rather than directly measuring the underlying information gap. ROA, in turn, measures recognised current-year surplus and may not capture every future default loss. An insignificant contemporaneous coefficient therefore does not disprove the theory, but it does mean this model did not detect the expected negative NPL–ROA relationship at the selected threshold. Unmeasured screening quality, governance, income concentration and provisioning practices could affect both ratios, while uncertainty in surplus measurement could obscure their association. Screening and monitoring remain prudent practices, but their effectiveness was not separately tested in this article.

CONCLUSION AND RECOMMENDATIONS

Conclusion: The study did not find a statistically significant contemporaneous relationship between NPL and ROA at the 5 per cent level among the 48

Nairobi-headquartered DT-SACCOs over 2021–2025. The preferred point estimate was positive, but its confidence interval included zero. This finding is not proof that credit risk has no financial consequences or that greater impairment improves profitability. Reported mean NPL remained above the study benchmark despite improvement by the final year. The short panel, substantial institution-specific variation, omitted controls and uncertainties in surplus measurement limit what can be concluded about long-term sustainability.

Recommendations: Boards and management should strengthen borrower appraisal, verify total indebtedness through licensed credit-reference channels, and establish early-warning triggers for accounts that move into arrears. Portfolio monitoring should be segmented by employer, economic activity, product, loan vintage, and guarantor exposure so that concentration problems are identified before default. Recovery teams should use structured cure plans and report roll rates, restructurings, recoveries, and write-offs to board risk committees. Forward-looking expected-credit-loss estimates and stress tests should complement the backwards-looking NPL ratio. These measures remain necessary because delayed profitability effects can conceal the long-term cost of current impairment.

SASRA should continue risk-based supervision of institutions with persistent NPL ratios above the prudential benchmark and encourage consistent firm-level disclosure of impairment, provisions, recoveries, and write-offs. Standardised disclosures would permit researchers and boards to distinguish temporary delinquency from sustained portfolio deterioration. Management should also connect credit-risk indicators to capital and liquidity planning rather than treating them as isolated compliance ratios. Staff training in credit analysis, data quality, and digital monitoring should be continuous. Such actions would improve early intervention while protecting member deposits and the lending capacity of the cooperative sector.

Limitations

The study covered a headquarters-defined population and a five-year period, so the findings should not be generalised automatically to other counties, branch operations or non-deposit-taking cooperatives. Some firm-level surplus components were not consistently traceable in the wider data preparation, and the workbook's sector-margin fallback creates a potential measurement limitation for ROA. Winsorisation limits the influence of extreme values but does not resolve incorrect entries or missing source evidence. The single-predictor model omitted liquidity, operational risk, solvency, governance, size and macroeconomic controls. If these factors influence both NPL and ROA, the estimated coefficient may be biased; institution clustering adjusts standard errors but does not remove omitted-variable bias.

Further Research

Further research should extend the period and examine lagged NPL, provisioning, recoveries and write-offs to assess whether losses emerge with a delay. Models should incorporate relevant institutional and macroeconomic controls rather than relying only on the credit-risk predictor. A source-verified ROA series should be analysed separately from any sector-margin estimates, with sensitivity checks showing whether the results change. Comparisons across counties should use clearly defined and reproducible inclusion frames. Dynamic panel or other suitable estimators may be considered where the sample and assumptions support them, but additional complexity cannot compensate for unverified inputs.

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