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Determinants of Sustainability of Informal Community-Based Financial Groups: Insights from a Survival Analysis Approach

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ABSTRACT *This study examines the survival factors of informal community-based financial groups in Burkina Faso, Mali, and Niger over the period 2014 to 2018. The results identify group size, meeting attendance, financial performance, and engagement in 'plus activities' as key predictors of savings group survival. The more efficiently funds are used and the higher the returns on savings, the more groups sustain their operations in the long run, irrespective of the absolute amount of savings per member. Similarly, active group engagement and involvement in additional non-financial activities alongside the core financial activities, also contribute to long-run survival. These findings highlight that social capital and financial efficiency should be at the forefront when designing savings-groups programs.*

KEYWORDS: Savings groups; sustainability; survival analysis; survival factors; Weibull accelerated failure time regression

1. Introduction

This article identifies the factors that influence the survival[1] of informal community-based financial groups, also known as savings groups (SGs). This research is prompted by growing concerns among development actors and policy makers about the sustainability of the initiatives they fund (Banerjee et al., 2015). SG mobilisation and training are often part of grassroots development programs assuming these groups can sustain themselves and survive independently after initial training from external donors (Gonzales et al. (2021); Nakato, 2021).

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However, prior studies on the factors influencing SG survival (Moret, Swann, & Lorenzetti, 2021; Van Swinderen et al., 2020) lack rigorous scientific research. Allen and Panetta (2010) highlight that this is mostly due to a lack of longitudinal data to support their assessments. This article helps to fill that gap. It should, therefore, be of interest to program implementers, policy makers, and donors who view SGs as a tool that 'helps the poor turn small amounts of money into meaningful opportunities to transform their lives' (Ashe & Neilan, 2014, p. 11).

Savings groups (SGs) are informal community-based groups of 15–30 people who save money and offer essential financial services such as savings, loans, and informal micro-insurance (Burlando, Canidio, & Selby, 2021). Estimates indicate that 419 million people are active members of informal financial groups mobilised through donor-funded global programs (Demirgüç-Kunt et al., 2022). These groups have emerged as an important tool for poverty alleviation and financial inclusion in economically disadvantaged communities in low-income countries (Gash & Odell, 2013).

These groups, mobilised with financial support from development aid donors, are a modernised version of the traditional informal rotating savings and credit associations (ROSCAs) that have existed in low-income countries for centuries (Allen & Panetta, 2010). The modernisation of ROSCAs, which includes training members in governance, transparency, and efficient intermediation of money, is necessary as a significant proportion of low-income villagers have suffered financial losses while participating in traditional ROSCAs (Wright & Mutesasira, 2001).

Redford and Verhoef (2022) have observed that SGs have emerged as an important means of building wealth and financial security for many individuals in low-income contexts. These groups actively support socioeconomic activities in underprivileged settings. SGs fulfil a diverse array of functions beyond the mere provision of financial services. As Allen and Panetta (2010), Orr, Brown, Carmichael, Lasway, and Chen (2019), and Gonzales et al. (2021) explain, facilitating agencies that mobilise and train groups often add 'plus activities' to their training programs such as education, income-generating activities, and health programs.

Savings groups serve remote and slum areas and meet the specific financial needs of vulnerable populations much better than traditional microfinance institutions (MFIs) (Ashe & Neilan, 2014; Ledgerwood & Rasmussen, 2011; Orr et al., 2019). They help their members deal with immediate financial challenges and develop social capital using members' untapped potential (Ashe & Neilan, 2014). In low-income countries, a significant proportion of the population relies on savings to protect against unforeseen events, such as illness, disability, or loss of income.

The lack of adequate government support and social security programs in these regions contributes to the popularity of SGs (Hannig & Wisniwski, 1999; Wheaton, 2018). Consequently, a SG failure can be financially damaging and socially harmful to vulnerable communities since it may jeopardise the village's social values, such as social capital, trust, and cooperation, potentially leading to social tensions. On the one hand, previous studies documented such negative externalities and emphasised the importance of understanding the determinants of SG sustainability (see for example, Moret et al., 2021; Ashe & Neilan, 2014; Odera & Muruka, 2007).

On the other hand, existing reports from practitioners on long-run survival are rather encouraging. For example, reports from Uganda and Mali show that savings groups survived for over eight years after a donor-funded development program ended, only to later collapse due to governance issues like poor management, fraud, theft, disputes, and noncompliance with rules and procedures (Van Swinderen et al., 2020).

A common limitation in the research on savings groups is the lack of sufficiently large panel datasets and rigorous methods for examining adequate determinants of SG sustainability (see for example, Allen & Panetta, 2010; Anyango et al., 2007; Mayoux, 2008). Many of the claims in previous research are anecdotic or suffer from a lack of data-driven conclusions regarding group survival. Given the call for more robust research on SG sustainability (Baland, Somanathan, & Vandewalle, 2019; Moret et al., 2021), this study employs rigorous methods and longitudinal data to identify factors that drive the sustainability of savings groups.

The data used in this study comes from the Strømme Foundation, a Norwegian non-governmental organisation (NGO). The dataset includes information on 3,541 savings groups in Niger, Mali, and Burkina Faso from 2014 to 2018. Given the statistical properties of our variables, our baseline model is a Weibull accelerated failure time-regression with random effects as outlined below. Our findings indicate that enhanced financial efficiency, evidenced through higher returns on members' savings and higher utilisation of funds, that is, a larger portion of collected savings and interests are lent to members, serves as a reliable predictor of the survival of savings groups. Furthermore, our analysis reveals that active group engagement in terms of group attendance and the provision of non-financial 'plus'-activities, is also positively related to long-run survival. Although we find a negative association between average savings amounts (per member per week), the negligible effect size indicates that financial efficiency matters more than the absolute dollar amount saved per individual for group survival.

The remainder of this article is structured as follows. Section 2 reviews the relevant literature. Section 3 describes the data and presents our empirical model. Section 4 presents the main results. Section 5 includes further analysis and robustness checks. Section 6 contains the conclusions, implications, and limitations of the study, as well as suggestions for future research.

2. Literature review

2.1. Savings groups: an overview

Savings groups (SGs) are informal, community-based financial organisations where members pool their savings and provide loans to one another. A review of the literature has widely documented the structure, operational mechanisms, and adaptability of SGs across diverse contexts (Ashe & Neilan, 2014; Burlando et al., 2021; Burlando & Canidio, 2017; Gash & Odell, 2013; Nakato, 2021). SGs typically consist of 15 to 30 members who meet regularly, often weekly, to contribute to a common fund (Ledgerwood & Rasmussen, 2011). Members can then apply for a loan at a pre-determined interest from the pooled fund, subject to collective approval. At the end of each savings cycle,[2] the pooled funds are distributed based on members' contributions. This process enables members to recover their savings and a share of the group's interest earnings. Local non-governmental organisations play a pivotal role in facilitating the establishment of these groups. These organisations provide staff to assist in the SG formation, training, and monitoring (Ledgerwood & Rasmussen, 2011). This approach promotes self-governance and contributes to the sustainability of SGs.

The loan limit is usually three times a member's savings contribution. Records of savings are carefully kept in group ledgers and individual passbooks. To ensure transparency and cash security, SGs employ security measures, including safe deposit boxes with multiple keys held by different members and collective loan approval procedures (Ledgerwood & Rasmussen, 2011). Consequently, savings groups offer a variety of benefits to their members: they are accessible to marginalised populations, cost-effective, and provide a relatively secure platform that protects members' savings from potential household risks such as overspending and theft (Burlando & Canidio, 2017; Gugerty, 2007). Women value SG membership as it allows them to control their financial resources (Anderson & Baland, 2002).

2.2. Savings groups: socio-economic drivers of participation

Savings groups (SGs) have shown resilience in areas with limited formal banking. However, the prevailing assumption that low savings among the poor merely reflect poverty and lack of options has been largely challenged. Earlier held beliefs that poor individuals lacked the ability or desire to save have largely contributed to their exclusion from formal financial services (Churchill, 2006). Empirical evidence shows that low-income people across continents (mostly in Africa, Asia, and South America) actively engage in informal savings mechanisms like cash storage, rotating savings and credit associations (ROSCAs), accumulating savings and credit associations

(ASCAs), and savings groups (SGs) to meet immediate financial needs (Bossuyt, D'Espallier, & Mersland, 2024), building assets (Besley & Levenson, 1996; Gugerty, 2007), manage savings, cultivate financial discipline, smooth consumption, and investments in human capital (Burlando et al., 2021; Mersland, D'Espallier, Gonzales, & Nakato, 2019; Van Hemert, D'Espallier, & Mersland, 2024; Wright, 1999). In many regions, ROSCAs serve as a compulsion to save (Churchill, 2006), informal insurance mechanisms (Calomiris & Rajaraman, 1998), intrahousehold resource allocation (Anderson & Baland, 2002), information sharing (Alvi & Dendir, 2009; Ambec & Treich, 2007; Kedir & Ibrahim, 2011), peer monitoring, and welfare enhancement (Gugerty, Biscaye, & Leigh Anderson, 2019; Karlan, Savonitto, Thuysbaert, & Udry, 2017).

Building on these principles, several scholars have highlighted that savings groups offer accessible, relatively secure, and flexible savings and borrowing options, often yielding high returns (Allen & Panetta, 2010; Anderson & Baland, 2002; Burlando et al., 2021; Gugerty, 2007; Jahns-Harms & Wilson, 2018; Petre, 2024; Van Hemert et al., 2024; Wright, 1999). Burlando and Canidio (2017) show that SG success and survival lie more in effective resource management – mobilisation, allocation, and repayment – rather than the absolute size of savings or the availability of financial options. SG participation has increased over the past decade and is driven by financial and social benefits. Members earn returns on their savings, save for future ventures, and use loans to develop small businesses (Alila, 1998; Hospes, 1995; Mayoux & Anand, 1995).

Savings groups (SGs) also serve as platforms for development interventions, also known as 'plus activities'. These NGO-led activities align with donor priorities in areas such as education, health, agriculture, and disease prevention (Allen & Panetta, 2010; Banerjee et al., 2015; Rippey & Fowler, 2011). The strategic use of SGs enables development actors to efficiently reach vulnerable populations while leveraging economies of scale and scope (Martínez, Mersland, & D'Espallier, 2021; Moret et al., 2021; Petre, 2024; Rippey & Fowler, 2011).

The success of groups with 'plus activities' likely stems from a supportive social network and enhanced interpersonal relationships, which are crucial for effectively managing informal finance (Burlando et al., 2021; Moret et al., 2021). Consistent with Mersland et al. (2019), Beaman, Karlan, and Thuysbaert (2014), Karlan et al. (2017), and Churchill (2006), these 'plus activities' promote social cohesion, mutual support, and risk-sharing, thereby enhancing community resilience against economic shocks. SGs are recognised as effective tools for local development and economic empowerment (Demirgüç-Kunt et al., 2022; Ashe & Neilan, 2014). However, Bouman (1979) cautions that these activities may shift the focus away from core financial services, undermining group autonomy and financial discipline.

Savings groups (SGs) rely exclusively on social collateral – defined by Wydick (1999) as mutual trust, solidarity, shared norms, and peer accountability – to ensure functionality and sustainability. Social capital seems to be a critical factor in the scalability of SG models, positioning them as key instruments for financial inclusion and poverty reduction. Petre (2024) emphasises that this reliance on social rather than financial collateral binds members together for group success. Allen and Panetta (2010) and Thorp, Stewart, & Heyer (2005) further argue that this intangible capital fosters a collective sense of ownership, reduces risks, and strengthens member commitment, particularly as members may self-select into groups at the beginning of the cycle, despite the involvement of facilitating agencies during group formation. Burlando and Canidio (2017) emphasise that self-selection helps savings groups mitigate adverse selection and moral hazard, Besley and Coate (1995) highlight how peer monitoring enhances transparency and ensures timely repayments. Although individual self-selection could introduce methodological biases, our analyses focus on the group level and therefore less prone to self-selection bias.

Petre (2024) and Le Polain, Sterck, and Nyssens (2018) note that non-compliance with group rules often triggers social sanctions, reinforcing adherence and accountability. However, Moret et al. (2021) and Anyango et al. (2007) warn that insufficient social collateral can erode cohesion, incite disputes, and lead to group failure, particularly in mismanagement or fraud cases.

While these studies underscore the importance of social collateral, gaps remain in understanding how varying levels of trust and accountability influence SG sustainability.

SGs frequently encounter threats like governance failures, fraud, defaults, and power imbalances, which can erode trust, destabilise the financial fabric, and reduce group survival (Anyango et al., 2007; Moret et al., 2021). The exclusion of ultra-poor individuals and those with disabilities who are often perceived as high-risk borrowers, remains a concern undermining the mission of SGs to promote financial inclusion (Burlando et al., 2021; Mersland et al., 2019; Wydick, 1999).

Despite their widespread success, the informal nature of SGs has led to concerns among scholars regarding the economic legitimacy of a financial model that often prioritises addressing immediate household financial needs over business growth (Allen & Panetta, 2010; Bossuyt et al., 2024; Le Polain et al., 2018). These groups rely on informal systems, emphasising trust and interpersonal accountability over formal regulation (Van Hemert et al., 2024; Petre, 2024).

2.3. Factors influencing the survival of savings groups

Despite the widely documented benefits of SGs in vulnerable communities, a significant knowledge gap remains regarding the factors that promote their long-run survival. This is particularly pressing because the facilitated SG model typically entails that the supporting development agency stops overseeing the group activities after a year (Gonzales et al. (2021); Nakato, 2021). Practitioner reports have identified factors related to SG sustainability. Dusuki (2008) highlights the importance of high returns and effective member retention. Allen and Panetta (2010) highlight the role of flexibility and accessibility in ensuring the sustainability of SGs. Burlando and Canidio (2017) emphasise the importance of rigorous loan repayment practices. SG's sustainability depends on internal stability as theft, fraud, disputes, and weak loan repayment could hinder its continued operation (Van Swinderen et al., 2020). Wheaton (2018) underscores that membership in multiple groups and borrowing from one group to repay another can compromise group survival. Le Polain (2017) and Le Polain et al. (2018) caution about problems associated with excessive flexibility, which can weaken group structure, compliance, and financial sustainability. This is due to mismanagement and increased dependence on external assistance. Conversely, Le Polain (2017) argues that rigid adherence to prescribed models can hinder success. It is crucial to strike a balance between structure and flexibility to ensure the sustainability of SGs.

Given the challenges associated with internal dynamics and operational flexibility, Le Polain et al. (2018) propose implementing comprehensive training programs for managers and members. This training ensures compliance and group sustainability. Burlando et al. (2021) underscore the pivotal function of effective credit management within the SG methodology. The success of SGs depends on their ability to transform savings into loans and generate wealth for members. Yet, both excessive and insufficient savings within a group can harm long-term performance and the group's survival (Burlando et al. (2021). Thus, targeting excessive utilisation of funds may not be a good strategy as it can pressure members into unnecessary borrowing and potentially jeopardise group cohesion and survival. Given this argument, a nonlinear relationship is plausible between group survival and these financial performance indicators. Although members could have an entrepreneurial orientation to use the funds, they may face difficulties in fully comprehending the opportunities and risks inherent in the microfinance market (Ledgerwood & White, 2006). Instead, Hirschland (2005) suggests prioritising member savings security to balance these dynamics.

Women's active participation as members and leaders seems an important driver for SG's success. Facilitating agencies often prioritise women in training programs, recognising their potential to drive positive change in their communities. Savings groups are often described as female financial activities (Mersland et al., 2019).

Despite a lack of formal studies on losses from SG failures, anecdotic evidence and practitioner reports indicate that many people in low-income countries have suffered losses from the collapse of informal financial groups or fraudulent deposit schemes (Wright, 1999). In contexts

with limited banking access and widespread mistrust of formal institutions (Churchill, 2006), SGs are often perceived as reliable alternatives, operating on principles of discipline and mutual accountability (Churchill, 2006). The collapse of an SG entails consequences that extend beyond the immediate loss of access to essential financial services, compelling members to rely on exploitative informal lenders or to make substantial reductions in critical areas such as education, healthcare, and small businesses (Karlan, Ratan, & Zinman 2014; Allen & Panetta, 2010). Such failures entail economic losses and erode social capital, trust, and community cohesion, increasing vulnerability to shocks (Wright, 1999).

Most of the reference studies above use simple descriptive statistics or bivariate analyses to support their conclusions. We employ a more rigorous analysis of group survival using a West African unique panel dataset from the Strømme Foundation, a Norwegian NGO with extensive microfinance experience. Our method is the Weibull accelerated failure time regression with random effects, which allows us to provide more conclusive evidence on the factors influencing the survival of SGs.

3. Data and empirical strategy

3.1. Data description

This study uses a dataset from annual records of a large and geographically dispersed number of savings groups in Burkina Faso, Mali, and Niger. Our sample consists of 3,541 savings groups in the 2014–2018 cohort of an unbalanced panel dataset originating from the Strømme Foundation. The Strømme Foundation is a Norwegian NGO supporting microfinance programs in many low-income countries. Their SG model is widespread across Africa, Asia, and South America. The three countries in this study share some similarities in religious practices, cultural values, and challenges such as political instability, climate change, poverty, and gender inequality. Due to these shared characteristics, we can combine observations across the three countries. At the same time, we incorporate country-fixed effects to control for remaining unobserved heterogeneity coming from country-specific attributes. Our dataset includes group-level characteristics, financial variables (for example, savings per member, fund utilisation rate, return on savings), and variables related to non-financial services.

A distinctive feature of the dataset is that, unlike most development programs that fund the mobilisation of SGs, the Strømme Foundation continues to track its groups even after its intervention ends (approximately 12 months after a group's formation). Data are reported to group leaders in meetings, collected by field officers during group visits, and cross-checked and consolidated by a local NGO before submission to the Strømme Foundation. As the data is reported by groups at different times throughout the year, we compute the 'savings per member per week', a standardised measure that allows us to compare savings behaviour across groups (Bossuyt et al., 2024).

A savings group founded in 2014 but not identified in subsequent years is classified as a 'non-survivor'. To ensure the reliability of this classification, we collaborated with local partners of the Strømme Foundation in conducting additional fieldwork to verify the failure of these groups. This approach ensured missing data were not erroneously interpreted as evidence of group failure. In addition, a targeted verification procedure was used to address the issue of survival bias. A random sample of 60 savings groups was selected from the dataset, with the criterion being that they continued to be tracked after the initial baseline data reporting. This procedure ensured the selection was unbiased regardless of the reported survival status. Former group members were directly contacted to ascertain whether their respective groups had survived or failed. This careful verification process validated the accuracy of the non-survivor classification. We trimmed the data to avoid extreme outliers that could introduce bias. This procedure excluded the lowest and highest 1 per cent of observations. These outliers, which may be due to measurement errors or atypical cases, might not accurately reflect the data's

Table 1. Variable definitions and summary statistics

Variables	Definition	Surviving groups			Non-surviving groups			Overall sample					
		Obs.	Mean	Std.	Obs.	Mean	Std.	Obs.	Mean	Median	Std.	Min	Max
Survival duration	The length of time until a savings group collapses or is censored							13,188	2.05	1.88	1.18	0.01	4.74
Membership	The number of active members in a savings group	12,072	24.84	3.82	348	24.31	4.09	12,420	24.82	25	3.83	0	45
Attendance rate	The percentage of members present during the last meeting	12,072	0.92	0.11	348	0.92	0.11	12,420	0.92	0.96	0.11	0.17	1
Field officer gender	1 if the field officer is a female and 0 if a male	12,072	0.32	0.47	348	0.17	0.47	12,420	0.32	0	0.47	0	1
Return on savings (ROS)	The sum of cash in the cashbox, bank balance, current property, and loans outstanding minus the sum of net savings, debts, and property at the start, divided by net savings	12,072	0.37	0.49	348	0.03	0.47	12,420	0.35	0.28	0.95	−2	2.83
Savings per member per week	Cumulative savings are divided by the number of active members in the group and the number of completed weeks in the cycle	12,072	0.31	0.30	348	0.57	1.11	12,420	0.32	0.26	0.30	0.01	5.87
Fund utilisation rate (FUR)	The value of loans outstanding is divided by the net value of members' savings.	12,072	0.92	0.40	348	0.72	0.37	12,420	0.91	0.97	0.39	0	2.21
Savings group 'plus activities'	It takes a value of 1 if the savings group received non-financial services, also called 'plus activities' from the donors, and 0 otherwise	12,072	0.29	0.45	348	0.14	0.34	12,420	0.30	0	0.46	0	1
Social funds	A small proportion of cash in dollars is set aside for social needs other than loans	12,072	0.43	5.99	348	0.55	5.36	12,420	0.43	0		0	1
Number of cycles	The number of savings cycles already completed by a group	12,072	0.63	0.39	348	0.59	0.41	13,173	2.06	0.62		0	4.31

central tendency. Subsequent re-estimation of our analyses on the trimmed dataset yielded robust results, affirming our findings are not influenced by these extreme values.

3.1.1. Descriptive statistics. Table 1 below presents definitions and descriptive statistics on both financial and non-financial information. Financial data were converted to US dollars using a fixed exchange rate from 2014.

As can be seen from the table, the average group size is 24.82 members, with a high attendance rate of 92 per cent. This indicates a strong community engagement. Interestingly, 68 per cent of the groups were originally mobilised by male field officers, although the members are predominantly women. This may be indicative of the pervasive gender imbalance that is a common phenomenon in rural and slum communities in West Africa. Most groups also operate in areas that are less accessible to female field officers due to a lack of infrastructure, security concerns, and potentially influential local customs.

Regarding financial performance, members collectively save an average of $0.31 per week, with a 35 per cent return on savings at the end of the savings cycle. It is worth highlighting that 91 per cent of the savings collected are converted into loans, indicating efficient internal resource utilisation on average. While 30 per cent of the groups receive additional services beyond basic financial training, the average social fund balance of $0.43 suggests a limited focus on informal insurance to cover risks and uncertainties such as sickness, loss of a family member, weddings, and so forth, compared to similar groups observed elsewhere (Nakato, 2021).

Table 2 outlines the survival rates of savings groups over the five-year (2014–2018) sample period, revealing a gradual decline. No assumptions are made about survival patterns or covariate effects. Formally, let t_i denote the failure time for group i, n_i the number of savings groups at risk just before t_i, and d_i the number of failures at t_i. The survivor function $S(t)$ is estimated as follows:

$$S(t) = \prod_{t_i \le t}^{t} \left(\frac{n_i - d_i}{n_i} \right) = \prod_{t_i \le t}^{t} \left(1 - \frac{d_i}{n_i} \right) = \prod_{t_i \le t}^{t} (1 - h_i),$$

where $S(t)$ is the probability of survival beyond t and $h_i \equiv \frac{d_i}{n_i}$ represents the hazard rate, that is, the ratio of the number of failed groups (d_i) to the number of groups at risk of failure (n_i) at t_i. Table 2 gives some descriptive statistics on savings groups' failure and survival, including the survival rate, $S(t)$, for the years 2014 to 2018.

Data indicate a high survival rate for savings groups over the sample period. Within five years, a total of 371 savings groups failed (sum of Column (2)), translating to an estimated average cumulative failure rate of approximately 7.65 per cent (Column (3)) during the same period. In the initial year 2014, 99.4 per cent of the groups remained active (Column (4)). A small number of groups (74) ceased activities before the end of 2014 (Column (2)). This attrition continued, with 101 savings groups exiting in 2014–2015 and 138 in 2015–2016 (Column (2)), showing that most failures occur in the second and third years. The estimated five-year survival

Table 2. Survival rate of the savings groups in the sample

Years	Failed	Cum. failure rates (%)	Survival rates	Std. error	[95% conf. int.]
0	0		1		
2014	74	0.65	0.994	0.001	0.992–0.995
2014–2015	101	1.90	0.981	0.002	0.978–0.983
2015–2016	138	4.83	0.952	0.003	0.946–0.957
2016–2017	58	7.65	0.923	0.005	0.914–0.932
2017–2018	0	7.65	0.923	0.005	0.914–0.932

rate is 92.3 per cent (Column (4)), indicating that nearly all savings groups demonstrably sustained their operations throughout the sample period.

3.2. Empirical strategy

Analysing survival data is unique in that it combines two key aspects: whether the event has occurred (a binary outcome) and when it has occurred (a continuous outcome) (Schober & Vetter, 2018). This dual focus needs specialised statistical methods capable of handling censoring and skewness data – common features of survival data. Model specification requires thoroughly examining probability distributions in order to identify a model that best fits the underlying data structure. The selection of an appropriate model is particularly critical when parametric or semi-parametric survival approaches are applied, as the choice fundamentally depends on the distribution of the error term (Cleves, Gutierrez, Gould, & Marchenko, 2010). Although survival analysis provides a range of model options to deal with survival data, the model choice requires careful selection to ensure robust inference.

In this study, to identify the optimal model for the Strømme Foundation data, we systematically evaluated five commonly used distributions in survival models with random effects: Weibull, Exponential, Log-normal, Gamma, and Log-logistic (Cleves et al., 2010). While this preliminary step does not definitively ascertain the best model, it informs the selection process, which we refined using standard model specification techniques. We rigorously evaluated goodness-of-fit using metrics like the log-likelihood, Akaike information criteria (AIC), and Bayesian information criteria (BIC) (Appendix Table A1), employing maximum likelihood estimation across all distributions.

We further compared the selected parametric model against a semi-parametric Cox proportional hazards model. However, the violation of the proportional hazards assumption[3] rendered the Cox model unsuitable for our data (Stata Corporation, 2003). Through iterative evaluations, the Weibull accelerated failure time (AFT) model with random effects emerged as the most appropriate, effectively capturing the dynamics of savings group survival and accommodating right-censored data. In order to enhance the precision of covariate effects and address potential heteroskedasticity and autocorrelation, we incorporated clustered standard errors at the savings group level. The final model is specified as follows:

$$log\ \ t_{ij} = X_{ij}\beta + v_i + \epsilon_{ij}$$

In this equation, t_{ij} represents the survival time of the i-th savings group at the j-th observation point, β denotes a vector of parameters to be estimated, $X_{i\,j}$ is a vector of covariates, and v_i indicates the random effects at the savings group level. These random effects are assumed to follow a normal distribution with a mean of 0 and a variance of σ^2. The error term ϵ_{ij} is modelled with a density function appropriate to the chosen distribution, ultimately determining the structure of the regression model. We acknowledge the Weibull-based accelerated failure time (AFT) model may be unfamiliar in the savings group literature. We contrast the alternative survival model specifications listed earlier with pooled OLS, logit estimates, and the semi-parametric Cox model (see Appendix Table A2) to assist readers less familiar with survival approaches. In pooled OLS regression, the dependent variable is the duration from SG formation to the subsequent reporting date between 2014 and 2018 and remains constant for each group once it is determined. In contrast, the logit model uses a binary outcome to indicate whether a group has survived in the same time range.

4. Empirical findings

This section presents results from the parametric analysis of factors associated with the survival of savings groups. Table 3 shows the relationship between group survival and survival factors for five different specifications using a random-effects Weibull accelerated failure time regression. All specifications include control variables from Table 1, grouped under group characteristics and additional services. The specifications differ according to how we include the three financial performance metrics: columns (1)–(3) including the Fund utilisation rate, Returns on savings, and Weekly savings per member per week separately. Column (4) includes all financial metrics simultaneously, and

Table 3. Survival factors of savings groups

Variables	(1)	(2)	(3)	(4)	(5)
Group characteristics					
Group size	0.03 (0.01)**	0.03 (0.01)**	0.04 (0.01)**	0.03 (0.01)**	0.03 (0.01)***
Meeting attendance rate	1.19 (0.34)***	1.30 (0.34)***	1.31 (0.32)***	1.22 (0.33)***	1.16 (0.32)***
Field officer's gender (female field officer = 1)	0.40 (0.08)***	0.41 (0.09)***	0.42 (0.08)***	0.35 (0.08)***	0.32 (0.08)***
Number of cycles	−0.10 (0.08)	−0.11 (0.08)	−0.09 (0.08)	−0.12 (0.07)	−0.10 (0.07)
Financial performance					
Fund utilisation rate	0.54 (0.08)***			0.40 (0.09)***	−0.09 (0.25)
(FUR)2					0.39 (0.20)**
Return on savings		0.32 (0.06)***		0.14 (0.06)**	0.09 (0.07)
Savings per member per week			−0.24 (0.04)*	−0.20 (0.05)**	−0.23 (0.05)***
(SPM)2					0.01 (0.01)**
Additional services					
Savings groups with 'plus activities'	1.20 (0.13)***	1.00 (0.12)***	0.93 (0.11)***	1.03 (0.12)***	1.00 (0.12)***
Social funds	0.001 (0.01)	0.002 (0.01)	0.002 (0.01)	0.001 (0.01)	0.001 (0.01)
Cons	0.10 (0.44)	0.36 (0.43)	0.38 (0.41)	0.29 (0.42)	0.49 (0.43)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes	Yes	Yes
Number of observations	12,420	12,420	12,420	12,420	12,420
Log-likelihood	−1206.69	−1213.17	−1218.08	−1198.78	−1173.76
Akaike information criteria	2439.38	2452.33	2462.17	2427.57	2393.51
Bayesian information criteria	2535.93	2548.89	2558.72	2538.97	2519.77

Notes: ***sign. $p < 1\%$, **sign. $p < 5\%$, *sign. $p < 10\%$. FUR is the fund utilisation rate, and SPM is savings per member. SE are standard errors.

column (5) accounts for squared terms for weekly savings per member and fund utilisation rates to explore for possibly non-linear effects as discussed in Section 2.3.

As can be seen from the Table, results are stable across these different specifications. We rely on Models (4) for further interpretations. Higher attendance rates are positively and significantly associated with the sustainability of savings groups ($\beta = 1.22$, $p < 0.01$), indicating active member participation is a crucial factor. Group size, measured by the number of registered members, is also positively correlated with the sustainability of savings groups ($\beta = 0.03$, $p < 0.05$). The presence of female field staff is significantly associated with increased group survival ($\beta = 0.35$, $p < 0.001$), suggesting gender dynamics in field support play a role. Additionally, the savings group's receipt of 'plus activities' – extending training beyond basic financial skills – is positively and significantly associated with group survival ($\beta = 1.03$, $p < 0.001$). The financial performance measures also predict group survival. Higher returns on savings (ROS) are associated with group sustainability ($\beta = 0.14$, $p < 0.05$). Similarly, the proportion of funds lent out (FUR) is positively associated with SG sustainability ($\beta = 0.40$, $p < 0.001$, Model (4)). These findings underscore the importance of financial efficiency in terms of profit generation and fund utilisation for group survival. However, higher weekly average savings per member show a slight negative association with group survival ($\beta = -0.20$, $p < 0.05$). All four models control for the number of completed cycles to account for the timing within and across cycles.

In column 5, we examine the possible existence of a nonlinear association of weekly savings per member and the proportion of funds lent out with group survival. However, the coefficients on the squared terms are positive, both for weekly savings per member and the proportion of funds lent out. Our analysis finds no empirical support for the hypothesised inverted u-shapes in these variables as stated earlier in the literature. In addition, the nonlinear analysis yields qualitatively similar results to the linear-in-variables model.[4]

The following graphs, using coefficients from column (4), illustrate the quantitative effect of selected variables. The y-axis is the predicted survival rate, and the x-axis is time. Figure 1 plots the predicted survival of savings groups in the full sample, assuming average values for all covariates. As expected, the predicted survival rate at means is comparable to the ones shown in Table 2. Figure 2 shows the predicted survival rate for savings groups with and without plus activities. As can be seen, the effect is large and increases strongly over time. Figure 3 compares

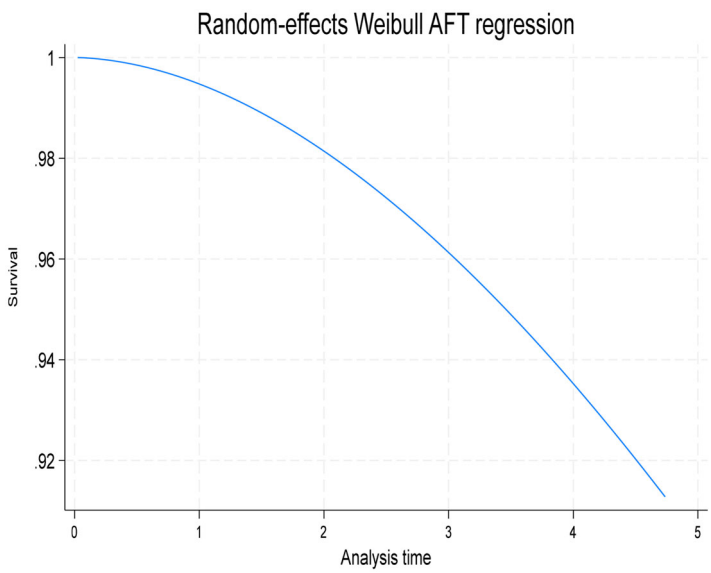

Figure 1. Marginal survival for all covariates.

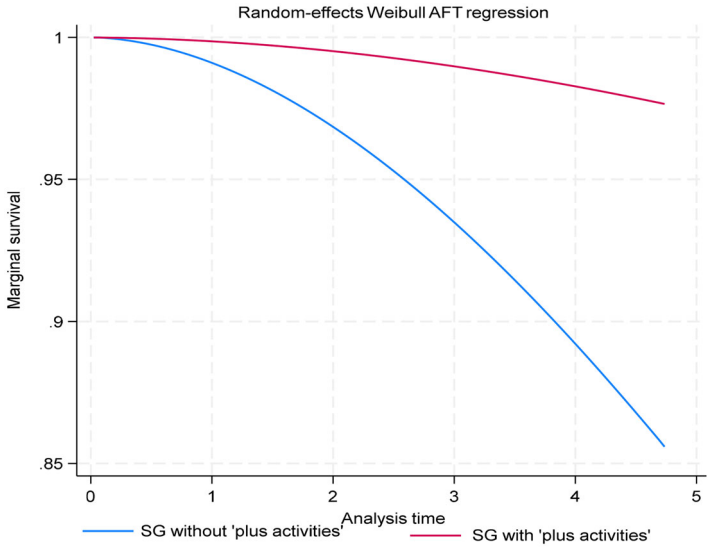

Figure 2. Marginal survival by additional services.

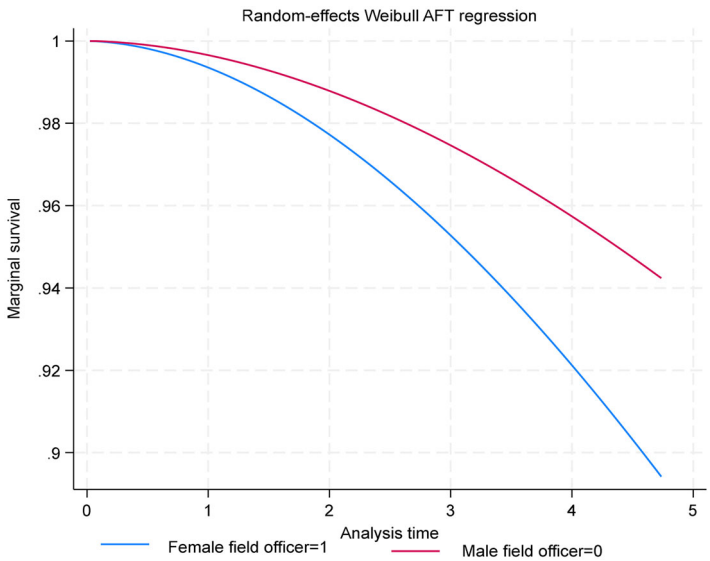

Figure 3. Marginal survival by gender of the field agent.

the predicted survival rate for groups with a male and female field officer. Finally, Figure 4 plots the predicted survival rate for groups with savings per member per week at the mean and two standard deviations above this mean. As can be seen, even if the effect of savings is on survival negative, the quantitative effect is quite small.

Our findings highlight financial efficiency is a key factor determining the survival of savings groups, translated to the positive relationship between both returns on savings and fund utilisation rate and survival. This aligns with Martínez et al. (2021), who suggest that more profitable groups are better positioned to sustain financial services to the poor. Consequently, groups that survive across cycles are more likely to perpetuate the savings group methodology and strengthen efforts toward financial inclusion, consistent with Dongier et al. (2003) and Nakato (2021).

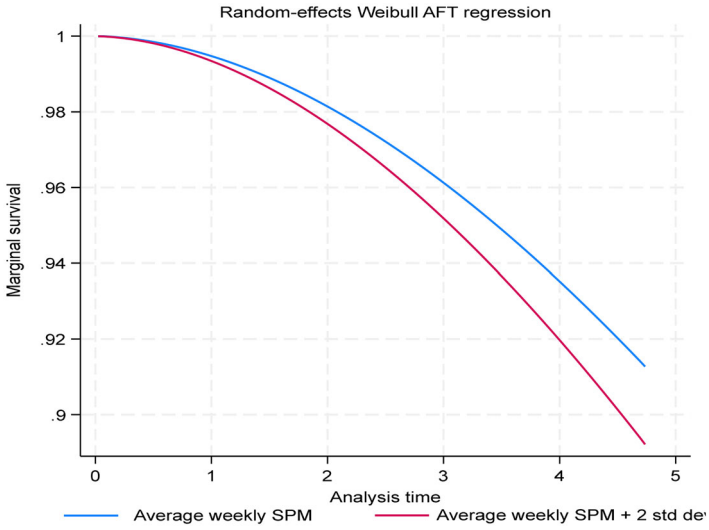

Figure 4. Marginal survival for weekly savings per member.

A high fund utilisation rate indicates that a significant portion of members' savings is actively distributed as loans, which minimises idle capital within the group. As seen, we find that this is positively related to group survival (Bossuyt et al., 2024). Results reveal that average savings (per week, per member) are weakly negatively related to survival. This suggests that financial efficiency is more important for survival than the absolute dollar amounts of savings invested in the group. This aligns with Ledgerwood and Rasmussen (2011), who warn that substantial increases in savings may increase liquidity management challenges, potentially heightening mismanagement risks, and undermining group stability over time. Petre (2024) corroborates that insufficient loan demand can potentially increase the cash in the box and expose the group to security risk and mismanagement. Burlando et al. (2021) similarly suggest that both insufficient and excessive savings could harm group survival. Conversely, constrained savings may limit access to larger loans for productive investments (Allen & Panetta, 2010; Le Polain et al., 2018). However, our findings do not strongly support this non-linearity.

Although we cannot observe savings at the individual level, consistent with Le Polain et al. (2018), the heterogeneity in savings amount within groups can lead to disparities among members. Cassidy and Fafchamps (2020) also emphasised group homogeneity to mitigate potential member imbalances, particularly for borrowing distribution. Le Polain et al. (2018) and Burlando et al. (2021) document tensions between net depositors and net borrowers in savings groups, where net savers may demand higher returns on their savings, while net borrowers may seek lower interest rates. Such conflicts are more likely to arise in more heterogeneous groups, where differences in savings and borrowing behaviour are more pronounced.

Meeting attendance and 'plus activities' are positively related to group survival. Consistent with earlier research (Gash & Odell, 2013; Mersland et al., 2019; Wheaton, 2019), high attendance rates reflect members' sense of discipline and community building that help members build social capital, share experiences, and support each other in various ways. That means active engagement of members is key for the survival. Furthermore, these meetings reinforce the perceived value and relevance of the services provided by the savings group (Allen & Panetta, 2010).

Indeed, the implementation of 'plus activities' enhances development outcomes for individuals with limited resources, addressing the broader development agendas (Gash & Odell, 2013; Orr et al., 2019). Mayoux (1999) argues that financial services alone are insufficient for meaningful reform, particularly for women. Armendáriz and Morduch (2010) highlight the need for

'group organisation and collective action beyond solely financial goals'. These results underscore the role of 'plus activities' in addressing broader social and cultural issues confronting disadvantaged people beyond their financial needs. Although integrating 'plus activities' is positively associated with group survival, concerns exist about their potential drawbacks. Kilby and D'Zmura (1985) and Boomgard (1989) are concerned that these socially oriented activities may create dependency and/or divert groups from their core financial objectives.

The positive relationship between group size, measured by the number of registered members, and survival is consistent with Maitra, Miller, and Sedai (2023) who found that larger ROSCA memberships increased household welfare in rural areas in India, attributing the sustainability of ROSCAs to strong social ties that often characterised rural communities. Similarly, women field officers play a pivotal role in the sustainability of savings groups as groups they train tend to demonstrate higher survival rates. This finding is consistent with Otiti, Godfroid, Mersland, and D'Espallier (2022) who identified in the microfinance sector that female loan officers were more effective than male loan officers in terms of loan repayment and conflict resolution. Female field officers have proven their ability to build stronger relationships with members, foster trust, and promote inclusive decision-making processes within savings groups (Wheaton, 2019). Their presence and guidance during the group's formation establish a robust foundation for sustained survival (Gugerty et al., 2019).

Savings groups also empower women at the individual level, enhancing their household decision-making power (Beaman et al., 2014; Karlan et al., 2017; Mayoux, 1999). However, the impact of women on the sustainability of savings groups varies depending on the local context (Otiti, 2022; Wheaton, 2019). Further research is needed, particularly concerning the effectiveness of financial inclusion in transforming social norms and traditions in the poorest communities (Armendáriz & Morduch, 2010, 192–193). Women with limited education and skills frequently encounter limited opportunities for employment outside the home (Rankin, 2002).

5. Further analysis and robustness checks

5.1. Alternative model specifications

First, in Appendix Table A2, we compare the results of the Weibull AFT model with alternative parametric (exponential, log-logistic, log-normal, gamma) and semi-parametric (Cox proportional hazards) models, as well as pooled OLS and logit regressions. As shown in the table, the results remain consistent across different survival models, reinforcing the robustness of our approach in a survival setting. However, traditional models such as pooled OLS and logit do little to address the skewed and censored nature of survival data, resulting in unreliable and inconsistent results consistent with Schober and Vetter (2018).

5.2. Sensitivity analysis

Appendix Table A3 performs extensive sensitivity analyses across four subsamples to check for potential survival bias by examining how the determinants of survival change as new groups emerge over time. The results show shifts in the importance of certain factors over time, but the overall effect remains consistent. For example, while the number of registered members shows no significant association with group survival in the earliest subsample (2014–2015), its influence on sustainability strengthens over time. Conversely, increases in weekly savings per member consistently reduce group survival in all subsamples. 'Plus activities' are initially excluded from the analysis because groups tend to receive them over time. Social funds are not significantly correlated with group survival in the overall model but reduce the likelihood of survival in the subsamples.

5.3. Endogeneity concerns

It is possible that some of our variables, most notably the financial performance measures, may suffer from an endogeneity problem. In particular, they may be correlated with not included characteristics that also affect survival. Therefore, we incorporated nonlinear and additional controls, such as macroeconomic and institutional factors[5] (for example, GDP growth, inflation, population density, and the Social Institutions and Gender Index [SIGI]) to address omitted variable bias. Appendix Table A4 confirms the robustness of our results across models: (1) baseline model, (2) inclusion of macroeconomic and institutional controls, and (3) additional quadratic terms for financial performance variables. The consistency of results across these models reinforces the validity of our findings. The significant association between SIGI[6] and group survival underscores the influence of structural gender inequalities on SG sustainability, particularly in West Africa. Studies including Otiti, Andersson, & Mersland (2021), Armendáriz and Morduch (2010), Churchill (2006), Rankin (2002), and Mayoux (1999) have documented structural barriers faced by women in low-income countries.

5.4. Additional analyses

We conducted three additional robustness checks to validate our findings. First, we standardised the covariates (mean = 0, SD = 1) to assess the influence of a one-standard-deviation increase on group survival (Appendix Table A5, column 2). Results remained largely stable. Second, we examined correlations between the number of completed cycles (measuring the timing within and across cycles) and covariates to address potential bias from the timing of covariate measurements – given that covariates are measured on different scales (see Appendix Table A6). The lack of correlation suggests that seasonal variability introduces random noise rather than systematic bias. Finally, we constructed de-seasonalised variables by subtracting cycle-specific means from observed values of covariates to deal with deviations from seasonal trends (Appendix Table A5, column 3). Results remain robust, underscoring the reliability of our conclusions.

We further explored country-specific dynamics by interacting covariates with country dummies and re-estimating the results (Appendix Table A7). Most covariates are not associated with group survival at the country level. Thus, our empirical evidence does not show significant contextual differences across these countries. This makes sense because these countries share socio-cultural and economic characteristics. Overall, our findings are consistently robust.

6. Conclusion, implications, and avenues for future research

This study contributes to understanding the factors influencing the sustainability of informal community-based financial groups that serve the poorest populations, offering valuable practical insights for policy makers, donors, and facilitators. The existing literature and practitioner reports acknowledge the high resilience of savings groups even in challenging environments (Gash & Odell, 2013; Van Swinderen et al., 2020). However, the factors contributing to the survival of savings groups are understudied in the current literature on informal financial schemes. This knowledge gap is of concern, as group failures can impede development outcomes and lead to conflicts among poor communities (Moret et al., 2021). However, we acknowledge that many practitioners' reports have documented the survival of savings groups. Nevertheless, these studies suffer a lot of limitations such as they frequently rely on anecdotal evidence, employ cross-sectional data, lack robust research designs, and are content with descriptive analysis. This makes it challenging to formulate effective policies.

By addressing these gaps, this study's originality lies in its rigorous scientific methodology and unique panel dataset, which are employed to investigate the determinants of SG survival. The findings indicate that the number of registered members, high meeting attendance, returns on savings, the proportion of funds lent out, and engaging in 'plus activities' are positively

associated with group survival. However, the average weekly savings per member are weakly negatively related to the survival.

Such results highlight the importance of financial efficiency over the absolute weekly dollar saved per member and the active engagement of members to sustain a group over time. Consistent with earlier studies (Le Polain et al., 2018; Martínez et al., 2021; Moret et al., 2021), the survival of SGs is contingent on effective portfolio management and equilibrium between savings supply and loan demand, enabling groups to create meaningful value for their members (Burlando et al., 2021; Burlando & Canidio, 2015; Le Polain et al., 2018; Martínez et al., 2021). Therefore, SGs capable of generating higher returns and efficiently managing loans are more likely to sustain the operations in subsequent cycles (Burlando et al., 2021; Martínez et al., 2021). Savings groups also facilitate the development of strong social ties among members through regular interactions during meetings, promoting gender equality and women's empowerment (Allen & Panetta, 2010).

Although Kilby and D'Zmura (1985) and Boomgard (1989) have expressed scepticism about the potential negative influence of integrating 'plus activities' alongside basic financial training, our results reveal a strong positive link between these activities and group survival. This finding aligns with Mayoux's (1999) who supports that 'plus activities' boost group survival. Our findings warrant further investigations into which type of 'plus' activities are beneficial or detrimental to the survival of SGs. Likewise, future research could also study whether the informal nature of SGs, which is central to their flexibility, may expose them to vulnerabilities in changing socioeconomic and regulatory environments.

The potential of emerging financial innovations, such as microinsurance and mobile banking, to increase SG resilience, reduce transaction costs, and mitigate risks, warrants in-depth analysis. Leveraging individual-level data could explore how heterogeneity in savings behaviour correlates with group sustainability. The role of the gender of the field officers in promoting group cohesion, trust-building, and conflict resolution should also be systematically examined, as these are critical for SG sustainability. Future research should examine how social capital and trust mitigate challenges like adverse selection and moral hazard, as these factors are key to SG sustainability. Understanding their role in reducing risks and fostering group cohesion will provide valuable insights for enhancing SG effectiveness in the long term. Experimental or mixed-methods designs could be employed in future research to establish causal relationships and integrate qualitative dimensions. This would enhance the development of evidence-based interventions and policies that optimise SGs as instruments for economic empowerment and financial inclusion.

Notes

1. SG's survival is a strong indicator of its sustainability (Ritchie, 2007). Thus, the article uses the terms 'sustainability' and 'survival' interchangeably.
2. In general, the typical duration of a cycle is between nine and 12 months.
3. The proportional hazards assumption posits that the hazard ratio remains constant over time.
4. The 'marginal effect' of SPM and ROS from results displayed in column (5) are, respectively, $\frac{\partial}{\partial SPM}(-0.23 + 0.01*SPM^2) = -0.22$ and $\frac{\partial}{\partial ROS}(-0.09 + 0.01*ROS^2) = 0.62$ at sample means. These are close to the corresponding measures from column (4), that is, −0.20 and 0.40.
5. Macroeconomic and institutional factors come from World Bank and OECD databases (www.wordbank.org and https://www.oecd.org/).
6. The SIGI, developed by the OECD, captures institutionalised gender discrimination, reflecting contextual factors like location, safety, and social norms related to female field officer working conditions.

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Data availability statement

The data supporting the findings of this study are available upon request from the corresponding author.

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Appendices

Table A1. Comparison of different parametric and semi-parametric models

Variables	Weibull regression	Exponential regression	Log-logistic regression	Log-normal regression	Gamma regression	Cox regression
Number of observations	12,526	12,526	12,526	12,526	12,526	12,526
Log-likelihood	−1212.02	−1243.76	−1232.85	−1257.63	−1304.17	−2792.42
df	15	14	15	16	15	13
AIC	2454.03	2515.52	2495.70	2547.25	2638.34	4985.82
BIC	2565.57	2619.62	2607.23	2666.22	2749.87	5082.48
Wald chi2	859.62	600.66	861.97	813.35	737.28	509.92
Prob > chi^2	0.000	0.000	0.000	0.000	0.000	0.000
Proportional hazards test						159.35***

Table A2. Alternative model specifications

	Log-normal distribution	Exponential distribution	Log-logistic distribution	Gamma distribution	Cox regression	Pooled OLS regression	Logit regression
Group size	0.03 (0.01)***	0.06 (0.02)***	0.03 (0.01)***	0.07 (0.02)***	0.95 (0.02)***	−0.01 (0.00)***	−0.08 (0.02)***
Attendance rate	1.39 (0.33)***	2.19 (0.55)***	1.38 (0.37)***	2.35 (0.50)***	0.11 (0.06)***	0.57 (0.08)***	−2.53 (0.68)***
Completed cycles	−0.01 (0.08)	−0.12 (0.15)	−0.10 (0.08)	−0.04 (0.13)	1.27 (0.17)	−0.13 (0.03)***	0.19 (0.18)
Female Officers	0.30 (0.09)***	0.62 (0.15)***	0.32 (0.08)***	0.52 (0.13)***	0.53 (0.08)***	−0.00 (0.02)	−0.72 (0.16)***
FUR	0.42 (0.12)***	0.75 (0.16)***	0.41 (0.10)***	0.61 (0.14)***	0.47 (0.08)***	−0.05 (0.03)*	−0.86 (0.23)
Return on savings	0.21 (0.08)**	0.32 (0.11)***	0.16 (0.07)***	0.32 (0.10)***	0.77 (0.08)***	−0.05 (0.03)*	−0.38 (0.14)**
Weekly SPM	−0.25 (0.07)***	−0.21 (0.08)***	−0.22 (0.05)***	−0.24 (0.07)***	1.42 (0.12)***	−0.25 (0.04)***	0.34 (0.13)**
SG plus activities	0.96 (0.13)***	1.92 (0.17)***	0.98 (0.12)***	1.67 (0.15)***	0.15 (0.03)***	−0.12 (0.03)***	−2.20 (0.27)***
Social funds	0.00 (0.01)	0.01 (0.01)	0.00 (0.01)	−0.01 (0.00)***	1.00 (0.01)	−0.00 (0.00)***	−0.01 (0.02)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cluster SE (SGs)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	−0.04 (0.46)	−0.88 (0.70)	−0.04 (0.48)	−2.29 (0.63)***		2.56 (0.11)	1.58 (0.86)

Notes: Cox regression results should be read as hazard ratios FUR: Fund utilisation rate, ROS: Return on savings, and SPM: Savings per member.

Table A3. Sensitivity analysis on subsamples

	Panel A: 2014–2015	Panel B: 2014–2016	Panel C: 2014–2017	Panel D: 2015–2018
Variables	AFT Coefficient	AFT Coefficient	AFT Coef.	AFT Coefficient
Group size	0.02 (0.02)	0.05 (0.02)***	0.04 (0.01)**	0.04 (0.01)***
Meeting attendance rate	0.57 (0.44)	1.53 (0.55)***	1.31 (0.39)***	1.38 (0.32)***
Female field off.	0.35 (0.12)***	0.48 (0.13)***	0.36 (0.09)***	0.34 (0.09)***
Fund utilisation rate	0.46 (0.13)***	0.58 (0.14)***	0.39 (0.10)***	0.34 (0.09)***
Return on savings	0.26 (0.10)**	0.31 (0.12)**	0.20 (0.08)**	0.17 (0.07)***
Savings per member per week	−0.16 (0.02)	−0.12 (0.02)***	−0.01 (0.01)	−0.01 (0.01)
Social funds	−0.01 (0.00)	−0.02 (0.00)***	−0.03 (0.00)***	−0.01 (0.00)***
Savings groups 'plus activities'			1.03 (0.23)***	0.96 (0.10)***
Completed cycles	−0.16 (0.10)	−0.20 (0.12)*	−0.10 (0.09)	−0.05 (0.08)
_cons	0.54 (0.69)	−1.21 (0.72)*	0.49 (0.57)	−1.10 (0.43)***
Cluster SE (savings groups)	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Table A4. Omitted variable checks

	(1)	(2)	(3)
Group size	0.031 (0.012)***	0.02 (0.01)***	0.023 (0.009)***
Attendance		0.65 (0.22)***	0.607 (0.215)***
Completed cycles	−0.112 (0.073)	−0.16 (0.05)***	−0.152 (0.046)
Female field officers	0.375 (0.084)***	0.27 (0.06)***	0.226 (0.059)***
Fund utilisation rate (FUR)	0.442 (0.097)***	0.33 (0.07)***	−0.024 (0.169)
(FUR)2			0.250 (0.131)**
Return on savings (ROS)	0.148 (0.061)**	0.07 (0.04)*	0.038 (0.046)
Weekly savings per member (SPM)	−0.015 (0.007)**	−0.01 (0.01)	−0.187 (0.044)***
(Weekly SPM)2			0.008 (0.004)**
SG plus	1.093 (0.122)***	32.94 (8.33)***	9.462 (2.437)***
Social funds	0.002 (0.007)	−0.00 (0.00)	−0.003 (0.003)
Inflation rate		0.46 (0.05)***	0.446 (0.049)***
SIGI		Omitted	142.65 (35.589)***
Population density		0.62 (0.16)***	0.606 (0.154)***
GDP per capita growth		−0.84 (0.18)***	−0.812 (0.176)***
Intercept	0.167 (0.436)	−40.91 (10.72)***	−79.92 (20.415)***
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes
Number of observations	12526	12526	12526
Log-likelihood (model)	−1212.016	−1084.45	−1071.122
AIC	2454.031	2206.93	2182.243
BIC	2565.565	2348.17	2330.954

Table A5. Models with a one-standard-deviation increase and deseasonalized covariates

	Baseline model (1)	A one-standard-deviation increase (2)	Deseasonalized model (3)
Group size	0.03 (0.01)***	0.120 (0.044)***	0.03 (0.01)***
Attendance rate	1.22 (0.33)***	0.134 (0.036)***	1.25 (0.33)***
Female field officers	0.35 (0.08)***	0.375 (0.084)***	0.36 (0.08)***
Completed cycles	−0.12 (0.07)	−0.044 (0.029)	−0.13 (0.07)*
Fund utilisation rate (FUR)	0.40 (0.09)***	0.215 (0.047)***	0.35 (0.10)***
Return on savings (ROS)	0.14 (0.06)***	0.140 (0.058)**	0.16 (0.06)***
Weekly savings per member (SPM)	−0.20 (0.05)***	−0.027 (0.013)**	−0.18 (0.05)***
SG plus	1.03 (0.12)***	1.093 (0.122)***	1.04 (0.12)***
Social funds	0.001 (0.01)	0.009 (0.039)	0.00 (0.01)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Cluster SE	Yes	Yes	Yes
Intercept	0.29 (0.42)	2.461 (0.088)***	0.55 (0.43)
Number of observations	12526	12526	12,526
Log-likelihood (model)	−1203.056	−1212.016	−1200.811
df	17		17
AIC	2440.111	2454.031	2435.621
BIC	2566.516	2565.565	2562.026

Table A6. Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Registered female members	1.000								
(2) Meeting attendance rate	−0.103	1.000							
(3) Fund utilisation rate	0.109	0.005	1.000						
(4) Return on savings	0.040	−0.061	0.709	1.000					
(5) Savings per member per week	0.022	−0.014	0.019	0.010	1.000				
(6) Field officer's gender	0.070	0.072	0.128	0.082	−0.006	1.000			
(7) Savings group 'plus activities'	−0.147	0.076	−0.333	−0.130	−0.038	−0.058	1.000		
(8) Social funds	0.005	−0.000	0.004	−0.007	−0.005	0.007	−0.007	1.000	
(9) Number of cycles	0.002	0.066	0.017	0.034	−0.020	−0.001	0.142	−0.058	1.000

Table A7. Country-specific dynamics

	Baseline model	Interactions
Group size	0.03 (0.01)***	0.01 (0.01)
Group size * Country (Burkina Faso: reference)		
Mali		0.04 (0.02)
Niger		0.02 (0.03)
Attendance rate	1.22 (0.33)***	0.79 (0.37)*
Attendance rate * Country		
Mali		0.34 (0.66)
Niger		1.46 (0.78)
Gender		
Female field officer	0.35 (0.08)***	0.40 (0.11)**
Female field officer * Country		
Mali		−0.18 (0.22)
Niger		−0.21 (0.22)
Fund utilisation rate	0.39 (0.09)	0.38 (0.11)**
FUR * Country		
Mali		0.05 (0.24)**
Niger		0.07 (0.24)
Savings per member per week	−0.20 (0.05)***	−0.23 (0.06)**
SPM_Week * Country		
Mali		0.01 (1.18)
Niger		1.20 (1.03)
Return on savings	0.14 (0.06)	0.22 (0.07)**
Return on savings * Country		
Mali		−0.28 (0.17)
Niger		−0.40 (0.18)
SG plus	1.03 (0.12)	Omitted
Social funds	0.001 (0.007)	0.01 (0.01)
Social funds * Country		
Mali		−0.03 (0.01)**
Niger		−0.02 (0.01)
Completed cycles	−0.12 (0.07)	−0.23 (0.10)*
Cycles completed * Country		
Mali		0.08 (0.26)
Niger		0.27 (0.18)
Intercept	0.29 (0.42)	1.24 (0.54)***
Country interactions/fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Clustered SE	Yes	Yes
Number of observations	12,420	12,420
Log-likelihood (model)	−1200.811	−1180.386
df	17	37
AIC	2435.621	2434.771
BIC	2562.026	2709.887