

How should rural financial cooperatives be best organized? Evidence from Ethiopia

Kibrom A. Abay, Bethelhem Koru, Gashaw Tadesse Abate, and Guush Berhane

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ABSTRACT

What is the optimal size and composition of Rural Financial Cooperatives (RFCs)? With this broad question in mind, we characterize alternative formation of RFCs and their implications in improving the access of rural households to financial services, including savings, credit, and insurance services. We find that some features of RFCs have varying implications for delivering various financial services. The size of RFCs is found to have a nonlinear relationship with the various financial services RFCs provide. We also show that compositional heterogeneity among members, including diversity in wealth, is associated with higher access to credit services, while this has little implication on households' savings behavior. Similarly, social cohesion among members is strongly associated with higher access to financial services. These empirical descriptions suggest that the optimal size and composition of RFCs may vary across the domains of financial services they are designed to facilitate. This evidence provides suggestive insights on how to ensure financial inclusion among smallholders, a pressing agenda and priority of policy makers in developing countries, including Ethiopia. The results also provide some insights into rural microfinance operations which are striving to satisfy members' demand for financial services.

Keywords: Rural financial cooperatives, size, compositional heterogeneity, wealth diversity, social cohesion.

I. INTRODUCTION

Rural Financial Cooperatives (RFCs) are member-owned institutions entrusted to provide financial services to rural households in developing countries. In fact, RFCs are the forerunners of lending schemes that rely on the principles of social sanctions in group lending that are common in microfinance institutions globally (Guinnane 1994; Ghatak and Guinnane 1999; Guinnane 2001).¹ They are considered suitable instruments to promote self-financing among customers that conventional banks traditionally spurn. As members are simultaneously the owners and users of the financial services, RFCs capitalize on having better access to information about members' financial viability and have a creditable incentive, implicit in their design, that encourages members to effectively monitor one another (Stiglitz 1990; Banerjee et al. 1994; Krahnert and Schmidt 1995; Guinnane 2001). Following these notions, many African countries, including Ethiopia, are promoting rural savings and credit cooperatives. The aforementioned features particularly make RFCs particularly appealing to countries like Ethiopia which lag behind in supplying financial services to the rural population. Recent estimates by the Global Findex (2014) of the World Bank highlight that only about 22 percent of Ethiopia's population has access to formal financial services. However, the rise of microfinance institutions and RFCs provide fresh optimism for improving access to financial services in the country.²

Despite the intuitive theoretical rationales and justifications above, RFCs around the world are known for their mixed records, success in some Latin American countries (e.g., Damiani 2000) and some failure in India (Banerjee et al. 2001). In particular, there is limited empirical evidence on the potential of these RFCs to serve as reliable financial service providers to rural households with limited access to formal banks and microfinance. In the Ethiopian context, while rural saving and credit cooperatives have a long history, the potential of these institutions to ensure financial inclusion of poor rural households is unexplored.³ Furthermore, there is limited evidence on how the various attributes of these RFCs, particularly their size and composition, affect their efficiency.

Theoretically, while smaller size and homogenous composition of rural cooperatives may enhance enforcement and peer-monitoring capacities, larger size and heterogeneous composition may provide stronger financial capabilities and economic opportunities among members (Huppi and Feder 1990; Adams 1995; Ghatak 1999; Ghatak and Guinnane 1999; Laffont and N'Guessan 2003; Armendariz de Aghion and Morduch 2010). These attributes may also have varying implication across RFCs engaged in providing various types of financial services. For instance, larger membership size and coverage may enable rural cooperatives to build strong institutional capacity and financial viability for mobilizing domestic savings. However, having these attributes may jeopardize peer-monitoring and enforcement capacities necessary for sustainably providing credit services. These are two important attributes of RFCs with contradicting implications to the stability and success of RFCs. However, empirical studies that characterize the implications of these attributes of rural cooperatives in providing effective services to their members are scant.

¹ RFC are also sometimes refereed as Rural Savings and Credit Cooperatives (RuSACCOs). In this paper we use both terminologies interchangeably.

² While microfinance institutions provide pro-poor financial services, they have not yet reached the majority of poor rural households in Ethiopia.

³ Previous studies have focused on the role of RFCs on farmers' technology adoption and document mixed evidence (see Bernard et al. 2008; Bernard and Spielman 2009; Francesconi and Heerink 2011; Abebaw and Haile 2013).

In this paper we empirically characterize alternative formations of RFCs and their implications on households' access to financial services. We focus on three important attributes of these organizations: size, composition, and social cohesion among members. We measure the size of RFCs based on their total number of members. We measure compositional heterogeneity considering overall diversity, as measured by the proportion of members from the same village, as well as heterogeneity in wealth among members of the cooperative. We exploit information on members' familiarity and interaction among themselves to capture social cohesion and social interaction effects. We employ a longitudinal, two-round survey conducted on RFC members and leaders from Ethiopia. Most of the RFCs in Ethiopia provide basic financial services, including savings, credit, and to a limited extent, credit-life insurance.⁴ Hence, we mainly focus on exploring the relationships between the various attributes of RFCs and households' access to these financial services. Implicitly, we investigate the potential of these RFCs in improving the access of poor rural households to financial services.

Our empirical investigation highlights several insights on the implication of alternative formation of RFCs. We find that some features of rural cooperatives are more suited for delivering specific financial services than others. The implications of size, composition of cooperatives, and social cohesion among members seem to vary across the various domains of financial services that RFCs provide. The size of RFCs has a nonlinear relationship with households' access to savings, credit, and insurance services. Similarly, more heterogeneous RFCs (including diversity in wealth) is associated with higher access to credit services, while this characteristic does not predict members' savings. This is plausible because RFCs in Ethiopia heavily rely on members' savings as loanable funds. Hence, a heterogeneous composition of members may create greater economic opportunities among members by availing potential borrowers with providers of loanable funds. Similarly, strong social cohesion among members is associated with better access to financial services, particularly savings and credit services. Overall, our empirical characterizations suggest that the optimal size and composition of RFCs varies across the domains of financial services they provide. The results also suggest that in areas with limited access to financial services, the supply-side attributes of the market and, hence, the qualities and attributes of RFCs appear to be more crucial in explaining take-up than do demand-side attributes. While savings decisions are significantly explained by the human and physical resources of households, these attributes do not explain demand for credit and insurance.

These findings contribute to a broader research question on the optimal size and composition of RFCs. The results highlight that rural savings and credit organizations may need customized support that fits their size, composition, and product scope. For example, introducing diversity (including heterogeneity in wealth) in the formation of RFCs may help them generate economic opportunities through increased lending and borrowing. Conversely, RFCs formed by homogenous groups of households living in the same village might be more effective in providing credit services if they are supported to mobilize external resources (Bernier and Meinen-Dick 2014). The results also hint that, without enhancing institutional capacity and risk bearing abilities, expanding the product range of these cooperatives may have conflicting implications (Huppi and Feder 1990). This evidence can help in scaling-up good practices by these community-based financial institutions. These results also provide some insights on how to ensure financial inclusion of smallholders in remote rural areas, a pressing agenda for policy makers in developing countries, including Ethiopia.

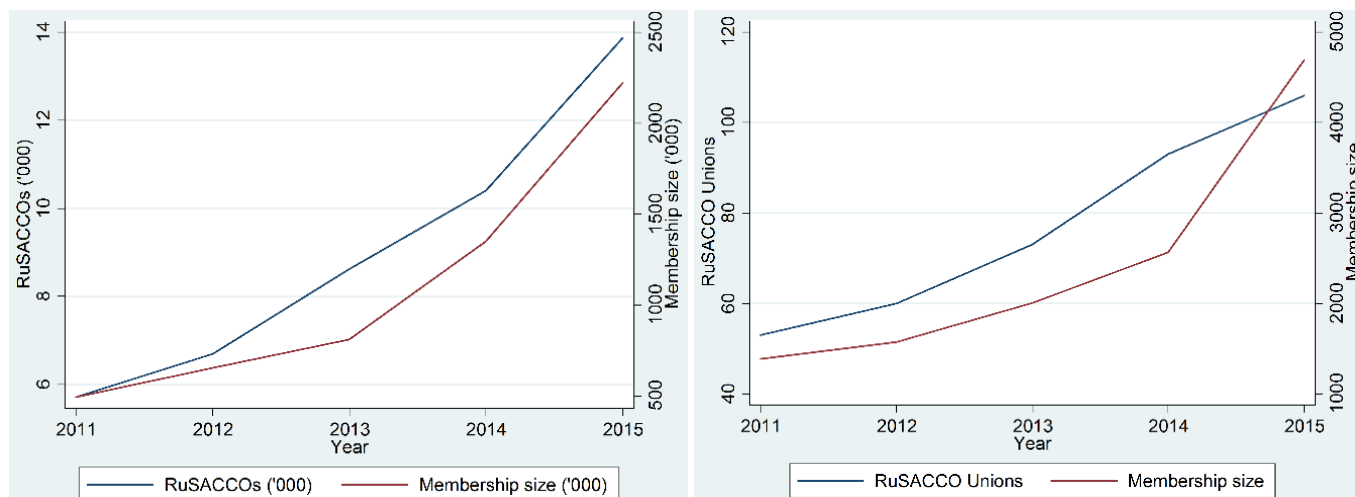
2. RURAL FINANCIAL COOPERATIVES IN ETHIOPIA: RECENT DEVELOPMENTS

RFCs have a long and turbulent history in Ethiopia. They have gone through different political regimes and have been at times perceived as arms of the state under certain regimes. This resulted in their dissolution during the transition period two decades ago. RFCs received renewed interest after the economic reform in the 1990s and were revitalized as self-standing financial institutions to provide microfinance services to rural population. Often initiated by strong government support, RFCs are now common in most rural areas of Ethiopia. Their key purpose is to mobilize savings from local economies and provide credit services to their members (FDRE 2002; Emanu 2009; Bernard et al. 2008). However, RFCs in Ethiopia have recently started providing credit-life insurance services in some areas, albeit mostly at a pilot stage. In general, they have been integrated into government agricultural policies and are "ambitiously" expected to facilitate financial inclusion of the rural poor. Towards this end, RFCs are provided with legal support. The Federal Cooperatives Agency (FCA) is mandated to oversee their functioning.

⁴ Credit-life insurance is an insurance service that writes off debts in the event that the borrower or a key member of the household dies before the due date.

RFCs in Ethiopia are much smaller than banks and microfinance institutions, and they deal with a member clientele that most banks would not be willing to serve. They generally cover a smaller geographic area, usually a *kebele*.⁵ In principle, a small group of farmers, as small as ten, can form a rural savings and credit cooperative in Ethiopia. As a result, the average size of primary saving and credit cooperatives in the country is still small (Table 2.1). More recently, RFCs have enjoyed growth both in number and membership base. As shown in Figure 2.1, the growth of primary RFCs and their unions over the last five years has been strong. Currently there are about 14,000 RFCs and more than 100 unions serving more than 2.5 million rural households in Ethiopia.

Figure 2.1: Number and membership of Rural Financial Cooperatives (left) and their unions (right) in Ethiopia, 2011-2015



Source: Federal Cooperative Agency (FCA) of Ethiopia

In terms of market share, while RFCs account for a sizable amount of savings held by non-bank financial institutions, their share of total credit provision is limited to one percent (Amha and Peck 2010). In addition, while the average loan size of RFCs is larger than the loan amount provided by other non-bank financial institutions in Ethiopia, it is not sufficiently large to support long-term investments that could sustainably raise members' income. These figures are in contrast to global trends in which rural financial cooperatives often surpass other providers of microfinance both in average loan size and number of clients (Gaul 2011). Nonetheless, the institutional and product size indicators in Table 2.1 show a positive trend in the growth of RFCs in the country.

Table 2.1: Aggregate trends of Rural Financial Cooperatives in Ethiopia

Mean characteristics of Rural Financial Cooperatives	2011	2015	Average annual growth rate (%)
Membership size, average	86.4	160.1	17
Capital base, Birr per member	209.5	478.3	26
Deposit size, Birr per member	411.8	699.6	14
Loan size, Birr per borrower	9,877.4	14,125.9	9

Source: Federal Cooperative Agency (FCA). Birr is the Ethiopian currency. 1 USD ≈ 20 Ethiopian Birr during the survey year.

Aside from common savings and credit services, FCA, through the Household Asset Building Program, has piloted a micro-insurance scheme, namely credit-life insurance, to be provided through RFCs. In the four major regions of Ethiopia (Oromiya, Tigray, Amhara, and Southern Nations, Nationalities and Peoples (SNNP)), RFCs with better institutional capabilities are selected to deliver this micro-insurance, which is exclusively tied to credit. To get access to this insurance scheme, loan applicants are required to subscribe during the loan application process. This insurance offers protection against specific risks in return for payment of regular premiums, indemnifying outstanding debt in case a borrower dies. Implicitly, this credit-life insurance is linked with mortality risk and, hence, protects household members from being burdened by the outstanding debts of a deceased household head or other member.

⁵ *Kebele* is the smallest administrative unit in Ethiopia, which corresponds to a village.

3. ALTERNATIVE FORMATION OF RURAL FINANCIAL COOPERATIVES AND THEIR IMPLICATIONS: REVIEW

RFCs possess features that can be intrinsically associated with their performance in serving their members. These attributes include size and coverage, social cohesion among members, and their compositional and organizational structure. Understanding the complex relationships between these attributes and the performance of RFCs in delivering financial services to their members may help explain their mixed record across different institutional settings and countries. This section provides a brief review of the theoretical implications of these attributes on the effectiveness of RFCs in delivering various financial products.

3.1. Size and Coverage

Membership size and geographic coverage of RFCs have implications on their performance and pose substantial trade-offs. On the one hand, large membership and large geographic coverage make rural cooperatives financially strong by increasing their capital base and options for risk diversifications. Large size and coverage can enhance cooperatives' ability to raise loanable funds which are crucial for their existence, since they rely on members' deposits as their primary source of loanable funds. RFCs with large membership bases and geographic coverage have been shown to have more opportunity to grow and are potentially more resilient to members' economic reversals than are smaller RFCs (Adams 1995; Armendáriz de Aghion and Morduch 2010). On the other hand, small membership and geographic coverage may enhance the flow of information and enforcement capabilities among members. Small membership size implies operating in an environment where members have considerable knowledge of each other, and these social and economic relationships enable cheap and effective screening, monitoring, and enforcement mechanisms (Hoff and Stiglitz 1990; Guinnane 2001). Therefore, the choice of size of rural community-based financial organizations may involve a trade-off between effective peer monitoring and financial strength (Krahn and Schmidt 1995).

These arguments imply that the optimal size and coverage of RFCs may vary depending on: (i) the type of financial services the cooperative primarily provides, (ii) the amount of peer-monitoring and enforcement efforts required to ensure effective delivery of these services, (iii) product size (i.e. size of loans and deposits), availability of resources, and investment opportunities in the locality. As indicated above, larger sizes and coverage may enable cooperatives to build strong institutional capacity to mobilize domestic savings, but this may jeopardize peer-monitoring and enforcement capacities in managing credit services.

3.2. Composition

Homogenous or positive assortative matching has been suggested as a core explanation for the remarkable success of alternative institutional credit lending arrangements (Ghatak 1999; Ghatak and Guinnane 1999; Laffont and N'Guessan 2003). It has been found that the repayment performance on loans made to homogenous, self-selected groups of individuals in the same village tend to be more successful than in more heterogeneous groups (Huppi and Feder 1990; Karlan 2007; Wydick 1999). However, compositional heterogeneity among members, in terms of wealth, risk, and need for financial services (deposits vs. credit) is also a positive feature of some successful financial cooperatives (Guinnane 1994; Banerjee et al. 1994). Compositional heterogeneity among members (wealth and risk included) is particularly crucial for RFCs that heavily rely on members both as providers of the demand for and the supply of loanable funds, which is the case for RFCs in Ethiopia. As such institutions do not pursue a traditional bank-client relationship, in order for some members to be able to borrow, other members should continuously save. Such a design inherently entails heterogeneity. Although it dilutes monitoring and enforcement capabilities, heterogeneity, along with expanded geographic coverage (serving more and varying villages), enables RFCs to broaden their capital base and diversify their risk.⁶

The above arguments imply that compositional heterogeneity of RFCs may involve substantial trade-offs. In a broader setting, general diversity (e.g., ethnic) and heterogeneity in wealth (or earnings) among group members has been shown to significantly predict improved economic outcomes and good economic performance of group members (Varughese and Ostrom 2001; La Ferrara 2002; Alesina and La Ferrara 2005; Marx et al. 2015; Abay and Berhane 2016). However, other studies show that heterogeneity among group members may reduce repayment performance on loans. The net effect of these factors on the performance of the RFC overall will depend on which effect dominates.

⁶ In a broader sense, more heterogeneous composition in rural cooperatives may generate economic opportunities among members and, hence, enable them to provide a wider range of services than would be the case in more homogenous groups (Newman 2003; Page 2007; Eagle et al. 2010).

3.3. Social Cohesion and Acquaintances among Members

Social cohesion is an integral aspect of social wellbeing, reflecting established long-term links within a community that are demonstrated by shared understanding, mutual support and reciprocity (Berhane et al. 2009; Lensink and Mehrteab 2003; Karlan 2007; Armendariz de Aghion and Gollier 2000). In the context of rural credit and saving institutions, social connections can be vital instruments for reducing transaction costs and information asymmetries. Social connections may also serve as substitutes for collateral, which in turn facilitates peer monitoring and enforcement among members. While theoretical studies argue that social cohesion effectively mitigates information asymmetries and enhances peer monitoring for effective rural financing (Ghatak and Guinnane 1999; Wydrick 1999; Besley and Coate 1995; Hoff and Stiglitz 1990; Stiglitz 1990), the empirical studies present mixed findings.

Recent studies by Cassar et al. (2007) and Karlan (2007) show that social connections have positive effects on saving contributions, loan repayment, and loan enforcement. Cassar et al. (2007), in particular, shed light on the importance of disentangling different aspects of social ties in explaining repayment performance of group members. Another strand of empirical literature argues that strong social cohesion and group homogeneity may lead to potential collusion of members against rural microfinance institutions, which may undermine enforcement incentives (Paxton et al. 2000; Sharma and Zeller 1997). However, in the case of RFCs these negative implications of social cohesion are less likely to be substantial since members are also the providers of loanable funds.

Besides the three key attributes discussed, RFCs possess additional features that make them unique relative to other community-based and member-owned financial associations in Ethiopia. Most RFCs are legally registered with the government, although lightly supervised and generally self-regulated.⁷ While regulation can increase savings through protecting depositor's interest, implementing the required regulations fully can be prohibitively costly, given the small size of most RFCs and their ubiquity.

The entry and exit policies and restrictions of RFCs also are features that may affect their performance. RFCs with open membership policies may be preferable for bringing into a single financial institution members who are in a position to save with those who are in need of credit. However, inadequate vetting of new members can undermine the monitoring and enforcement capabilities of the RFC and induce adverse effects on credit provision because of potential free-riding.

Another interesting feature of RFCs in Ethiopia is related to the how the individual institutions were established. Due to strong government effort to promote rural cooperatives, the decision to establish any type of cooperatives in Ethiopia is largely based on external considerations. Bernard et al. (2008) found that the members themselves initiated the formation of only 26 percent of agricultural cooperatives in Ethiopia (see also, Table 4.1 for our data). The remainder were externally initiated, supported either by the government or by non-governmental organizations. While external assistance provides an opportunity of overcoming the barriers to growth that are inherent in any self-help organizations, it may undermine the monitoring and enforcement advantages that cooperatives potentially have over other microfinance providers, i.e., cooperatives that resort to external sources of funding are found to be more likely to abandon the principle of reciprocity and peer monitoring (Guinnane 1994; Krahn and Schmidt 1995).⁸ On the other hand, strong government involvement may generate perceptions that strengthen enforcement of regulations.

4. DATA AND DESCRIPTIVE STATISTICS

Our empirical analysis is based on a two-round survey conducted on RFCs in Ethiopia. The data were collected by the International Food Policy Research Institute (IFPRI) in collaboration with the Ethiopian Development Research Institute (EDRI). The survey covered RFCs operating in the four major regions of Ethiopia, namely Oromiya, Tigray, Amhara, and Southern Nations, Nationalities and Peoples (SNNP). These are the regions which were selected by the Federal Cooperative Agency of Ethiopia to run pilot schemes for the provision of micro-insurance, namely credit-life insurance. The first round of the survey was conducted to evaluate the potential of RFCs to deliver this micro-insurance. Hence, the sampling design included a set of RFCs which were selected for providing credit-life insurance and a set of comparable RFCs which were not selected for selling credit-life insurance. From a list of all *woredas* (districts) in the four regions, a total of 14 *woredas* were selected using stratified random sampling based on whether there were RFCs selected to sell credit-life insurance. From each *woreda*, two RFCs selling credit-life insurance and up to two RFCs in the area which

⁷ Self-regulation is often justified by their member-based ownership that makes internal supervision by members more effective (Christen and Rosenberg 2000).

⁸ Previous empirical studies indicate that external assistance discourages the institution's effort to mobilize savings and results in inefficient operation (Bogan 2012). Dependency on internal resources (either through saving mobilization or borrowings from cooperative networks), on the other hand, is one of the critical elements for successful financial cooperatives (Huppi and Feder 1990; Gingrich 2004; Meyer 2015).

were not selected for selling credit-life insurance were randomly selected. Sixteen member households from each cooperative were randomly selected and interviewed using the household-level questionnaire. The first round of the survey was conducted in 2014 and involved 38 RFCs. The second round, conducted in 2015, tracked the same cooperatives and households.

Detailed household and RFC-level questionnaires were administered. The household-level questionnaire obtained information on the access of households to financial services from their cooperative. The RFC-level questionnaire was used to obtain detailed information about the operation, structure, and organizational profile of each institution. The same questionnaire was administered in both rounds with a few additional questions included in the second round. The household and RFC-level data were linked for analysis.

Table 4.1 provides descriptive aggregate figures for the RFCs in our data. On average, the RFCs surveyed had 337 members, with 76 percent of these members being from the same *kebele*. 63 percent of RFCs have religious and traditional leaders as members, and 74 percent of the members knew each other before becoming members of their cooperative. In terms of capital, the average current capital of the RFCs studied is fairly large. The RFCs in our sample had existed on average for nine years, and most of them are legally registered. As expected, most RFCs were established through external initiatives, mainly by government and non-governmental organizations. More than 70 percent of the RFCs have some restrictions on the entry of new members. Compared to the national averages on RFCs presented in Table 2.1, the aggregate figures in Table 4.1 show higher overall capital, and larger capital base (per member), average loan size per member, and membership. This is anticipated, given that our sampling design oversamples successful RFCs, as more successful cooperatives were chosen to sell credit-life insurance under the pilot program.

Table 4.1: Rural Financial Cooperative-level summary statistics

Variable	Mean	SD
Size and composition		
Total members, number	337	373
Proportion of members from the same Kebele	0.76	0.39
Heterogeneity in self-reported wealth among members	1.24	0.21
Members know each other, 0/1	0.74	0.44
Presence of religious or traditional leader in RFC, 0/1	0.63	0.48
Capital, structure and establishment		
Total current capital, Birr	462,353	574,277
Total capital per member, Birr	1,983	3,567
Total current savings, deposits in Birr	346,681	541,927
Average loan size given in the last 12 months, Birr	10,636	18,766
Years since established	9.18	3.30
RFC is legally registered, 0/1	0.97	0.16
RFCs established through external help (versus by member initiative), 0/1	0.65	0.47
RFC receives external assistance, 0/1	0.55	0.50
Frequency of members' meeting, per year	2.40	0.99
RFC has open entry policy (i.e., no restrictions to join), 0/1	0.27	0.44
<i>Number of observations (38*2)</i>	76	

Source: Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

Notes: This table provides RFC-level summary statistics, with means in the second column and standard deviations (SD) in the third.

In Table 4.2 we provide household-level summary statistics. The first rows of this table present our outcome variables to measure households' access to financial services from their RFCs. As discussed in Section 2, RFCs in Ethiopia are mandated to provide financial services to poor rural households who have limited access to conventional banks and microfinance institutions. They mainly provide to members savings, credit services, and, to a limited extent, micro-insurance services. They perform financial intermediation, particularly mediating between net savers and net borrowers, while ensuring that loan resources remain in the communities from which the savings were mobilized. Table 4.2 shows that, on average, households have good levels of savings in their RFCs, even though the amount households save monthly is not large. We can observe that a substantially large share of households has access to credit services from their cooperatives.

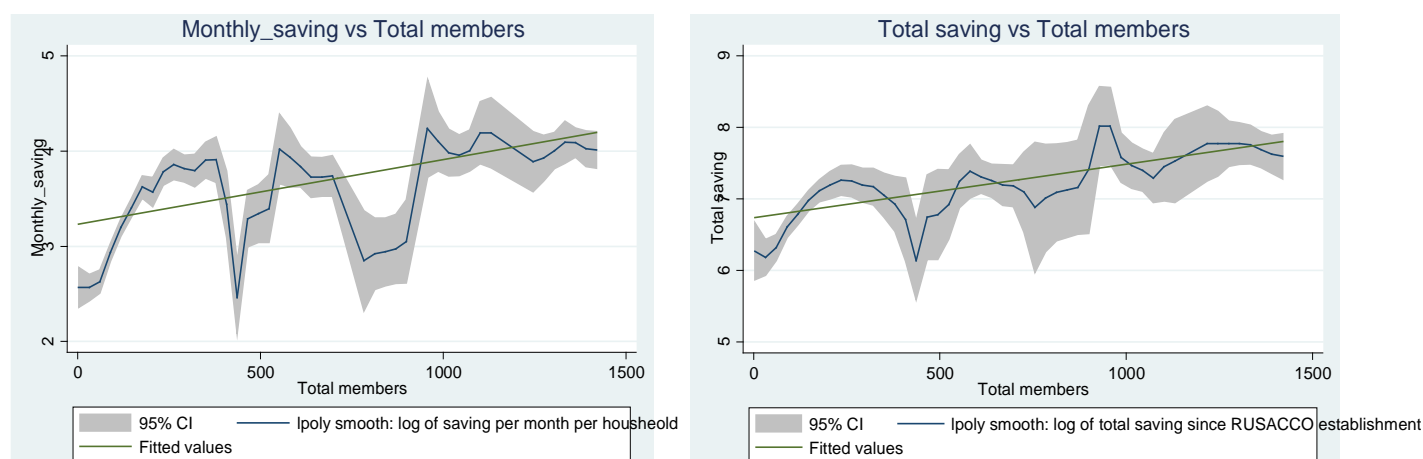
Table 4.2: Household-Level summary statistics

Variable	Mean	SD
Outcome variables (financial services)		
Household total savings, Birr	2,649	10,719
Household savings per month, Birr	59.0	104.0
Household received loan from RFC in last 5 years, 0/1	0.77	0.42
Household bought credit-life insurance, 0/1	0.31	0.46
Household affiliation and trust		
Member of household has position in RFC, 0/1	0.19	0.39
Years since household member joined RFC	6.00	3.00
Trust of RFC leaders, 1 = agree with statement that RFC leaders do what is right for the RFC, 0/1	0.89	0.30
Distance to RFC office, minutes of travel time	18.0	21.0
Household characteristics and resources		
Age of household head, years	45.0	11.0
Male household head, 0/1	0.80	0.40
Household head has received any education, whether normal, adult education, religious, or other, 0/1	0.75	0.43
Household size, members	5.50	2.10
Total landholding size, ha	1.22	1.20
Mobile phone, member of household owns one, 0/1	0.66	0.47
Value of livestock assets, Birr	8,078	27,404
Self-reported wealth status rank, 1 = very poor; 7 = very rich	4.90	1.30
<i>Number of observations across the two rounds</i>	<i>1,269</i>	

Source: Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

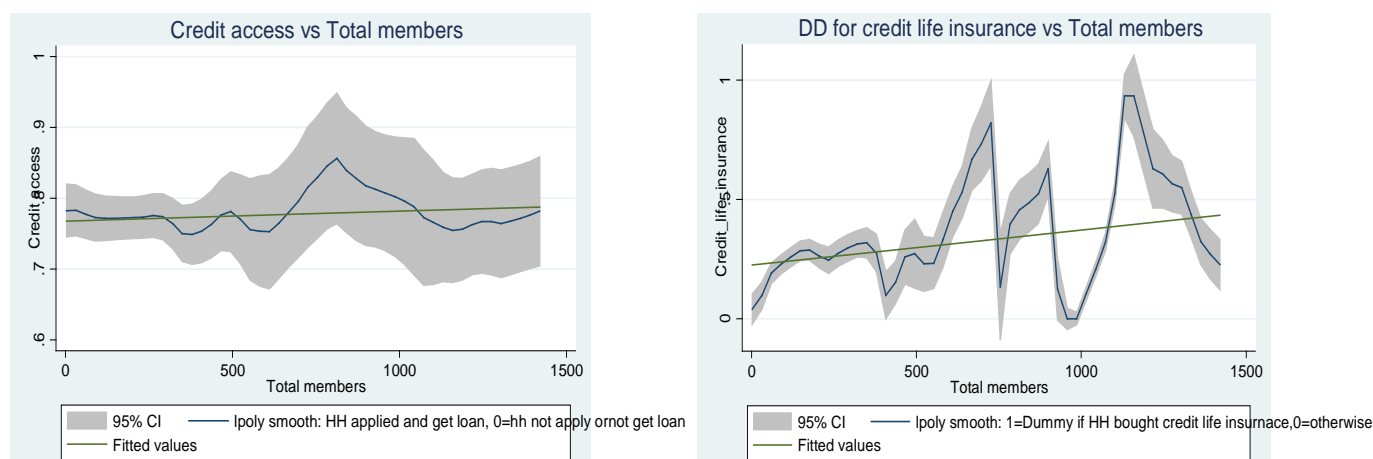
Notes: This table provides descriptive statistics of the explanatory variables considered in the household-level analysis, with means in the second column and standard deviations (SD) in the third.

We provide simple non-parametric polynomial regressions to show some unconditional associations between our outcomes of interest and one of the key attributes of RFCs, that of membership size. The left figure in Figure 4.1 shows the pattern of association between households' monthly savings and the size of their RFC. The right figure in Figure 4.1 provides a similar plot of the association between member households' total savings and the size of their RFC. The left figure in Figure 4.2 displays the association between households' access to credit and the size of their RFCs while the right figure in Figure 4.2 shows the association between the proportion of member households that purchased credit-life insurance and the size of their RFC.

Figure 4.1: Monthly savings (left) and total savings (right) by size of Rural Financial Cooperatives

Source: Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

Figure 4.2: Credit access (left) and share of members purchasing credit-life insurance (right) by size of Rural Financial Cooperatives



Source: Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

These figures provide at least two interesting insights. First, the association between size of RFCs and households' access to financial services, including savings, credit, and insurance, appears to be largely nonlinear. As shown in the figures, an assumption of a linear association between households' access to financial services and the size of an RFC provides incomplete and misleading inferences on the implication of the size of RFCs. Second, the curvatures and degree of nonlinearities appear to vary across product ranges, showing that an increase in the size of RFCs may have varying implications on households' access to the various different financial services these institutions provide. Observing the turning points in the four figures, one may argue that the optimal size of RFCs differs depending on the product that they deliver. This further complicates the choice of optimal size of RFCs and other related community-based financial institutions.

5. ESTIMATION STRATEGY

Considering the financial services that RFCs in Ethiopia commonly provide—savings, credit, and insurance, we explore the relationship between the various attributes of RFCs and their potential in mobilizing domestic savings and improving households' access to credit and insurance. Empirical characterization of community-based organizations and social networks is challenging due to the endogenous formation of these networks (Manski 1993). This problem includes self-selection of individuals into these community-based organizations, as well as endogenous choice of institutional type. As we aim to characterize alternative formation of these organizations, the former may not be a major concern in our case.

Although our exercise does not aim to establish causality, we provide two contextual and empirical justifications that may support our empirical exercise. First, in the context of Ethiopia, although the decision to join cooperatives can be endogenous, the choice of cooperative type might be potentially exogenous to members for the reason that many cooperatives are established through external support (Bernard et al. 2008) and households have very limited choice of cooperative type in their village. Government and external initiatives commonly aim to establish one cooperative in each village. Indeed, our data shows that most of the RFCs in our data are established through external initiatives from governmental and non-governmental agents. However, the placement of RFCs and these initiatives may not be random. We capture these types of placement selections using district-level dummies. We also have information about households' motives and objectives for subscribing to their RFCs and we can control for potential households' strategic network type choice. Second, even with the above problems and caveats, our empirical characterizations can still provide important insights on the potential of RFCs to ensure the financial inclusion of rural households.

Despite the longitudinal nature of our data, our key variables of interest (RFC-level attributes) are not expected to substantially vary within a short period of time. Thus, we mainly employ random effect (instead of fixed effects) models to empirically characterize the various attributes of RFCs and their implications in improving financial inclusion of poor rural households. We estimate the following model for each financial service we are interested in:

$$Y_{hrt} = \alpha_h + \beta_1(RFC_{rt}) + \beta_2' X_{hrt} + \beta_3(time_{rt}) + \beta_4(woreda_{hrt}) + \varepsilon_{hrt} \quad (1)$$

where Y_{hrt} stands for access to financial service (savings, credit, or insurance) for each household h in each RFC r and at time t . α_h stands for household-level random effects. RFC_{rt} comprises various attributes of RFCs, including size,

composition, social cohesion among members, and organizational structure. X_{hrt} captures household-level covariates that may affect savings behavior as well as demand for credit and insurance. Time dummies capture potential aggregate shifts in our outcome variables or shifts in demand for financial services. *Woreda* stands for district-level geographic dummies. The estimation process involves stepwise inclusion of important variables. We first run regressions of our outcome variables on indicator variables which measure the size and composition of RFCs and latter extend the specification by adding other attributes of cooperatives and households. Members of the same RFC are expected to share some unobservable effects, so in all regressions we cluster standard errors at RFC level. For this reason, we will mainly focus on linear regression approaches, although some of our outcome variables assume a binary nature. Following the unconditional non-parametric regressions in Figures 4.1 and 4.2 and the observed nonlinearities, we initially allow for sufficiently higher order polynomials of some of the important covariates of RFCs and stepwise exclude statistically insignificant terms.

Technically, we can also estimate equation (1) using panel data fixed effects approaches by controlling for household and RFC fixed effects. As we are more interested in characterizing alternative formation of RFCs, controlling for RFC-fixed effects is more important than controlling for household-fixed effects. While this can be considered as a more robust characterization, we do not have sufficient RFC-level variation in one year to identify its implication on households' access to financial services. However, as we have two or three RFCs within each *woreda*, including the *woreda*-level fixed effects in our empirical specification can capture potential endogeneities related to placement of RFCs.

6. RESULTS AND DISCUSSION

RFCs in Ethiopia typically provide savings, credit, and insurance services. Here we discuss the implication of the various attributes of RFCs in terms of delivering these financial services. By doing so, we characterize alternative formations of RFCs to ensure financial inclusion of poor households in rural areas.

6.1. Savings

Placing one's savings in an RFC requires substantial commitment to the institution by the member depositing his or her savings. This may be influenced by the member's level of affiliation with the cooperative, as well as by its size, composition, and organizational structure. We can relate this decision to an investment in a common pool resource, a decision which is expected to be a function of attributes related to the investor, the members, and the nature of the common pool resource. However, since RFC members are simultaneously investors and users of this investment pool, characterizing the implication of these attributes makes it somewhat more complex. We hypothesize three key elements to explain households' savings (investment) behavior in their RFC: (i) the size, composition, and structure of the RFC; (ii) the household's association and sphere of influence in the RFC; and (iii) the household's human and physical resources. Empirical characterization of household saving behavior as a function of these attributes is given in Table 6.1. In column 2 we characterize household's monthly savings as a function of RFCs size and composition. Columns 3 and 4 extend this empirical specification by adding other covariates related to the cooperative and the household.

Table 6.1 shows that several features of RFCs including size, composition, and social cohesion among members significantly predict households' savings (investment) behavior in these rural financial institutions. We particularly find significant and nonlinear association between RFC size and household monthly savings. This is intuitive for several reasons. Larger cooperatives may be better placed to build strong financial bases and capital that may imply higher profitability in investments made for every member of the cooperative. Larger cooperatives may also be considered more trustworthy by members for financial viability and, hence, they can demand higher monthly savings. The nonlinear effects associated with the size of RFCs may imply that increased membership beyond a certain level may create managerial, monitoring, and enforcement problems and, hence, negatively affect the effectiveness of RFCs in mobilizing local savings.

Compositional heterogeneity among members, as indicated by "proportion of members from the same *kebele*" and "wealth diversity among members" do not significantly predict savings behavior. However, stronger social connections among members and the level of affiliation of a household with their cooperatives are associated with higher savings behavior. More specially, those households joining rural cooperatives where members knew each other, those households with longer affiliation with their cooperatives, and those with higher sphere of influence over these institutions are more likely to save higher amounts monthly. This is plausible given that savings require trust and commitment, which can be built through social ties. Those RFCs with legal status are more likely to mobilize higher domestic savings from their members. This may support the value of formality in these institutions.

Table 6.1: Models of household monthly savings in Rural Financial Cooperatives

Explanatory variables	Log (monthly savings)		Log (monthly savings)		Log (monthly savings)	
RFC size, composition, and structure						
Total RFC members	0.003***	(0.001)	0.003***	(0.001)	0.002***	(0.001)
Total RFC members squared /10000	-0.011**	(0.005)	-0.009*	(0.005)	-0.008*	(0.004)
Proportion of members from same kebele	0.09	(0.215)	0.116	(0.209)	0.011	(0.197)
Diversity in wealth among members	-0.476	(0.319)	-0.427	(0.312)	-0.263	(0.290)
Most members know each other, 0/1	1.014***	(0.339)	0.997***	(0.305)	0.737***	(0.264)
Presence of religious or traditional leader, 0/1	0.146	(0.098)	0.12	(0.112)	0.172	(0.108)
Number of years since membership in RFC	0.030*	(0.017)	0.029*	(0.017)	0.031**	(0.015)
HH has any position in RFC (1=yes)	0.216***	(0.082)	0.236***	(0.081)	0.137*	(0.082)
HH trust on RFC leaders	-0.093	(0.067)	-0.089	(0.067)	-0.052	(0.058)
HH distance to RFC (Minutes)	-0.002	(0.002)	-0.002	(0.002)	-0.001	(0.002)
RFC is legally registered (1=yes)			0.623***	(0.219)	0.599***	(0.195)
RFC received external help (1=yes)			0.033	(0.131)	0.068	(0.127)
Open policy (1=no restriction to join RFC)			0.122	(0.086)	0.151*	(0.086)
Reason to join RFC (1=saving, 0=otherwise)			0.069	(0.055)	0.048	(0.057)
RFC selected to sell insurance in the first pilot			-0.081	(0.142)	-0.077	(0.133)
Household characteristics and resources						
Gender of household head (1=male)					0.079	(0.095)
Age of household head					-0.004	(0.003)
Household size					-0.025	(0.019)
Education of household head					0.051**	(0.021)
Total land size (Ha)					0.025	(0.027)
Household owns mobile phone (1=yes)					0.059	(0.058)
Log value of total asset (Birr)					0.029*	(0.015)
Self-reported wealth status					0.060***	(0.019)
Constant	2.179***	(0.222)	1.502***	(0.220)	1.133*	(0.627)
Time dummy	Yes		Yes		Yes	
Woreda (district) dummies	Yes		Yes		Yes	
R-squared	0.180		0.221		0.304	
Number of observations	1,093		1,093		1,093	

Source: Authors' analysis of Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

Notes: This table provides empirical characterization of households' monthly savings. In the first model (column 2), we characterize these savings as a function of mainly RFC-level attributes and then gradually extend this specification to include household characteristics and resources. Asterisks: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively. Survey-design corrected standard errors are presented in parentheses.

Besides RFC-level attributes and the degree of household affiliation with their cooperative, households' level of human and physical resources significantly predict investments in these institutions. Table 6.1 shows that wealthier households and those headed by educated household heads tend to save more in RFCs. As expected, those households with higher levels of total asset and wealth commit higher amount of monthly savings in their cooperatives. We also estimated the same model on households' total savings and found consistent results with that of monthly savings, i.e., households joining larger cooperatives in which they had higher influence within the cooperative accumulated higher amounts of overall savings (Appendix Table A1). In both of these regressions (monthly and total savings), the size of the estimates associated with the various attributes of RFCs remain unaffected by the inclusion of large set of household level covariates beyond educational attainment and wealth—evidence suggesting that the selection of type of RFC by households may not be a substantial determinant of savings behavior.

6.2. Credit

Table 6.2 provides estimates characterizing households' access to credit from their cooperatives as a function of various attributes of RFCs and households. These are linear probability model estimates. The estimates from the first model in column 2 show that the size of RFCs significantly, but nonlinearly, predicts households' access to credit from their cooperatives. These nonlinear effects suggest that an increase in RFCs membership base can improve households' access to credit up to a certain level, while an increase beyond this level may jeopardize monitoring of credit services. This is plausible, since larger RFCs may imply limited social and economic interaction among members, which may

inhibit delegated monitoring and enforcement in serving collateral poor borrowers (Hoff and Stiglitz 1990; Guinnane 2001).

Table 6.2: Models of household access to credit from their Rural Financial Cooperatives

Explanatory variables	Access to credit		Access to credit		Access to credit	
RFC size, composition, and structure						
Total RFC members	0.001***	(0.001)	0.001***	(0.001)	0.001***	(0.001)
Total RFC members squared /10000	-0.003**	(0.001)	-0.003**	(0.001)	-0.003**	(0.001)
Proportion of members from same kebele	-0.086***	(0.033)	-0.094***	(0.033)	-0.095***	(0.034)
Diversity in wealth among members	0.236***	(0.063)	0.210***	(0.064)	0.183***	(0.061)
Most members know each other, 0/1	0.269***	(0.085)	0.225**	(0.091)	0.229**	(0.093)
Presence of religious or traditional leader, 0/1	0.014	(0.049)	0.033	(0.054)	0.046	(0.059)
Number of years since membership in RFC	0.038***	(0.006)	0.038***	(0.006)	0.040***	(0.005)
HH has any position in RFC (1=yes)	0.033	(0.030)	0.032	(0.029)	0.046	(0.029)
HH trust on RFC leaders	-0.006	(0.023)	-0.006	(0.023)	-0.005	(0.023)
HH distance to RFC (Minutes)	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)
RFC is legally registered (1=yes)			-0.041	(0.078)	-0.029	(0.073)
RFC received external help (1=yes)			0.046	(0.053)	0.049	(0.054)
Open policy (1=no restriction to join RFC)			-0.007	(0.034)	-0.006	(0.035)
Reason to join RFC (1=saving, 0=otherwise)			-0.015	(0.029)	-0.011	(0.031)
RFC selected to sell insurance in the first pilot			0.039	(0.054)	0.035	(0.053)
Household characteristics and resources						
Gender of household head (1=male)					-0.008	(0.033)
Age of household head					0.000	(0.001)
Household size					0.005	(0.007)
Education of household head					-0.001	(0.009)
Total land size (Ha)					-0.012	(0.011)
Household owns mobile phone (1=yes)					0.001	(0.026)
Log value of total asset (Birr)					-0.004	(0.005)
Self-reported wealth status					-0.017	(0.011)
Constant	-0.407*	(0.222)	0.069	(0.220)	0.139	(0.261)
Time dummy	Yes		Yes		Yes	
Woreda (district) dummies	Yes		Yes		Yes	
R-squared	0.144		0.162		0.164	
Number of observations	1,093		1,093		1,093	

Source: Authors' analysis of Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

Notes: This table provides empirical characterization of households' credit access. In the first model (column 2), we characterize households' access to credit as a function of mainly RFC-level attributes. We then gradually extend this specification by including household characteristics and resources. Asterisks: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively. Survey-design corrected standard errors are presented in parentheses.

The estimates from the first model (column 2) also indicate that households joining RFCs dominated by members from the same village (*kebele*) have a lesser likelihood of getting credit access from their cooperatives. Interestingly, diversity in wealth among members of RFCs is strongly associated with higher household access to credit services. This is intuitive given that RFCs rely on members' savings for loanable fund and, hence, members from the same village or those with similar wealth status are more likely to end up either on the supply or demand side of the credit market within these cooperatives. This supports theoretical perspectives that emphasize heterogeneous formation of social networks and rural cooperatives for creating market opportunities among members. Although contextually intuitive, these results are in contrast to previous studies which argue that heterogeneity among group members may hamper economic performance (Varughese and Ostrom 2001; La Ferrara 2002; Alesina and La Ferrara 2005; Marx et al. 2015). Thus, our results suggest that the implication of compositional heterogeneity among group members may vary across the type of groups and product ranges (credit or savings) that these groups provide. For instance, our results show that compositional heterogeneity has no significant implication on members' savings.

As expected, social cohesion among members is associated with higher access to credit services. Those RFCs in which members are known to each other are associated with improved access by members to credit services. This is consistent with the broader literature which generally acknowledges the potential of social cohesion and social capital in group-based microfinance (Wydick 1999; Cassar et al. 2007; Karlan 2007). We also observe that those households with

a longer record of membership have higher access to credit from their cooperatives. This is plausible considering that RFCs are expected to receive excess demand for credit services, the provision of which requires careful monitoring and screening of potential borrowers, a process which may take some good time and effort.⁹

Interestingly, the third model in Table 6.2 (column 4) shows that households' characteristics and resources have no significant implications on their demand for (access to) credit services from their cooperatives. This is in contrast to the results characterizing households' savings, which broadly show that households with higher human and physical resource (education and self-reported wealth level) are more likely to save more. Given that RFCs provide credit services at low interest rates, the demand curve for credit service is expected to be reasonably inelastic to the various attributes of households, including physical and human capital.

6.3. Credit-life Insurance

Besides providing the basic financial intermediation services to their members, RFCs are well-positioned to provide micro-insurance to rural households. Given their close links to and experience with rural households, RFCs can overcome information asymmetry and moral hazard problems in provision of insurance coverage. Along this line of justification, the Federal Cooperative Agency (FCA) of Ethiopia, through the Household Asset Building Program, recently launched a pilot scheme to provide micro-insurance to smallholders through RFCs and their unions. RFCs are entrusted to deliver to their members this credit-life insurance for the credit services that they provide. Despite being at a pilot stage, examining households' demand for the credit-life insurance and the implication of the various attributes of RFCs in creating such demand is worthwhile.

We investigate households' demand for this type of insurance as a function of attributes of RFCs and households. The results, given in Table 6.3, contrast with the results on the determinants of savings and credit services presented in Tables 6.1 and 6.2.¹⁰ The size effect does not seem statistically significant, in contrast to the effects of size of RFCs on households' access to savings and credit services. Consistent with the credit demand function, the composition of cooperatives is significant in explaining households' demand for insurance, while social cohesion among members appears to be statistically insignificant. Rather, institutional trust appears to be crucial in explaining households' demand for credit-life insurance. In particular, those households who trust their cooperatives or those joining trustworthy RFCs or those with higher membership are more likely to buy credit-life insurance.

The second model (column 3) of Table 6.3 further highlights that organizational entry policies associated with RFCs may also explain households' demand for credit-life insurance, while their legal status appears to be statistically insignificant. This is consistent with the results on demand for credit. Given that the credit-life insurance is loan-linked, entry policies of RFCs may explain households' access to credit and associated credit life. Those households joining inclusive or open cooperatives may have to compete for limited loanable funds and, hence, have lesser probability of getting access to credit. RFCs without any entry restrictions may also be susceptible to potential free-riding problems.

The third model (column 4) of Table 6.3 suggests that household demographic characteristics and observable resources are not significant factors in explaining households' demand for credit-life insurance. This is consistent with the implication of these attributes on households' demand for credit services from their RFCs. One intuitive explanation here is related to the elasticity of demand for credit and credit-life insurance with respect to these attributes. Given that most RFCs provide credit services at a low interest rate, and the fact that the type of insurance we are studying is loan-linked, households are expected to have inelastic demand for credit and associated insurance. In such a situation, the market price and take-up of credit and associated insurance heavily rely on supply-side attributes, which in turn rely on RFCs characteristics.

⁹ Column 2 of Table 6.2 also shows that formality (legal status) of financial cooperatives has no significant implication on households' access to credit services. This suggests that while formality of RFCs is crucial for mobilizing domestic savings for the reason that savings entail some level of trust, it may not matter in terms of households' access to credit. The results in Table 6.2 also show that households' motive for joining RFCs does not significantly predict their access to credit, suggesting that potential strategic (endogenous) network choice can be ruled out.

¹⁰ We also conduct these empirical characterizations by restricting the sample to those RFCs which were selected to sell credit-life insurance in the first pilot. These results are consistent with the full sample results and given in Appendix Table A2.

Table 2.3: Households' Demand for Credit-life insurance

Explanatory variables	Bought credit-life insurance		Bought credit-life insurance		Bought credit-life insurance	
RFC size, composition, and structure						
Total RFC members	0.001	(0.001)	0.001	(0.001)	0.001	(0.001)
Total RFC members squared /10000	-0.001	(0.003)	-0.002	(0.003)	-0.001	(0.003)
Proportion of members from same kebele	-0.158***	(0.039)	-0.177***	(0.031)	-0.176***	(0.027)
Diversity in wealth among members	0.359***	(0.117)	0.281**	(0.114)	0.273**	(0.113)
Most members know each other, 0/1	0.076	(0.123)	-0.006	(0.156)	-0.072	(0.148)
Presence of religious or traditional leader, 0/1	-0.143	(0.128)	-0.093	(0.141)	-0.068	(0.139)
Number of years since membership in RFC	0.012*	(0.007)	0.011*	(0.006)	0.012*	(0.006)
HH has any position in RFC (1=yes)	-0.003	(0.027)	-0.013	(0.026)	-0.019	(0.027)
HH trust on RFC leaders	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
RFC trusted when it comes to insurance (1=yes)	0.136***	(0.037)	0.112***	(0.037)	0.111***	(0.038)
HH distance to RFC (Minutes)	0.366***	(0.044)	0.370***	(0.046)	0.358***	(0.046)
RFC is legally registered (1=yes)			-0.005	(0.113)	0.012	(0.116)
RFC received external help (1=yes)			0.057	(0.086)	0.056	(0.087)
Open policy (1=no restriction to join RFC)			-0.113***	(0.042)	-0.110**	(0.043)
Reason to join RFC (1=saving, 0=otherwise)			0.022	(0.022)	0.014	(0.023)
RFC selected to sell insurance in the first pilot			0.113*	(0.068)	0.117*	(0.065)
Household characteristics and resources						
Gender of household head (1=male)					0.012	(0.027)
Age of household head					-0.001	(0.001)
Household size					-0.003	(0.006)
Education of household head					-0.003	(0.006)
Total land size (Ha)					-0.013	(0.011)
Household owns mobile phone (1=yes)					-0.02	(0.027)
Log value of total asset (Birr)					-0.004	(0.007)
Self-reported wealth status					0.024*	(0.013)
Constant	0.084	(0.256)	0.018	(0.301)	0.049	(0.280)
Time dummy		Yes		Yes		Yes
Woreda (district) dummies		Yes		Yes		Yes
R-squared		0.417		0.475		0.480
Number of observations		1,093		1,093		1,093

Source: Authors' analysis of Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

Notes: This table provides empirical characterization of households' access to credit-life insurance. In the first model (column 2), we characterize households' demand for credit-life insurance as a function of mainly RFCs-level attributes and then gradually extend this specification by including household characteristics and resources. Asterisks: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively. Survey-design corrected standard errors are presented in parentheses.

7. CONCLUDING REMARKS

In this paper we empirically investigate the implication of alternative formation of RFCs on households' access to financial services. Implicitly, we investigate the potential of these RFCs in improving poor households' access to financial services and, hence, the financial inclusion of rural households. By doing so, we contribute to addressing on-going questions related with the optimal size and composition of rural community-based financial institutions.

Our empirical characterizations reveal several interesting insights on the implication of alternative formation of RFCs. We find that some features of RFCs have varying and sometimes conflicting implications for delivering various financial services—savings, credit and insurance. For instance, the size of the RFC has nonlinear and varying implications across the various financial services that RFCs provide. This implies that the optimal size of RFCs may differ depending on the product offered. On the other hand, compositional heterogeneity among members (including diversity in wealth levels) is associated with higher access to credit—probably through the broker function of RFCs in bringing together potential borrowers and with potential lenders, while this has no implication on households' savings behavior. This corroborates previous theoretical predictions which emphasize that heterogeneous group formation can create economic opportunities among members (Page 2007; Krishnan and Sciubba 2009; Eagle et al. 2010). Similarly, strong social cohesion among members is associated with better access to financial services, particularly savings and credit

access. Overall, these results suggest that the optimal size and composition of RFCs may vary across the domains of financial services they provide. The results also suggest that in areas with limited access to financial services, the supply-side attributes of the market (and, hence, the qualities and attributes of RFCs) appear to be more crucial in explaining take-up and the price of these products than do demand-side attributes. While savings decisions are significantly explained by households' human and physical resources, these attributes are insignificant factors in explaining demand for credit and insurance.

The empirical associations particularly highlight that RFCs may need customized support that fits their product range. For example, introducing diversity in the formation of RFCs may help them generate economic (depositing and borrowing) opportunities. RFCs formed by homogenous groups of households living in the same village might not be effective in providing credit services unless they are supported to mobilize external resources (Bernier and Meinen-Dick 2014). Similarly, embracing larger membership size and coverage may help mobilize domestic savings. The results also suggest that, without the necessary institutional capacity and risk bearing abilities, expanding the product range of these cooperatives may have varying and conflicting implications (Huppi and Feder 1990). Altogether, this evidence may help in scaling-up good practices and qualities of these organizations. The results also provide some insights into rural microfinance and RFCs operations which are struggling to improve the saving rates of their customers. For instance, establishing trustworthy RFCs may help these institutions mobilize domestic savings from their members.

Despite the insights and descriptive characterizations of alternative formation of RFCs, this study suffers from some limitations. As in other studies on rural cooperatives and related community-based institutions, this study was unable to circumvent potential sources of endogenous formation and choice of these cooperatives. Thus, despite the intuitive empirical contexts which are expected to alleviate some of these empirical challenges, causal inferences based on our empirical characterizations are more complex without some exogenous variations in the attributes of RFCs. Nonetheless, our empirical exercises should help further studies that explore the nature of these associations and the overall economic and social development potential of rural community-based financial institutions.

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APPENDIX

Table AI: Models of household total savings in Rural Financial Cooperatives

Explanatory variables	Log (total savings)		Log (total savings)		Log (total savings)	
RFC size, composition, and structure						
Total RFC members	0.003***	(0.001)	0.003***	(0.001)	0.002***	(0.001)
Total RFC members squared /10000	-0.009	(0.006)	-0.006	(0.005)	-0.004	(0.005)
Proportion of members from same kebele	0.182	(0.183)	0.251	(0.171)	0.143	(0.154)
Diversity in wealth among members	-0.606	(0.463)	-0.470	(0.431)	-0.265	(0.440)
Most members know each other, 0/1	1.316***	(0.457)	1.411***	(0.421)	1.212***	(0.402)
Presence of religious or traditional leader, 0/1	0.049	(0.145)	-0.080	(0.156)	-0.053	(0.155)
Number of years since membership in RFC	0.114***	(0.023)	0.115***	(0.022)	0.112***	(0.022)
HH has any position in RFC (1=yes)	0.429***	(0.146)	0.436***	(0.138)	0.284**	(0.133)
HH trust on RFC leaders	-0.045	(0.080)	-0.038	(0.081)	-0.004	(0.077)
HH distance to RFC (Minutes)	-0.004	(0.002)	-0.003	(0.002)	-0.003	(0.002)
RFC is legally registered (1=yes)			0.943***	(0.247)	0.918***	(0.264)
RFC received external help (1=yes)			-0.090	(0.171)	-0.045	(0.169)
Open policy (1=no restriction to join RFC)			0.034	(0.149)	0.048	(0.152)
Reason to join RFC (1=saving, 0=otherwise)			0.046	(0.082)	0.018	(0.078)
RFC selected to sell insurance in the first pilot			-0.289*	(0.160)	-0.255	(0.162)
Household characteristics and resources						
Gender of household head (1=male)					-0.010	(0.171)
Age of household head					-0.001	(0.005)
Household size					0.005	(0.033)
Education of household head					0.072**	(0.029)
Total land size (Ha)					0.044	(0.056)
Household owns mobile phone (1=yes)					0.004	(0.134)
Log value of total asset (Birr)					0.027	(0.030)
Self-reported wealth status					0.108***	(0.037)
Constant	4.527***	(0.859)	3.789***	(0.768)	2.861***	(0.961)
Time dummy		Yes		Yes		Yes
Woreda (district) dummies		Yes		Yes		Yes
R-squared		0.180		0.221		0.304
Number of observations		1,093		1,093		1,093

Source: Authors' analysis of Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

Notes: This table provides empirical characterization of households' monthly savings. In the first model (column 2), we characterize these savings as a function of mainly RFC-level attributes and we gradually extend this specification by including household characteristics and resources.

Asterisks: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively. Survey-design corrected standard errors are presented in parentheses.

Table A2: Models of household demand for credit-life Insurance for those Rural Financial Cooperatives selected to sell insurance in the first pilot

Explanatory variables	Bought credit-life insurance		Bought credit-life insurance		Bought credit-life insurance	
RFC size, composition, and structure						
Total RFC members	0.001	(0.001)	0.001	(0.001)	0.001	(0.001)
Total RFC members squared /10000	0.001	(0.003)	0.001	(0.004)	0.001	(0.003)
Proportion of members from same kebele	-0.137*	(0.075)	-0.152**	(0.076)	-0.152**	(0.069)
Diversity in wealth among members	0.207	(0.149)	0.259	(0.197)	0.265	(0.193)
Most members know each other, 0/1	-0.027	(0.144)	0.026	(0.180)	-0.006	(0.165)
Presence of religious or traditional leader, 0/1	-0.35	(0.329)	-0.353	(0.308)	-0.325	(0.303)
Number of years since membership in RFC	0.004	(0.008)	0.003	(0.007)	0.004	(0.007)
HH has any position in RFC (1=yes)	-0.01	(0.045)	-0.035	(0.042)	-0.045	(0.046)
HH trust on RFC leaders	0.001	(0.001)	0.001	(0.001)	0.001	(0.001)
RFC trusted when it comes to insurance (1=yes)	0.145***	(0.039)	0.135***	(0.043)	0.125***	(0.042)
HH distance to RFC (Minutes)	0.546***	(0.059)	0.551***	(0.060)	0.537***	(0.062)
RFC is legally registered (1=yes)			1.002*	(0.597)	0.885	(0.570)
RFC received external help (1=yes)			-0.072	(0.170)	-0.076	(0.173)
Open policy (1=no restriction to join RFC)			-0.140**	(0.064)	-0.136**	(0.066)
Reason to join RFC (1=saving, 0=otherwise)			0.043	(0.039)	0.028	(0.039)
Constant	0.968*	(0.506)	0.001	(0.001)	0.001	(0.001)
Household characteristics		No		No		Yes
Time dummy		Yes		Yes		Yes
Woreda (district) dummies		Yes		Yes		Yes
R-squared		0.426		0.439		0.443
Number of observations		605		605		605

Source: Authors' analysis of Ethiopian Rural Financial Cooperative survey of 2014 and 2015.

Notes: This table provides empirical characterization of households' access to credit-life insurance, by restricting the sample to those RFCs who were selected to sell this micro-insurance in the first pilot. In the first model (column 2) we characterize households' demand for credit-life insurance as a function of mainly RFC-level attributes and then gradually extend this specification by including household characteristics and resources. Asterisks: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively. Survey-design corrected standard errors are presented in parentheses.

About the Authors

Kibrom A. Abay is a Post-doctoral Fellow at the University of Copenhagen in Denmark; **Bethelhem Koru** is a Research Officer in the Ethiopia Strategy Support Program (ESSP) under the Ethiopian Development Research Institute (EDRI), based in Addis Ababa; **Gashaw Tadesse Abate** is a Research Coordinator in the Markets, Trade and Institutions Division of IFPRI, based in Addis Ababa; and **Guush Berhane** is a Research Fellow of the Development Strategy and Governance Division of IFPRI, working in ESSP and based in Addis Ababa.

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

2033 K Street, NW | Washington, DC 20006-1002 USA
T: +1.202.862.5600 | F: +1.202.457.4439
Skype: ifprihomeoffice | ifpri@cgiar.org | www.ifpri.org

IFPRI-ESSP ADDIS ABABA

P.O. Box 5689, Addis Ababa, Ethiopia
T: +251.11.617.2000 | F: +251.11.646.2318
mahlet.mekuria@cgiar.org | <http://essp.ifpri.info>

ETHIOPIAN DEVELOPMENT RESEARCH INSTITUTE

P.O. Box 2479, Addis Ababa, Ethiopia
T: +251.11.550.6066; +251.11.553.8633 | F: +251.11.550.5588
info@edri-eth.org | www.edri-eth.org



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