



Effect of Debt Financing on Financial Stability of Deposit Taking SACCOs in Kenya: The Moderating Role of SACCO Size

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Abstract

The study examined the effect of debt financing on the financial stability of deposit taking SACCOs in Kenya and evaluated the moderating role of SACCO size in this relationship. Positivism philosophy, longitudinal and explanatory non-experimental research designs were used. Secondary panel data for 79 SASRA-licensed deposit taking SACCOs covering 2015–2024 were obtained from audited annual reports. Financial stability was measured by credit risk and solvency risk, while debt financing was captured through short-term, long-term and total debt to asset ratios and SACCO size by the natural log of total assets. Panel regression with interaction terms was estimated in STATA, with unit root and Hausman tests used to validate the models. Debt financing had a significant effect on financial stability. Total debt and short-term debt increased credit risk, whereas long-term debt reduced it. Total and short-term debt were positively associated with solvency. SACCO size significantly moderated the relationship: it strengthened the positive link between total debt and credit risk and the credit risk-reducing effect of long-term debt, and it weakened the solvency benefit of short-term debt. The study provides SACCO-specific evidence that the stability consequences of borrowing depend on the maturity of debt and on institutional size. It offers guidance to SACCO managers and boards on debt-maturity management and to SASRA on size-sensitive prudential supervision.

Introduction

Financial stability is central to the ability of deposit taking savings and credit cooperative societies (DT-SACCOs) to safeguard member savings, sustain lending and support financial inclusion. In the aftermath of the 2007–2009 global financial crisis, policymakers across the world have given renewed priority to the soundness of financial institutions, and in Kenya the Sacco Societies Regulatory Authority (SASRA) was established to license and supervise DT-SACCOs in a manner similar to the prudential oversight applied to commercial banks. Financial stability is commonly understood as the distance of an institution from insolvency and is measured using accounting-based indicators such as solvency risk, credit risk and liquidity risk (Beck et al., 2009). Solvency is often captured by the Z-score, which combines profitability, capitalization and return volatility in a single indicator, while asset quality is proxied by the ratio of non-performing loans to total loans (Akuku, Nyang'au & Maobe, 2023).



How an institution finances its assets is a major determinant of its stability. Two competing schools of thought explain financing choices. The trade-off theory holds that firms balance the tax and discipline benefits of debt against the expected costs of financial distress, so that an optimal level of leverage exists (Modigliani & Miller, 1958, 1963). The pecking order theory, in contrast, argues that firms prefer internal funds, then debt, and only lastly external equity because of information asymmetry (Myers & Majluf, 1984). Empirical evidence on the leverage–stability link is mixed. Some studies find that leverage improves performance and stability where earnings exceed the cost of debt (Berger & Udell, 2006; Bitok, Cheboi & Kemboi, 2021), while a larger body of work reports adverse effects of high leverage (Abor, 2005; Salim & Yadav, 2012; Sufian, 2024). A further strand emphasizes that the maturity structure of debt matters: Amidu (2007), for instance, found that overall leverage was negatively related to bank assets while long-term debt was positively related to operating assets.

Around the world, credit unions and SACCOs operate under pressure from regulatory change, technology and competition from larger institutions, and in many African countries their stability is undermined by weak capitalization and governance. In Kenya, DT-SACCOs mobilize savings and extend affordable credit to households and small businesses, yet the sector has experienced capital inadequacy, regulatory non-compliance and rising loan delinquency. SASRA (2024) reported that the non-performing loans ratio of the sector rose to 6.3 percent in 2024, a trend that points to growing credit risk. Because SACCOs finance their assets through a mixture of member deposits, external borrowing and retained earnings, understanding how the debt component affects their stability is of direct relevance to management, members and regulators.

Institutional size may also shape the outcome of debt financing. Larger institutions tend to enjoy easier access to credit, diversified portfolios and stronger risk management systems, which can alter how borrowing translates into stability, whereas smaller institutions are more exposed to refinancing and liquidity pressures (Kiemo, Olweny, Muturi & Mwangi, 2019; Naeem, Rehman & Farooq, 2024). Yet the moderating role of size in the debt–stability relationship has received little attention in the SACCO sector.

The sector’s importance makes the question more pressing. Cooperatives are widely regarded as a major source of livelihood in Kenya, and SACCOs in particular promote savings, extend credit to households and small enterprises and support income redistribution and poverty reduction (Kagiri, 2023; Fundi & Wamugo, 2023). Because members’ savings are the principal source of funds, a SACCO that borrows heavily from external lenders adds a second layer of obligations to those it already owes depositors. Whether this additional borrowing strengthens the institution by enabling it to meet loan demand, or weakens it by adding repayment and refinancing pressure, has direct consequences for member welfare and for the credibility of the regulatory framework.

The study contributes to the literature in three ways. First, it examines stability rather than profitability, using both an asset quality measure (credit risk) and a solvency measure (Z-score). Second, it separates total, short-term and long-term debt so that the role of maturity can be observed. Third, it tests whether SACCO size conditions these relationships. The remainder of the paper is organized as follows: the next section reviews theory and empirical literature, followed by the methodology, the findings and discussion, and finally the conclusions, recommendations and contributions.

DT-SACCOs are a key pillar of financial inclusion in Kenya, but their stability has come under strain. The sector has been characterized by inadequate capital to meet operational costs and loan demands, non-compliance with regulatory requirements and weak financial oversight, while non-performing



loans rose to 6.3 percent in 2024 (SASRA, 2024). These developments suggest a pattern of credit and solvency risk that threatens the financial health of SACCOs and the savings of their members. Existing capital structure research has been carried out largely in developed markets and in banks and listed firms, and the evidence from developing economies is inconclusive. Studies in Malaysia, Vietnam, Ghana, South Africa and Nigeria mostly report a negative association between debt and performance (Abor, 2005; Salim & Yadav, 2012), whereas Kyereboah-Coleman (2007) found that high gearing improved the performance of microfinance institutions in sub-Saharan Africa. Within Kenya, Gichuru et al. (2019) found that leverage had a significant negative effect on the return on assets of SACCOs, while Akuku et al. (2023) found that capital structure positively influenced their stability. Most studies concentrate on profitability rather than stability (Shahriar, et al., 2023; Nazir et al. 2021), rely on aggregate leverage without separating short-term from long-term debt (Salim, et al. 2012), (Le & Phan, 2017), and do not consider whether SACCO size conditions the relationship, (Mahat & Dahir 2018). This study therefore examines the effect of debt financing on the financial stability of DT-SACCOs in Kenya, with SACCO size as a moderating variable.

Literature Review

Theoretical Framework: Trade-off Theory and Pecking Order Theory

The study is anchored on the trade-off theory and the pecking order theory. The trade-off theory, developed from the work of Modigliani and Miller (1958, 1963), posits that firms select a capital structure that balances the tax shield and other benefits of debt against bankruptcy and agency costs that increase with leverage. Applied to DT-SACCOs, the theory implies that a prudent level of borrowing can support lending and earnings, but excessive leverage raises the probability of distress and undermines solvency. The theory has been criticized for oversimplifying financing decisions and for mixed empirical support (Frank & Goyal, 2003).

The pecking order theory of Myers and Majluf (1984) argues that, because managers know more about the firm than outside investors, firms prefer retained earnings first, then debt, and equity last. For SACCOs, whose equity is largely member share capital and retained surplus, the theory suggests that borrowing is resorted to when internal funds are insufficient to meet loan demand, so that the level and maturity of debt reflect funding pressure rather than a target leverage ratio. Together, the two theories suggest that the effect of debt on stability is not uniform but depends on the amount and maturity of debt and on the characteristics of the institution, including its size.

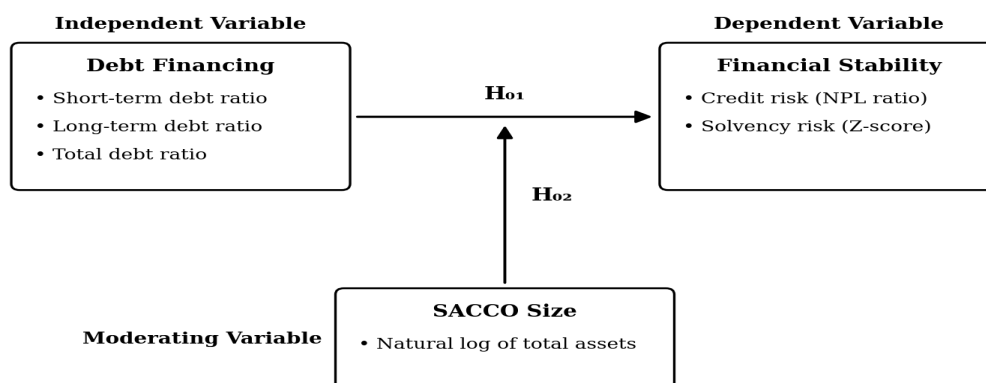


Figure 1: Conceptual Framework



Conceptual Review

Debt financing was conceptualized as: debt ratio; short-term debt ratio and long-term debt ratio. The relationship between financial leverage and financial stability is complex. While moderate levels of leverage can improve a firm's return on equity and support growth, excessive leverage can lead to increased financial risk and instability (Frank & Goyal, 2003; Kayo & Kimura, 2011; Brealey & Myers, 2014). Thus, maintaining an optimal level of debt is essential for ensuring that SACCOs can navigate financial challenges while pursuing growth strategies effectively.

Research Methodology

Research Philosophy and Design: The study adopted the positivist philosophy and a deductive approach, isolating debt financing, SACCO size and financial stability and observing them repeatedly over ten years. An explanatory, longitudinal, non-experimental research design was used to establish cause-and-effect relationships without manipulating the independent variables.

Study Area and Population: The study was conducted in Kenya and covered the 176 SASRA-licensed deposit taking SACCOs, classified into large (23), medium (51) and small (102) tiers as at 2023.

Sample and Sampling Technique: The Krejcie and Morgan (1970) formula gave a sample of 121 SACCOs, which was allocated proportionately across the three tiers and selected by simple random sampling (Table 1). After excluding SACCOs without complete annual reports for 2015–2024, the final panel comprised 79 SACCOs. Because the variables were differenced to achieve stationarity, the regressions used 632 observations (79 SACCOs × 8 periods).

Table 1: Target Population and Sample by SASRA Tier

SASRA Tier	Number of SACCOs	Sample Size
Large	23	16
Medium	51	35
Small	102	70
Total	176	121

Source: SASRA (2024); Author Compilation (2026)

Data Collection: Secondary data were extracted from audited annual financial statements published on the SASRA and individual SACCO websites, using a document analysis sheet. Research authorization was obtained from NACOSTI, and the data were used solely for academic purposes.

Measurement of Variables: Debt financing was measured by the short-term debt to asset ratio (STDAR), long-term debt to asset ratio (LTDAR) and total debt to asset ratio (DAR). Financial stability was measured by credit risk and solvency risk, and SACCO size by the natural logarithm of total assets (Table 2). All variables were transformed to natural logarithms.

Table 2: Measurement of Variables

Variable	Indicator	Measurement
Debt financing (Independent)	Short-term debt ratio; Long-term debt ratio; Total debt ratio	STDAR = short-term debt ÷ total assets; LTDAR = long-term debt ÷ total assets; DAR = total debt ÷ total assets
Financial stability (Dependent)	Credit risk; Solvency risk	Credit risk = (non-performing loans ÷ total loans) × 100; Solvency risk (Z-score) = (ROA + equity to assets ratio) ÷ standard deviation of ROA
SACCO size (Moderating)	Total assets	Natural logarithm of total assets (LNTA)

Source: Author Compilation (2026)



Data Analysis: Data were analyzed using STATA. Descriptive statistics and Pearson correlation summarized the data, and panel regression was used to test the hypotheses. Diagnostic tests comprised the Jarque-Bera test for normality, the modified Wald test for heteroscedasticity, the variance inflation factor for multicollinearity, the Wooldridge test for serial correlation, and the Levin-Lin-Chu, Im-Pesaran-Shin, ADF-Fisher and Phillips-Perron-Fisher panel unit root tests (Levin, Lin & Chu, 2002; Im, Pesaran & Shin, 2003; Maddala & Wu, 1999). Non-stationary series were differenced before estimation, and the Hausman (1978) test guided the choice between fixed effects and random effects estimators. Moderation was tested by introducing SACCO size and its interaction with each debt ratio, following Baron and Kenny (1986). The models were specified as follows:

$$\text{Stability}_{it} = \alpha + \beta_1\text{STDAR}_{it} + \beta_2\text{LTDAR}_{it} + \beta_3\text{DAR}_{it} + \varepsilon_{it} \quad (1)$$

$$\text{Stability}_{it} = \alpha + \beta_1\text{STDAR} + \beta_2\text{LTDAR} + \beta_3\text{DAR} + \beta_4\text{SIZE} + \beta_5(\text{STDAR} \times \text{SIZE}) + \beta_6(\text{LTDAR} \times \text{SIZE}) + \beta_7(\text{DAR} \times \text{SIZE}) + \varepsilon_{it} \quad (2)$$

where Stability is credit risk or solvency risk of SACCO *i* in year *t*, SIZE is the natural log of total assets, and a significant coefficient on an interaction term indicates moderation.

Diagnostic Tests and Model Selection: Because panel data combine cross-sectional and time-series dimensions, several assumptions were examined before estimation. The Jarque-Bera statistic was used to assess normality, with skewness and kurtosis within acceptable ranges taken as evidence of approximate normality. Multicollinearity was assessed with pairwise correlations (a threshold of 0.8) and variance inflation factors (a threshold of 10). The modified Wald test checked for group wise heteroscedasticity and the Wooldridge test for first-order serial correlation. Panel unit root tests were applied to avoid spurious regression, and variables found to contain unit roots were differenced, which explains why the models are estimated on differenced series (Δ^2). The Hausman test then determined whether fixed effects or random effects estimation was appropriate: where the test indicates that SACCO-specific effects are correlated with the regressors, the fixed effects estimator is preferred, and otherwise the more efficient random effects estimator is used.

Moderation Testing and Ethical Considerations: Moderation was assessed by first estimating the direct effect model, then adding SACCO size, and finally adding the interaction of size with each debt ratio. A significant interaction coefficient, together with the improvement in explanatory power between the models, was taken as evidence of moderation. Data were obtained from published reports, so no human participants were involved. Research authorization was obtained from the National Commission for Science, Technology and Innovation (NACOSTI), and the data were used only for academic purposes.

Findings

This section presents the correlation and regression results on the effect of debt financing on the financial stability of DT-SACCOs and on the moderating role of SACCO size and discusses them in relation to theory and earlier studies. Credit risk was measured by non-performing loans, so a positive coefficient signals higher risk and lower stability; solvency is measured by the Z-score, so a positive coefficient signals higher stability.



Correlation Analysis

Table 3: Pearson Correlations of Debt Financing and SACCO Size with Financial Stability

Variable	Credit Risk (r)	Solvency (r)
Total debt to asset ratio (LNDAR)	0.2430***	-0.3546***
Short-term debt to asset ratio (LNSTDAR)	0.1380***	-0.3730***
Long-term debt to asset ratio (LNLTDAR)	-0.1736***	-0.3602***
SACCO size (LNTA)	-0.1818***	0.0943***

*** $p < 0.01$.

Source: Author Compilation (2026)

Table 3 shows that total and short-term debt are positively correlated with credit risk, while long-term debt is negatively correlated with it. All three debt ratios are negatively correlated with solvency. SACCO size is negatively correlated with credit risk and positively correlated with solvency, implying that larger SACCOs tend to have better asset quality and to be more solvent, possibly because of economies of scale and better risk management.

Effect of Debt Financing on Financial Stability

Table 4: Direct Effect of Debt Financing on Financial Stability

Variable	Credit Risk (Random Effects)	Solvency (Random Effects)
Total debt to asset ratio (Δ^2 LNDAR)	18.2706*** (2.7468)	0.4321*** (0.1455)
Short-term debt to asset ratio (Δ^2 LNSTDAR)	0.5428*** (0.1010)	0.5032*** (0.1160)
Long-term debt to asset ratio (Δ^2 LNLTDAR)	-18.2687*** (2.7413)	0.2072 (0.1133)
Constant	-0.0350 (0.0365)	-1.7572*** (0.4630)
Observations	632	632
Number of SACCOs	79	79
Within R ²	0.0706	0.0747
Between R ²	0.0196	0.0013
Overall R ²	0.0694	0.0665
Wald $\chi^2(3)$	46.84***	44.75***

Standard errors in parentheses; *** $p < 0.01$. Variables are in natural logarithms and second-differenced (Δ^2).

Source: Author Compilation (2026)

Both models are statistically significant (Wald $\chi^2 = 46.84$ and 44.75 , $p < 0.01$), although the debt variables explain a modest share of the variation in credit risk (overall $R^2 = 0.0694$) and solvency (overall $R^2 = 0.0665$). This is expected in a panel in which stability is also driven by governance, macroeconomic conditions and lending practices.

For credit risk, the total debt ratio ($\beta = 18.2706$, $p < 0.01$) and the short-term debt ratio ($\beta = 0.5428$, $p < 0.01$) have positive and significant effects, while the long-term debt ratio has a negative and significant effect ($\beta = -18.2687$, $p < 0.01$). Higher borrowing, and particularly short-term borrowing that must be refinanced or repaid quickly, is therefore associated with a higher share of non-performing loans, whereas long-term borrowing reduces credit risk, plausibly by matching funding to the maturity of member loans and easing repayment and rollover pressure. For solvency, total debt ($\beta = 0.4321$, $p < 0.01$) and short-term debt ($\beta = 0.5032$, $p < 0.01$) are positively and significantly related to the Z-score, while long-term debt is positive but not significant at the 5 percent level ($\beta = 0.2072$, $p = 0.067$).

Discussions

The credit risk results agree with Almanaseer (2024), Setianti and Haryono (2023) and Githaiga and Bitok (2023), who found that leverage weakens stability, and with the trade-off theory's prediction



that the costs of distress rise with borrowing. The finding that long-term debt lowers credit risk is consistent with Amidu (2007), who found that long-term debt behaved differently from total debt. The positive solvency results are consistent with Berger and Di Patti (2006), Bitok et al. (2021), Obaid and Jassim (2022) who reported that leverage supports performance and stability where borrowed funds are used productively. Taken together, the results show that debt financing has a significant effect on the two dimensions of stability, although the direction depends on the measure of stability and the maturity of debt. The null hypothesis H_{01} is therefore rejected.

Moderating Effect of SACCO Size

Table 5: Moderating Effect of SACCO Size on the Relationship between Debt Financing and Financial Stability

Variable	Credit Risk Model	Credit Risk Model	Solvency Model A	Solvency Model B
	A	B		
LNDAR	17.2716*** (2.1099)	-0.6892 (0.7042)	-1.9796 (1.5809)	-0.4029 (1.6206)
LNSTDAR	0.2917*** (0.0683)	0.0864 (0.3007)	-0.7570*** (0.0735)	2.8278*** (0.6920)
LNLTDAR	-17.0926*** (2.1032)	0.6575 (0.6896)	2.0048 (1.5528)	0.4916 (1.5871)
SACCO size (LNTA)	0.0850*** (0.0237)	0.1015*** (0.0259)	0.2741*** (0.0614)	0.2601*** (0.0597)
LNDAR × LNTA		7.6441*** (1.1650)		3.5492 (2.6813)
LNSTDAR × LNTA		0.0968 (0.1419)		-1.4748*** (0.3267)
LNLTDAR × LNTA		-7.5723*** (1.1619)		-3.6519 (2.6741)
Constant	-0.3820 (0.3291)	-0.4959 (0.3684)	-8.0534*** (0.2716)	-6.8571*** (0.8479)
Estimator	RE GLS	RE GLS	Fixed effects	Fixed effects
Observations	632	632	632	632
Number of SACCOs	79	79	79	79
Within R ²	0.1426	0.2567	0.1858	0.2420
Between R ²	0.0094	0.1527	0.0173	0.0064
Overall R ²	0.1171	0.2385	0.0738	0.0420
Wald χ^2 / F statistic	$\chi^2(4) = 114.55***$	$\chi^2(7) = 201.91***$	$F(4,549) = 31.32***$	$F(7,546) = 24.90***$

Standard errors in parentheses; *** $p < 0.01$. Variables are in natural logarithms and second-differenced. Model A adds SACCO size to the debt ratios; Model B adds the interaction terms.

Source: Author Compilation (2026)

The moderation results are reported in Table 5. In all four models the joint tests are significant, and adding the interaction terms raises the overall R^2 from 0.1171 to 0.2385 for credit risk. SACCO size has a direct effect in every model: it is positively related to solvency ($\beta = 0.2601$, $p < 0.01$) and, in contrast to its negative simple correlation with credit risk in Table 3, positively related to credit risk once the debt ratios are controlled ($\beta = 0.1015$, $p < 0.01$).

For credit risk, the interaction of total debt with size is positive and significant ($\beta = 7.6441$, $p < 0.01$) and the interaction of long-term debt with size is negative and significant ($\beta = -7.5723$, $p < 0.01$), while the short-term debt interaction is not significant ($\beta = 0.0968$, $p > 0.05$). The direct effects of the three debt ratios lose significance once the interactions are added, which indicates that their effect on credit risk operates largely through the size of the SACCO: the credit risk associated with total borrowing rises as SACCOs grow, while the credit risk-reducing effect of long-term debt becomes stronger with size. For solvency, only the interaction of short-term debt with size is significant ($\beta = -1.4748$, $p < 0.01$); the positive solvency effect of short-term debt ($\beta = 2.8278$, $p < 0.01$) therefore weakens as SACCOs become larger, whereas the interactions for total and long-term debt are not significant.

These results imply that size does not affect all forms of debt in the same way. Larger SACCOs appear better able to use long-term funding to contain loan delinquency, consistent with their access to more stable and diversified sources of funds, but they are also more exposed to credit risk when total



borrowing expands, perhaps because larger loan books and rapid growth are harder to monitor. The diminishing solvency benefit of short-term debt in larger SACCOs is consistent with the argument that larger institutions face greater complexity and funding liquidity risk (Dahir & Mahat, 2017; Mahat & Dahir, 2018). The findings are in line with Naeem et al. (2024) and Ujam et al. (2023), who found that size moderates the effect of institutional decisions on distress and stability, and they extend that evidence to the SACCO sector. Because at least one interaction term is significant in each stability model, the null hypothesis H_{02} is rejected, although the moderating effect depends on the type of debt and on the measure of stability.

Discussions

The results are consistent with the trade-off theory, since the effect of borrowing on stability depends on how much and what kind of debt is used, and with the pecking order theory, since SACCOs that turn to external borrowing when internal funds are insufficient show different stability outcomes according to maturity and size. Two cautions apply. First, total debt is the sum of short-term and long-term debt, so the near-equal and opposite coefficients on the total and long-term debt ratios in the credit risk models (about 18 and -18) reflect the overlap between these measures and should be interpreted jointly rather than in isolation. Second, the low R^2 values and the sensitivity of some signs to model specification (for example, the short-term debt coefficient in the solvency models) suggest that the results should be read as evidence of association within this sample rather than as precise structural estimates.

Summary of Hypothesis Tests

Table 6: Summary of Hypothesis Testing

Hypothesis	Key Evidence	Decision
H_{01} : Debt financing has no significant effect on financial stability	Total and short-term debt raise credit risk ($p < 0.01$); long-term debt lowers it ($p < 0.01$); total and short-term debt raise solvency ($p < 0.01$)	Rejected
H_{02} : SACCO size has no significant moderating effect	Credit risk: $DAR \times size$ (7.6441) and $LTDAR \times size$ (-7.5723) significant at $p < 0.01$; solvency: $STDAR \times size$ (-1.4748) significant at $p < 0.01$	Rejected

Source: Author Compilation (2026)

Read together, the results give a consistent practical message. The maturity of borrowing matters at least as much as its amount: SACCOs that rely on short-term funding to expand lending face more delinquency, while those that secure longer-term funds tend to have better asset quality. Size changes this picture. As a SACCO grows, the loan-quality benefits of long-term funding become stronger, but the credit risk attached to raising total borrowing also increases, and the solvency gains from short-term funds fade. Growth in borrowing should therefore be matched by growth in credit risk management capacity, and the funding strategies appropriate to a small SACCO cannot simply be transferred to a large one.

Conclusions

The study concludes that debt financing significantly affects the financial stability of deposit taking SACCOs in Kenya, but that the effect depends on debt-maturity and on the stability measure. Total and short-term debt increase credit risk, while long-term debt reduces it, and total and short-term debt are positively associated with solvency. SACCO size significantly moderates these relationships: it magnifies the credit risk associated with total debt, strengthens the credit risk-reducing effect of long-term debt, and weakens the solvency benefit of short-term debt.



SACCO managers and boards should rely more on long-term funding, which is associated with lower credit risk, and limit dependence on short-term borrowing that must be refinanced quickly, while monitoring total borrowing against loan-quality. Large SACCOs should strengthen credit appraisal and loan monitoring as their borrowing grows, and small SACCOs should be cautious in using short-term debt to raise solvency. SASRA should incorporate the maturity structure of debt and SACCO size into its prudential limits and early-warning indicators, rather than applying a uniform leverage benchmark to all tiers. Future studies could use longer panels, dynamic (GMM) estimators, alternative stability measures such as liquidity risk, and could test whether regulatory tier or governance quality further conditions the debt-stability relationship.

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