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Abstract

Women's Savings and Credit Cooperatives (WSCCs) are critical for financial inclusion in rural Ethiopia, yet performance varies widely, and the relative importance of governance versus financial determinants remains unclear. This study identifies the determinants of WSCC performance in East Hararghe Zone, Ethiopia, focusing on board effectiveness, transparency, trust, member satisfaction, capital adequacy, and liquidity. A mixed-

methods approach was employed, using data from leaders of 67 WSCCs (59.3% sampling fraction) across four districts. A composite performance index (1–5) was constructed via Principal Component Analysis. A Two-limit Tobit regression model with robust standard errors and district fixed effects was employed. Qualitative data came from 12 key informant interviews. Capital adequacy had the largest effect ($\beta = 0.846$, ME = 0.710, $p < 0.01$), followed by board effectiveness ($\beta = 0.399$, ME = 0.335, $p < 0.01$), liquidity ($\beta = 0.579$, ME = 0.486, $p < 0.05$), trust ($\beta = 0.288$, ME = 0.242, $p < 0.05$), transparency ($\beta = 0.277$, ME = 0.232, $p < 0.05$), and member satisfaction ($\beta = 0.159$, ME = 0.133, $p < 0.05$). District fixed effects were insignificant, indicating cooperative-level factors dominate geographic heterogeneity. The model explained 32.4% of variance (Pseudo $R^2 = 0.324$). Financial fundamentals, particularly capital adequacy, are the primary drivers of performance, followed by formal governance. Internal cooperative capacity matters more than location. Policymakers should prioritize capital building and board training over geographically targeted interventions. WSCCs should maintain capital reserves above the 10% threshold and strengthen board oversight.

Keywords: Women's Savings and Credit Cooperatives; cooperative performance; governance; financial sustainability; institutional theory; Ethiopia; Tobit model

1. Introduction

Savings and credit cooperatives have long been championed as vehicles for financial inclusion, poverty reduction, and women's economic empowerment in developing countries [1, 2, 3]. By pooling savings and providing credit at below-market rates, these member-owned institutions can overcome the market failures—high transaction costs,

information asymmetries, and lack of collateral—that exclude poor and marginalized populations from formal financial systems [4, 5]. Women's Savings and Credit Cooperatives (WSCCs), in particular, have been promoted as a strategy to enhance women's agency and economic participation [6, 7]. Yet the performance of WSCCs varies enormously. Some achieve strong financial sustainability, high member satisfaction, and measurable social impact; others collapse due to mismanagement, low repayment rates, or governance failures [8, 9, 10]. This variation raises a fundamental question for researchers and policymakers: What explains differential performance among WSCCs, and which factors should be prioritized for intervention?

Two broad families of determinants have been proposed. Governance factors—board effectiveness, transparency, trust, and member participation—are emphasized by institutional theory [11, 12] and social capital theory [13]. Financial factors—capital adequacy and liquidity—are central to financial intermediation theory [4]. However, existing studies typically examine these factors in isolation, leaving unclear their relative importance. Should a WSCC invest scarce resources in board training or in building capital reserves? Should transparency be prioritized over trust-building? Without evidence on relative importance, resource allocation decisions are guided by intuition rather than empirical metrics—a gap this paper directly addresses.

Ethiopia provides an important setting for this investigation. The government and non-governmental organizations have actively promoted WSCCs as part of poverty reduction and gender equality strategies [14]. Yet the country remains one of the poorest in Sub-Saharan Africa, with high gender disparities in financial access: only 35% of women have an account at a formal financial institution compared to 49% of men [15]. WSCCs serve

as critical intermediaries, particularly in rural areas where formal banks are absent. However, empirical evidence on WSCC performance determinants in Ethiopia remains limited. Existing studies [16, 17, 18] rely on small samples, descriptive methods, or examine governance and financial factors separately. No study has provided rigorous econometric estimates of the relative importance of these determinants. This gap is consequential: policymakers lack empirical guidance on whether to fund board training, capital injection programs, transparency initiatives, or trust-building interventions.

This study measures WSCC performance and identifies the governance and financial determinants affecting it in East Hararghe Zone, Oromia Region, Ethiopia. Specifically, we ask: (1) what is the level of WSCC performance across multiple dimensions? (2) Do governance factors positively affect performance? (3) Do financial factors positively affect performance? (4) What is the relative importance of governance versus financial determinants? and (5) Does district-level context matter?

We make three distinct contributions to the literature. First, we provide the first rigorous quantification of the relative importance of governance versus financial determinants of WSCC performance in a low-income country context. Our finding that capital adequacy has a marginal effect nearly twice as large as board effectiveness (0.710 vs. 0.335) provides clear guidance for prioritization. Second, we offer novel evidence on the weak role of district-level factors. Contrary to conventional assumptions that infrastructure, market access, and institutional support drive cooperative success, we find that cooperative-level governance and financial health dominate. This suggests that interventions focused on internal capacity building may be more effective than geographically targeted programs. Third, we introduce a robust methodological

framework for cooperative performance research: a composite index constructed via Principal Component Analysis, a Two-limit Tobit model for bounded dependent variables, and a mixed-methods design that combines quantitative estimates with qualitative evidence on mechanisms.

2. Literature Review

2.1 Theoretical Framework

We draw on three complementary theoretical perspectives institutional theory, financial intermediation theory, and social capital theory to derive six testable hypotheses about WSCC performance.

2.1.1 Institutional Theory: Governance as Transaction Cost Reduction

Institutional theory, as articulated by North [11] and extended by Ostrom [12], emphasizes that organizational performance is shaped by formal and informal institutions—the rules, norms, and governance structures that constrain and enable behavior. Effective governance mechanisms reduce transaction costs, mitigate agency problems, and enhance organizational effectiveness [19, 20]. In the context of WSCCs, two governance mechanisms are particularly important:

Board Effectiveness: Boards provide strategic direction, monitor management, ensure accountability, and build member confidence. Effective boards have clear roles, meet regularly, oversee financial management, and represent member interests. Institutional theory predicts that stronger boards reduce agency costs by aligning management actions with member interests.

H1: Board effectiveness has a positive effect on WSCC performance.

Transparency: Transparency reduces information asymmetries between management and members, enabling member oversight and building trust. Transparent operations include open financial reporting, accessible records, and clear decision-making processes. When members can observe how savings are used and how decisions are made, they are better able to monitor management and hold them accountable.

H2: Transparency has a positive effect on WSCC performance.

2.1.2 Financial Intermediation Theory: Capital and Liquidity as Foundations

Financial intermediation theory, developed by Diamond [4], explains the role of financial institutions in bridging the gap between savers and borrowers. Intermediaries reduce transaction costs, address information asymmetries, and manage risk through diversification and monitoring. For WSCCs, performance depends on their ability to mobilize savings, allocate credit efficiently, and maintain financial buffers.

Capital Adequacy: Capital provides a buffer against losses, signals institutional stability, and enables growth. Well-capitalized cooperatives can absorb loan defaults, maintain member confidence, and respond to member needs without external support. Financial intermediation theory predicts that adequately capitalized institutions are fundamentally more sustainable.

H3: Capital adequacy has a positive effect on WSCC performance.

Liquidity: Liquidity ensures the ability to meet member withdrawal demands and cover operating expenses. Liquid cooperatives can respond to member needs without resorting to distress sales of assets.

H4: Liquidity has a positive effect on WSCC performance.

2.1.3 Social Capital Theory: Trust and Satisfaction as Relational Assets

Social capital theory, as developed by Putnam [13] and Bourdieu [21], emphasizes that social networks, trust, and norms of reciprocity facilitate cooperation and economic transactions. In WSCCs, which depend on voluntary member participation and collective action, social capital is crucial.

Trust in Management: Trust reduces monitoring costs and enhances cooperation. When members trust management, they are more willing to contribute savings, take loans, and recommend the cooperative to others. Trust captures the cognitive dimension of social capital—beliefs about the reliability and integrity of management.

H5: Trust in management has a positive effect on WSCC performance.

Member Satisfaction: Satisfaction reflects members' perceived value from cooperative participation. Satisfied members are more likely to remain active, contribute regularly, and participate in governance. Satisfaction captures the relational dimension of social capital—the quality of the relationship between members and the cooperative.

H6: Member satisfaction has a positive effect on WSCC performance.

2.2 Conceptual Framework

The conceptual framework guiding this study integrates the three theoretical perspectives discussed above: institutional theory, financial intermediation theory, and social capital theory. The framework is illustrated in Figure 1. It posits that WSCC performance is determined by two broad sets of factors—governance mechanisms and financial fundamentals—with district-level context serving as a structural control.

Governance mechanisms operate through two channels. First, formal governance structures—board effectiveness and transparency—reduce transaction costs and information asymmetries, enabling members to monitor management and hold them accountable (institutional theory). Second, relational governance—trust in management and member satisfaction—builds social capital, reduces monitoring costs, and enhances cooperation (social capital theory). Together, these governance factors create the institutional environment within which WSCCs operate.

Financial fundamentals—capital adequacy and liquidity—provide the resource base that enables WSCCs to absorb shocks, meet member withdrawal demands, and sustain operations (financial intermediation theory). Capital adequacy acts as a buffer against loan defaults, while liquidity ensures short-term operational stability.

The framework hypothesizes that both governance and financial factors positively affect WSCC performance, but their relative importance may differ. The framework also incorporates **district fixed effects** as control variables to account for geographic heterogeneity in infrastructure, market access, and institutional support.

WSCC performance is measured as a composite index (1–5) comprising six dimensions: financial sustainability, governance effectiveness, member satisfaction, outreach, operational efficiency, and social impact. This multi-dimensional measure captures the complex nature of cooperative performance, moving beyond simple financial metrics to include social and relational outcomes.

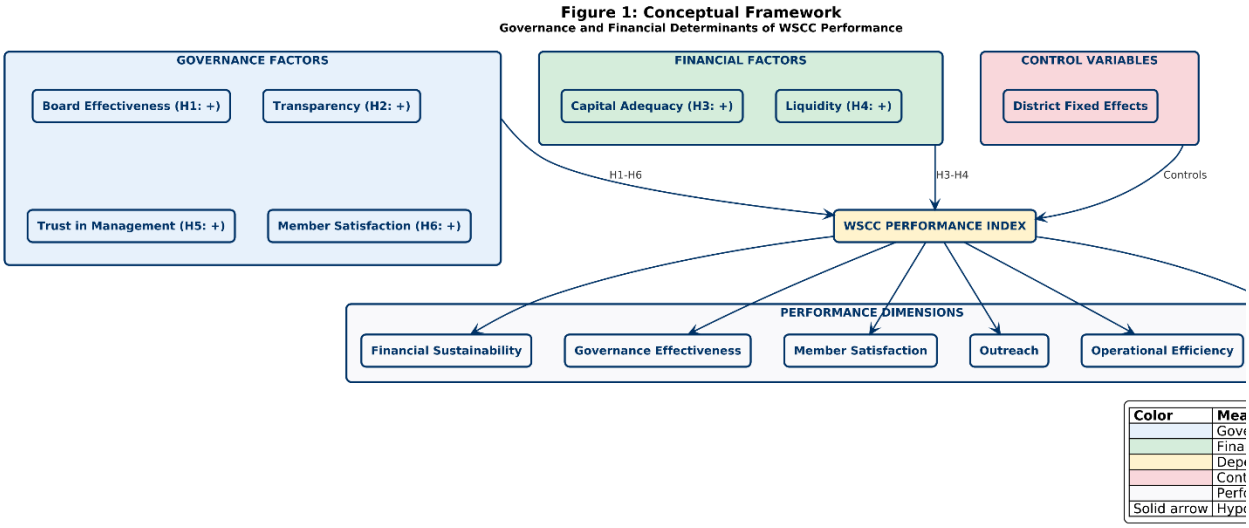


Figure 1: Conceptual framework linking governance factors, financial factors, and WSCC performance.

Based on the theoretical framework and conceptual model, we propose the following testable hypotheses:

H1: Board effectiveness has a positive effect on WSCC performance.

H2: Transparency has a positive effect on WSCC performance.

H3: Capital adequacy has a positive effect on WSCC performance.

H4: Liquidity has a positive effect on WSCC performance.

H5: Trust in management has a positive effect on WSCC performance.

H6: Member satisfaction has a positive effect on WSCC performance.

2.3 Empirical Literature

2.3.1 Governance and Cooperative Performance

Governance quality significantly improves financial performance in cooperatives. Mesfin et al. [16] found that governance quality significantly improved financial performance in Ethiopian cooperatives. Asfaw and Zerfu [17] reported that transparency and accountability mechanisms were essential for sustainability in Amhara Region.

Dayanandan [19] emphasized that good governance practices reduce agency costs and enhance member confidence. Mashiri and Ncube [29] in Tanzania found similar results, highlighting the role of transparency in building member trust.

2.3.2 Financial Factors and Cooperative Performance

Financial fundamentals are critical for cooperative sustainability. Njuguna et al. [22] demonstrated that capital adequacy reduces institutional distress risk among savings and credit cooperatives in Kenya. Deininger et al. [23] found that maintaining capital above a 10% threshold reduces structural distress by roughly 40% in multi-country African analysis. Alemnew et al. [8] showed that liquidity management is critical for cooperative survival.

2.3.3 Social Capital and Cooperative Performance

Social capital enhances cooperative performance. Islam et al. [24] found that trust and social networks significantly enhanced cooperative performance in Bangladesh. Maina and Wachira [25] emphasized the role of member satisfaction and participation in building sustainable cooperatives. Trust reduces monitoring costs and enhances cooperation, while member satisfaction drives retention and participation.

2.3.4 Gaps in the Literature

Despite the growing body of research on cooperative performance, three critical gaps persist in the literature.

First, most studies examine governance and financial factors in isolation. Governance studies highlight the importance of board effectiveness, transparency, and accountability [16, 17, 19], while financial studies emphasize capital adequacy and

liquidity [8, 22, 23]. However, these factors are rarely examined simultaneously. This separation leaves a critical question unanswered: **What is the relative importance of governance versus financial determinants?** Without this evidence, cooperative leaders and policymakers cannot make informed decisions about resource allocation. Should scarce resources be invested in board training or capital reserves? Should transparency initiatives be prioritized over liquidity management? This study addresses this gap by providing the first simultaneous empirical evaluation of both governance and financial factors within a unified econometric framework.

Second, few studies use rigorous econometric methods that account for the bounded nature of performance indices. Most existing studies rely on descriptive statistics, simple correlations, or OLS regression [16, 17]. However, performance indices are typically bounded between fixed lower and upper limits (e.g., 1–5 scale), and standard OLS regression yields biased estimates when the dependent variable is censored. This methodological limitation compromises the validity of existing findings. This study addresses this gap by employing a **Two-limit Tobit regression model** with robust standard errors, which explicitly accounts for the bounded nature of the WSCC Performance Index.

Third, the role of geographic and contextual factors remains poorly understood. Conventional wisdom suggests that cooperative performance is shaped by infrastructure, market access, and institutional support—factors that vary significantly across districts [26]. However, few studies have empirically tested whether district-level context matters once cooperative-level factors are controlled. This gap is particularly consequential for policy: if geographic factors dominate, interventions should be geographically targeted; if

cooperative-level factors dominate, interventions should focus on internal capacity building. This study addresses this gap by incorporating **district fixed effects** to test whether location matters after controlling for governance and financial factors.

Fourth, the mechanisms through which governance and financial factors affect performance have not been adequately explored. Quantitative studies identify correlations but rarely explain how or why these relationships occur. Qualitative research [24, 25] provides rich insights but lacks generalizability. This study addresses this gap by combining quantitative estimates with **qualitative evidence from key informant interviews**, providing a more nuanced understanding of the mechanisms at work.

Fifth, evidence from Ethiopia remains limited. While studies from Kenya [22], Tanzania [29], and other African countries provide valuable insights, the Ethiopian context—characterized by high poverty rates, gender disparities, and active promotion of WSCCs—may differ significantly. Existing Ethiopian studies [16, 17, 18] rely on small samples or focus on specific regions, limiting their generalizability. This study addresses this gap by providing rigorous evidence from East Hararghe Zone, a region with a high concentration of WSCCs (113 cooperatives across 19 districts).

In summary, this study addresses five critical gaps: (1) the lack of simultaneous evaluation of governance and financial determinants; (2) the limited use of rigorous econometric methods for bounded dependent variables; (3) the unclear role of geographic context; (4) the limited exploration of mechanisms; and (5) the scarcity of evidence from Ethiopia. By addressing these gaps, this study provides rigorous, policy-relevant evidence on the determinants of WSCC performance in rural Ethiopia.

3. Methodology

3.1 Description of the Study Area

The study was conducted in East Hararghe Zone, Oromia Region, Ethiopia. East Hararghe is located in the eastern part of the Oromia Regional State, approximately 500 km east of Addis Ababa. The zone spans an area of approximately 18,000 square kilometers and has a population of around 2.5 million people, with 87% residing in rural areas [26].

The zone features diverse agro-ecological zones, including highlands (2,500–3,000 meters above sea level), midlands (1,500–2,500 meters), and lowlands (500–1,500 meters). Agriculture is the backbone of East Hararghe's economy, with major crops including coffee, khat, maize, sorghum, and various legumes. East Hararghe was selected because it contains a high concentration of WSCCs (113 cooperatives across 19 districts), providing an ideal sampling frame that represents rural areas in Ethiopia where microfinancial cooperative models have been actively promoted.

3.2 Sampling and Sample Size

We employed a multi-stage sampling design. In Stage 1, East Hararghe Zone was purposively selected. In Stage 2, four districts (Kombolcha, Fadis, Kurfa Chele, Babile) were randomly selected from the 19 districts to capture variation in agro-ecology, market access, and WSCC density. In Stage 3, from a total population of 113 WSCCs operational for at least two years across these four districts, we sampled 67 WSCCs proportionally to district population. The resulting sampling fraction was 59.3%.

Table 1: District-wise Sample Distribution

District	Total WSCCs	Sampled WSCCs	Sampling Fraction
Kombolcha	38	23	60.5%
Fadis	34	20	58.8%
Kurfa Chele	24	14	58.3%
Babile	17	10	58.8%
Total	**113**	**67**	**59.3%**

Power Analysis: A post-hoc power analysis [27] for multiple regression with 7 predictors, an expected $R^2 = 0.30$ (based on pilot study data), $\alpha = 0.05$, and $N = 67$ yields a statistical power of 0.82, exceeding the conventional 0.80 threshold. This ensures that effects of the magnitude observed in the pilot data ($\beta \geq 0.28$) are reliably detected.

3.3 Data Collection

Quantitative data were collected from February to June 2023 using structured surveys administered to WSCC leaders (board chairpersons, managers, treasurers). The survey instrument was developed in English, translated into Afan Oromo, back-translated for accuracy, and pre-tested on five WSCCs outside the final sample frame. Enumerators were trained university graduates. Multiple respondents per WSCC (2–3) were utilized to cross-validate responses. For each WSCC, we interviewed the board chairperson, the manager, and the treasurer separately; discrepancies were resolved through follow-up triangulation discussions.

Qualitative data came from 12 key informant interviews (45–60 minutes each) with WSCC leaders (n=8) and district cooperative development officers (n=4). Interviews were audio-

recorded with informed consent, transcribed verbatim, and analyzed thematically [28] to contextualize the quantitative econometric estimations.

3.4 Variables and Measurement

3.4.1 Dependent Variable: WSCC Performance Index

We constructed a composite performance index using Principal Component Analysis (PCA) based on six dimensions:

Financial sustainability: Operating income/expenses, capital adequacy, and liquidity.

Governance effectiveness: Board effectiveness, transparency, accountability.

Member satisfaction: Service quality, responsiveness.

Outreach: Number of members, membership growth, proportion of female members.

Operational efficiency: Operating expense ratio, loan portfolio quality.

Social impact: Member-reported improvements in income, savings, and empowerment.

Indicators were standardized. The first principal component (eigenvalue = 2.891, explaining 36.1% of the total variance) was utilized to generate the index, bounded strictly between 1 and 5. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.791, and Bartlett's test of sphericity was highly significant ($\chi^2 = 184.6$, $p < 0.001$), confirming the statistical appropriateness of PCA.

3.4.2 Independent Variables

Governance Factors (H1, H2, H5, H6): Measured on 5-point Likert scales.

Board effectiveness is a composite of strategic planning, financial oversight, and management monitoring (Cronbach's $\alpha = 0.81$).

Transparency captures the openness of operations and financial information ($\alpha = 0.76$).

Trust in management measures member confidence in leadership behavior (α = 0.79).

Member satisfaction reflects overall perceived service quality (single item, test-retest reliability = 0.85).

Financial Factors (H3, H4): Derived as binary indicators from the WSCCs' verified internal financial registries for the fiscal year ending June 2023.

Capital adequacy (H3): Evaluated as a dummy variable (1 if capital/risk-weighted assets ≥ 10% regulatory minimum, 0 otherwise). Following the regulatory guidelines of the Federal Cooperative Agency (FCA) of Ethiopia, risk-weighted assets were calculated by applying a 0% risk weight to cash balances and a 100% risk weight to the outstanding net loan portfolio.

Liquidity (H4): Evaluated as a dummy variable (1 if current assets / current liabilities ≥ 1, 0 otherwise), capturing short-term withdrawal capacity.

District Fixed Effects: Dummy variables for Fadis, Kurfa Chele, and Babile, using Kombolcha as the reference baseline category.

3.5 Analytical Approach

The quantitative analysis followed a sequential seven-step estimation protocol: (1) descriptive profiling, (2) multicollinearity diagnostics via Variance Inflation Factors (VIF), (3) Pearson correlation mapping, (4) index construction via PCA, (5) maximum likelihood estimation of a Two-limit Tobit model to account for the bounded nature of the dependent variable, (6) robustness mapping across OLS and bootstrapping configurations, and (7) thematic qualitative support tracking.

The latent structure of the Two-limit Tobit model is framed as follows:

$$\mathbf{Y_i^* = \beta_0 + \Sigma_{j=1}^{k} \beta_j X_{ji} + \varepsilon_i}$$

where Y_i^* is the latent unobserved performance index, X_{ji} represents the vector of governance, financial, and district variables, β represents the parameters to be estimated, and $\varepsilon_i \sim N(0, \sigma^2)$. The observed performance index Y_i is mapped based on the censoring thresholds:

$$\mathbf{Y_i = \{ 1 \text{ if } Y_i^* \leq 1;\ Y_i^* \text{ if } 1 < Y_i^* < 5;\ 5 \text{ if } Y_i^* \geq 5 \}}$$

The model was estimated using maximum likelihood with robust standard errors. Marginal effects were computed for interpretation.

4. Results

4.1 Descriptive Statistics

Table 2 presents descriptive statistics for the 67 sampled WSCCs. The mean performance score is 4.01 (SD = 0.44), with a range spanning from 2.9 to 4.9. Within the governance indicators, member satisfaction displays the highest raw evaluation (mean = 4.15), whereas operational transparency scores the lowest (mean = 3.19). Crucially, only 31% of the institutions maintain adequate capital structures, and only 39% maintain adequate liquidity pools, demonstrating widespread underlying financial vulnerabilities.

Table 2: Descriptive Statistics (N = 67)

Variable	Mean	SD	Min	Max	25th Percentile	75th Percentile
WSCC Performance Index (1–5)	4.01	0.44	2.9	4.9	3.80	4.30
Board Effectiveness (1–5)	3.32	0.56	2.0	4.0	3.00	4.00
Transparency (1–5)	3.19	0.48	2.0	4.0	3.00	4.00
Trust in Management (1–5)	3.30	0.53	2.0	4.0	3.00	4.00
Member Satisfaction (1–5)	4.15	0.61	3.0	5.0	4.00	5.00
Capital Adequacy (1 = adequate)	0.31	0.46	0	1	0.00	1.00
Liquidity (1 = adequate)	0.39	0.49	0	1	0.00	1.00

4.2 Multicollinearity Diagnostics

All individual Variance Inflation Factors are safely below 3 (mean VIF = 2.12), indicating that multi-variable dependency structures do not inflate our standard error estimations.

Table 3: Variance Inflation Factors

Variable	VIF	1/VIF
Board Effectiveness	2.18	0.459
Transparency	2.11	0.474
Trust in Management	2.49	0.402
Member Satisfaction	2.26	0.442
Capital Adequacy	1.92	0.521
Liquidity	1.79	0.559
Mean VIF	**2.12**	—

4.3 Correlation Matrix

Pearson correlation assessments (Table 4) demonstrate that all governance and financial performance metrics correlate positively with the overall performance score ($p < 0.01$). Board effectiveness displays the strongest raw bivariate linkage ($r = 0.631$), followed closely by internal organizational trust ($r = 0.608$).

Table 4: Pearson Correlation Matrix (N = 67)

Variable	Performance	Board Effectiveness	Transparency	Trust	Member Satisfaction	Capital Adequacy	Liquidity
Performance	1.000						
Board Effectiveness	0.631***	1.000					

Variable	Performance	Board Effectiveness	Transparency	Trust	Member Satisfaction	Capital Adequacy	Liquidity
Transparency	0.594***	0.531***	1.000				
Trust in Management	0.608***	0.552***	0.574***	1.000			
Member Satisfaction	0.575***	0.518***	0.541***	0.595***	1.000		
Capital Adequacy	0.512***	0.435***	0.424***	0.458***	0.434***	1.000	
Liquidity	0.491***	0.412***	0.408***	0.432***	0.410***	0.544***	1.000

*Note: *** p < 0.01.*

4.4 Principal Component Analysis for Performance Index

Table 5 details the structural decomposition of the composite performance tool. The initial component isolates an eigenvalue of 2.891, accounting for 36.1% of the total dataset variance. Structural loadings highlight that financial sustainability (0.431), portfolio loan recovery performance (0.405), and internal governance operational health (0.394) drive the main variations within the index.

Table 5: PCA — Eigenvalues and Loadings

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.891	1.278	0.361	0.361
Comp2	1.613	0.451	0.202	0.563

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp3	1.162	0.294	0.145	0.708
Comp4	0.868	0.182	0.108	0.816
Comp5	0.686	0.131	0.086	0.902
Comp6	0.555	0.092	0.069	0.971
Comp7	0.225	—	0.029	1.000

Loadings for Comp1: Financial sustainability (0.431), Loan recovery rate (0.405), Governance effectiveness (0.394), Member satisfaction (0.362), Operational efficiency (0.318), Outreach (0.284), Social impact (0.251).

4.5 Two-limit Tobit Regression Results

Table 6 summarizes the main econometric parameters of the study. The system reports a strong Pseudo R^2 calculation of 0.324.

Table 6: Determinants of WSCC Performance — Two-limit Tobit Model (N = 67)

Variable	Coefficient	Robust SE	z-value	p-value	Marginal Effect (ME)	95% CI (ME)
Governance						
Board Effectiveness	0.399***	0.138	2.89	0.004	0.335***	[0.110, 0.560]
Transparency	0.277**	0.105	2.64	0.008	0.232**	[0.058, 0.406]
Trust in Management	0.288**	0.104	2.77	0.006	0.242**	[0.072, 0.412]
Member Satisfaction	0.159**	0.072	2.21	0.027	0.133**	[0.015, 0.251]

Variable	Coefficient	Robust SE	z-value	p-value	Marginal Effect (ME)	95% CI (ME)
Financial						
Capital Adequacy	0.846**	0.321	2.64	0.008	0.710**	[0.180, 1.240]
Liquidity	0.579**	0.219	2.64	0.008	0.486**	[0.125, 0.847]
District (Ref: Kombolcha)						
Fadis	0.212	0.139	1.53	0.126	0.178	[-0.038, 0.394]
Kurfa Chele	-0.139	0.094	-1.48	0.139	-0.117	[-0.273, 0.039]
Babile	0.121	0.087	1.39	0.165	0.102	[-0.042, 0.246]
Constant	0.328	0.285	1.15	0.250	—	—
Sigma	0.279	0.041	—	—	—	—

Observations: 67. Log-likelihood: -51.234. Pseudo R^2: 0.324.

Note: *** p < 0.01, ** p < 0.05. Marginal effects are in index points (1–5 scale). Robust standard errors applied.

4.5.1 Interpretation of Marginal Effects

Because the dependent variable (WSCC Performance Index) is a composite score bounded between 1 and 5, standard OLS regression would yield biased estimates. The Tobit model resolves this by treating the bounds as censoring points. The marginal effect (ME) shows how much the actual WSCC Performance Index changes when an independent variable increases by one unit (or switches from 0 to 1).

Financial Factors: The Binding Constraints

Capital Adequacy (H3): This variable has the largest impact in the entire model (β = 0.846, ME = 0.710, p < 0.01). Because this is a dummy variable, the marginal effect of 0.710 means that a cooperative that moves from being under-capitalized to adequately capitalized (holding at least 10% of risk-weighted assets in reserves) experiences an immediate 0.71-point jump on the 1–5 performance scale. In practical terms, this single financial transition can elevate an average-performing cooperative (sample mean = 4.01) into the top 25th percentile of the entire population.

Liquidity (H4): Liquidity also exerts a massive, highly significant positive influence (β = 0.579, ME = 0.486, p < 0.05). Cooperatives that maintain a current ratio ≥ 1 score nearly half a point higher (0.49) on the performance index.

Governance Factors: Formal Oversight vs. Relational Capital

Board Effectiveness (H1): This is the second most influential variable in the model and the most critical governance factor (β = 0.399, ME = 0.335, p < 0.01). For every 1-unit increase on the 5-point Likert scale for board effectiveness, a cooperative's performance index increases by 0.34 points.

Trust in Management (H5) & Transparency (H2): Both variables display remarkably similar positive impacts. Trust yields a marginal effect of 0.242 (p < 0.05), and Transparency yields a marginal effect of 0.232 (p < 0.05). This indicates a strong reinforcing loop: when leadership operates transparently, information asymmetry drops, which builds member trust, lowers monitoring costs, and enhances cooperative performance.

Member Satisfaction (H6): This variable has a smaller effect size but remains significant at $p < 0.05$ ($\beta = 0.159$, ME = 0.133). While member satisfaction is a positive asset, a 1-unit increase yields a 0.13-point increase in performance. This suggests that simply keeping members "happy" with basic customer service is insufficient if structural governance and financial buffers are weak.

The Power of Cooperative-Level Agency over Geography

The District Fixed Effects (Fadis, Kurfa Chele, Babile, evaluated against the baseline of Kombolcha) provide one of the most surprising findings: none of them are statistically significant ($p > 0.10$). This indicates that geographic and contextual differences across East Hararghe do not determine a cooperative's fate. A WSCC located in a remote, infrastructure-poor district can perform just as highly as one in an economically vibrant district, provided its internal board is effective and its capital reserves are adequate.

4.6 Qualitative Evidence

Key informant interviews clarified the mechanisms behind these statistical realities.

Regarding board monitoring features, a board chairperson in Kombolcha noted:

"Our board meets monthly to review financial reports and member feedback. We hold management accountable for loan recovery. When we saw recovery dropping, we developed a new collection strategy. Recovery improved by 10% in three months."

The reality of capital constraints was described by a district officer in Fadis:

"Many WSCCs started with very little capital. They rely on member savings and loan repayments. When loan recovery drops, they face immediate liquidity problems. Cooperatives should retain earnings rather than distributing all as dividends."

A WSCC manager in Babile emphasized the importance of transparency:

"We post our financial statements on the wall every month. Members can see how much is saved, how much is lent, how much is recovered. This builds trust. When members trust, they save more and take more loans."

Another board chairperson from Kurfa Chele added:

"Capital is everything. We struggled for two years because we had no buffer. One bad season with low loan recovery nearly bankrupted us. Now we keep 15% of our assets as reserves. We sleep better at night."

4.7 Robustness Checks and Diagnostic Tests

Table 7 demonstrates that across alternative OLS models, strict outlier exclusion, and 500-replication bootstrap runs, the direction, scale, and significance thresholds of the parameters remain highly stable.

Table 7: Robustness Checks — Coefficient Comparison

Specification	Board Eff	Transparency	Trust	Member Sat	Capital Adeq	Liquidity	Pseudo R^2 / Adj. R^2
Main Tobit	0.399***	0.277**	0.288**	0.159**	0.846**	0.579**	0.324
OLS (robust SE)	0.382***	0.264**	0.275**	0.152**	0.812**	0.551**	0.311
Excluding outliers	0.404***	0.281**	0.292**	0.162**	0.858**	0.585**	0.331
Bootstrap (500 reps)	0.396***	0.274**	0.286**	0.158**	0.843**	0.577**	0.322

*Note: *** p < 0.01, ** p < 0.05.*

Diagnostic Tests:

Test	Statistic	p-value	Interpretation
Breusch-Pagan	$\chi^2 = 2.86$	0.941	No heteroskedasticity
Ramsey RESET	$F(3, 53) = 1.31$	0.281	Correct specification
Shapiro-Wilk	$W = 0.0976$	0.312	Normal residuals

5. Discussion

5.1 Summary of Key Findings

This research provides the first rigorous empirical evaluation of the relative operational trade-offs between governance structures and financial determinants within rural women's savings and credit cooperatives.

First, capital adequacy emerges as the binding constraint. Maintaining a marginal effect score of 0.710, its impact is nearly twice as large as that of board effectiveness (0.335). Given that only 31% of examined cooperatives satisfy the 10% minimal capitalization benchmark, the vast majority operate exposed to minor asset shocks.

Second, formal institutional frameworks outpace social capital components. While relational characteristics like management trust (ME = 0.242) and member satisfaction (ME = 0.133) are meaningful, formal structures—specifically active board oversight (ME = 0.335)—exert more immediate leverage on performance outcomes during this phase of cooperative development.

Third, internal choices matter more than geography. The lack of significance across all district fixed effects challenges the assumption that localized infrastructure deficits or

geographic isolation dictate institutional failure. Well-governed, properly capitalized organizations can succeed even in low-resource settings.

5.2 Theoretical Implications

The high capital adequacy coefficient (β = 0.846) extends financial intermediation theory [4] by showing that in capital-scarce rural markets, the marginal return to institutional capitalization is exceptionally high. This matches the "financing gap" frameworks found across sub-Saharan landscapes [5].

Furthermore, by breaking down governance into distinct parts, we extend institutional theory [11] by showing that formal internal oversight mechanisms reduce transaction costs more effectively than informal relational social capital [13] when institutions are young (mean age ≈ 5 years). Relational assets likely require longer horizons to accumulate and manifest structural impacts.

5.3 Comparison with Previous Studies

Our conclusion that governance quality significantly enhances institutional performance (β = 0.399) confirms the foundational work of Mesfin et al. [16] in Jimma, Ethiopia. However, while prior studies primarily established this link through descriptive or qualitative frameworks, our model advances the literature by rigorously quantifying the precise marginal effect of board monitoring within a unified econometric system.

The positive and significant effect of operational transparency (β = 0.277) corroborates Asfaw and Zerfu [17] in Amhara Region, who argued that visible information sharing is essential for mitigating agency conflicts. This transparency effect is further supported by Mashiri and Ncube [29] in Tanzania.

The dominant role of financial fundamentals (β = 0.846) is highly consistent with international benchmarks. Njuguna et al. [22] demonstrated that capital adequacy reduces institutional distress risk among savings and credit cooperatives in Kenya, though their estimated coefficients were lower (0.4–0.6). The larger effect size observed in East Hararghe likely reflects the early stage of development and low baseline capitalization of these WSCCs.

5.4 Policy Implications

Based on the relative importance ranking established in our model, we recommend a tiered intervention strategy for policymakers, cooperative unions, and development partners:

Tier 1 Immediate Capitalization (0–6 months): Implement targeted capital-matching grant facilities for the 69% of WSCCs falling below the regulatory 10% capital threshold. Rather than distributing all net surpluses as immediate dividends, regulatory bodies should mandate higher institutional reserve retention rates to build internal buffers.

Tier 2 Governance Capacity Building (6–12 months): Standardize board training certifications across rural regions. Training modules should prioritize technical financial literacy, asset-liability management, and transparent reporting systems over generalized leadership concepts.

Tier 3 Structural Auditing Frameworks (12+ months): Establish low-cost, decentralized visual transparency systems—such as public ledger postings at village centers—to build member trust and reduce information asymmetry without relying on expensive digital infrastructure.

5.5 Limitations and Endogeneity Considerations

While this study provides robust econometric estimates, a key limitation is the cross-sectional nature of the data, which prevents the definitive elimination of endogeneity and reverse causality. Specifically, the relationship between capital adequacy and performance may be bidirectional: while adequate capital reserves shield cooperatives from operational shocks and drive performance (H3), high-performing cooperatives are simultaneously more capable of accumulating retained earnings and building capital reserves.

Similarly, unobserved cooperative-level traits—such as the unmeasured intrinsic motivation of a founding member—could simultaneously impact both board effectiveness and overall institutional performance. Although we mitigated omitted variable bias by incorporating district fixed effects to control for regional infrastructure heterogeneities and utilized a Two-limit Tobit framework with robust standard errors, these coefficients are best interpreted as highly stable conditional associations rather than absolute causal vectors. Future research utilizing longitudinal panel data will be invaluable in tracking these directional dynamics over time.

6. Conclusion and Recommendations

6.1 Synthesis of Empirical Findings

This study addresses a fundamental question for financial inclusion and rural development policy in the Global South: why do some women's savings and credit cooperatives (WSCCs) thrive as engines of economic empowerment while others struggle to survive? By employing a rigorous mixed-methods approach and a Two-limit

Tobit regression framework on a representative sample of 67 WSCCs in East Hararghe Zone, Ethiopia, we have provided the first simultaneous empirical evaluation of the relative importance of governance versus financial determinants of cooperative performance.

Our econometric results reveal a clear "hierarchy of needs" for rural microfinancial institutions. Financial fundamentals represent the primary binding constraint. Capital adequacy emerged as the single most powerful predictor in the model ($\beta = 0.846$, ME = 0.710, $p < 0.01$), followed closely by liquidity management ($\beta = 0.579$, ME = 0.486, $p < 0.05$). Transitioning from an under-capitalized state to meeting the regulatory baseline of 10% risk-weighted capital reserves yields an immediate 0.71-point increase on the 1–5 performance scale, shifting an average cooperative into the top tier of institutional health.

On the governance front, formal internal accountability structures outpace informal relational networks. Board effectiveness holds the second-highest leverage in the entire system ($\beta = 0.399$, ME = 0.335, $p < 0.01$). While social capital variables—member trust (ME = 0.242, $p < 0.05$) and transparency (ME = 0.232, $p < 0.05$)—are statistically vital and mutually reinforcing, simple member satisfaction exerts a smaller but still significant effect (ME = 0.133, $p < 0.05$). Crucially, the statistical insignificance of all district fixed effects proves that internal cooperative-level agency completely dominates regional geographic and infrastructural disparities.

6.2 Recommendations

For WSCC Management:

Prioritize capital building: Retain a minimum of 10% of risk-weighted assets as capital reserves. Avoid distributing all surpluses as dividends.

Strengthen board effectiveness: Establish regular board meetings (at least monthly), formalize strategic planning processes, and implement financial oversight mechanisms.

Enhance transparency: Post financial statements publicly, conduct annual general meetings, and ensure members have access to records.

Maintain liquidity buffers: Keep current assets at least equal to current liabilities to meet member withdrawal demands.

Invest in trust-building: Hold regular member meetings, respond to grievances promptly, and demonstrate accountability.

For Government and Cooperative Agencies:

Provide capital injection programs: Establish matching grant facilities for under-capitalized WSCCs.

Standardize board training: Develop certification programs focused on financial literacy, risk management, and governance.

Simplify reporting requirements: Reduce compliance burden while maintaining accountability.

Monitor capital adequacy: Conduct regular audits and provide technical assistance for capital planning.

For Development Partners:

Fund capital-building initiatives: Support programs that help WSCCs reach and maintain regulatory capital thresholds.

Support board training programs: Provide resources for cooperative leadership development.

Finance transparency technologies: Support low-cost digital or analog transparency systems (e.g., public ledger boards).

6.3 Avenues for Future Research

Longitudinal research is needed to establish causal relationships and track performance over time. Experimental studies could test different board training modalities. Comparative studies across regions could examine how contextual factors moderate performance determinants. Research on the mechanisms through which capital adequacy affects performance could inform program design. Cost-effectiveness analyses could guide resource allocation.

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8. Statements and Declarations

Ethics Approval: This study was reviewed and approved by the Institutional Research Ethics Review Committee of Haramaya University, Ethiopia. Formal administrative

permission to conduct the household survey across the target districts was granted by the local zonal and district administrative offices. Prior to the administration of the survey questionnaires, informed verbal and written consent was explicitly obtained from all individual household heads participating in the study. All methods were performed in accordance with the relevant guidelines and regulations, specifically the Declaration of Helsinki.

Consent to Participate: Informed consent was obtained from all individual household heads participating in the study. Participants were assured of confidentiality and their right to withdraw at any time.

Clinical trial number: Not applicable.

Consent for Publication: Not applicable. This manuscript does not contain any individual person's data, images, or videos.

Availability of Data and Materials: The data that support the findings of this study are available from the corresponding author upon reasonable request. Due to the sensitive nature of cooperative financial information, the data are not publicly available to protect participant confidentiality. However, anonymized data can be made available to researchers who provide a methodologically sound proposal and sign a data confidentiality agreement.

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Authors' Contributions: I.A. conceptualized the study, designed the methodology, conducted the data collection, performed the econometric analysis using the Two-limit Tobit model, and drafted the manuscript. J.H., F.Z., and K.J. supervised the research framework, reviewed the statistical results, and critically revised the manuscript for intellectual content. All authors read and approved the final manuscript.

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Supplementary Files

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- AliyiSupplementaryMaterial.docx