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How Should Rural Financial Cooperatives Be Best Organized? Evidence from Ethiopia

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Abstract:

What is the optimal size and composition of Rural Savings and Credit Cooperatives (RuSACCOs)? With these broader questions in mind, we characterize alternative formation of RuSACCOs and their implications in improving rural households' access to financial services, including savings, credit and insurance services. We find that some features of RuSACCOs have varying implications for delivering various financial services (savings, credit and insurance). We find that the sizes of RuSACCOs have nonlinear and varying implications across the various financial services that RuSACCOs 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 (no) implication on households' savings behavior. Similarly, strong social cohesion among members is strongly associated with higher access to financial services, particularly savings and credit access. These empirical characterizations suggest that the optimal size and composition of RuSACCOs may vary across the domains of financial services they are meant to provide. The results provide some insights into rural microfinancing operations and saving cooperatives which are striving to satisfy members' demand for financial services.

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Keywords: RuSACCOs, size, compositional heterogeneity, wealth diversity, social cohesion.

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1. Introduction

Rural Savings and Credit Cooperatives (RuSACCOs) are member-owned institutional models entrusted to provide financial services to rural households in developing countries. In fact,

RuSACCOs are the forerunners of lending schemes that rely on joint liability in serving collateral poor borrowers (Guinnane, 1994; Ghatak and Guinnane, 1999; Guinnane, 2001). They are thought to be suitable instruments of promoting self-financing among customers that conventional banks traditionally spurn. As members are simultaneously owners and users, RuSACCOs capitalize on their better access to information about members' financial viability and have a creditable incentive (implicit into their design) that encourages members to effectively monitor one another (Stiglitz, 1990; Banerjee et al., 1994; Krahnen and Schmidt, 1995; Guinnane, 2001). Following these notions, many African countries including Ethiopia, are promoting rural savings and credit cooperatives. The aforementioned features make RuSACCOs particularly appealing to countries like Ethiopia which lags in supplying financial services for rural population. Recent estimates by the Global Findex (2014) of the World Bank highlight that only about 22 percent of the population of Ethiopia have access to formal financial services. However, the rise of microfinances and RuSACCOs provide a fresh optimism towards improving access to financial services in Ethiopia.[1]

Despite the intuitive theoretical motivations indicated above, rural saving and credit cooperatives are known for their mixed record, a success story in some Latin American countries (see for instance, Damiani, 2000) while also some failure stories from India (Banerjee et al., 2001). In particular, there is limited empirical evidence on the potential of these RuSACCOs to serve as reliable (and alternative) financial service providers to rural households with limited access to formal banks and microfinances. In the Ethiopian context, while rural saving and credit cooperatives own long history, the potential of these institutions in ensuring financial inclusion of poor rural households is unexplored.[2] Furthermore, there is limited evidence on how the various attributes of these RuSACCOs, particularly size, composition and organizational structure affect the efficiency of these organizations. Intuitively, these various attributes are expected to contribute to the existing mixed record associated with the potential of rural saving and credit cooperatives. For instance, theoretically while smaller size and homogenous composition of cooperatives may enhance enforcement and peer-monitoring capacities, larger size and heterogeneous composition may provide strong financial capabilities and economic

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

[2] Previous studies have focused on the role of RuSACCOs 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).

opportunities among members (see 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 various RuSACCOs engaged in providing various types of financial services. For instance, larger sizes and coverage may enable cooperatives build strong institutional capacity and financial viability for mobilizing domestic savings, while this may jeopardize peer-monitoring and enforcement capacities in credit services. However, empirical studies that characterize the implications of these attributes of rural cooperatives in providing effective services to their members are scant.

In this paper we empirically characterize alternative formation of rural savings and credit cooperatives and their implications on households' access to financial services. We mainly focus on three important attributes of these organizations, size, composition, and social cohesion among members. We measure the size of RuSACCOs using total members subscribing. We measure compositional heterogeneity considering overall diversity (measured by the proportion of members from the same village) as well as heterogeneity in wealth among members of the RuSACCOs. We exploit information on members' familiarity and interaction among members to capture the implication of social cohesion and social interaction among members. We employ longitudinal (two-year) survey conducted on RuSACCO members and leaders from Ethiopia. Most of the rural cooperatives in Ethiopia provide basic financial services, including savings, credit and to a limited extent credit life insurance. Hence, we mainly focus on investigating the implication of the alternative formation of rural saving and credit cooperatives on households' access to these financial services. Implicitly, we investigate the role of these rural saving and credit cooperatives in improving poor households' access to financial services and hence financial inclusion of rural households. We aim to identify potential qualities of these organizations in mobilizing domestic savings and improving households' access to credit and insurance.

Our empirical investigation highlights several interesting insights on the implication of alternative formation of rural savings and credit cooperatives. We find that some features of rural cooperatives are more suited for delivering some specific financial services than others. The implication of size, composition of cooperatives and social cohesion among members seem to vary across various domains of financial services that RuSACCOs provide. The implication of size of RuSACCOs appears to be substantially nonlinear and varying for households' access to

savings, credit and insurance services. Similarly, heterogeneous composition of RuSACCOs (including diversity in wealth) is associated with higher access to credit services, while this has (no) little implication in improving households' savings. This is intuitive because RuSACCOs heavily rely on members' savings as loanable fund, and hence heterogeneous composition of members may create economic opportunities among members by availing potential borrowers and 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 RuSACCOs may vary across the domains of financial services they are meant to provide. The results also reinforce that in areas with limited access to financial services, the supply-side attributes of the market (and hence qualities and attributes RuSACCOs) appear to be more crucial in explaining equilibrium take-up and price of these products than demand-side attributes. While savings decisions are significantly explained by households' human and physical resources, these attributes provide limited implication in explaining demand for credit and insurance.

The empirical findings in this study contribute to a broader research question on the optimal size and composition of rural financial cooperatives. The empirical characterizations particularly highlight that rural savings and credit organizations need customized support that fits their size, composition and product scope. For example, introducing diversity in the formation of rural savings and credit cooperatives may help them generate economic (lending and borrowing) opportunities. Conversely, RuSACCOs 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 Meinzen-Dick, 2014). The results also hint that, without the necessary institutional capacity and risk bearing abilities, expanding the product range of these cooperatives may have conflicting implications (see also, Huppi and Feder, 1990). These pieces of evidence and characterizations can help in scaling-up good practices of and qualities of these community-based institutions. The results also provide some new insights on how to ensure financial inclusion of smallholders in remote and rural areas, a pressing agenda of policy makers in developing countries, including Ethiopia.

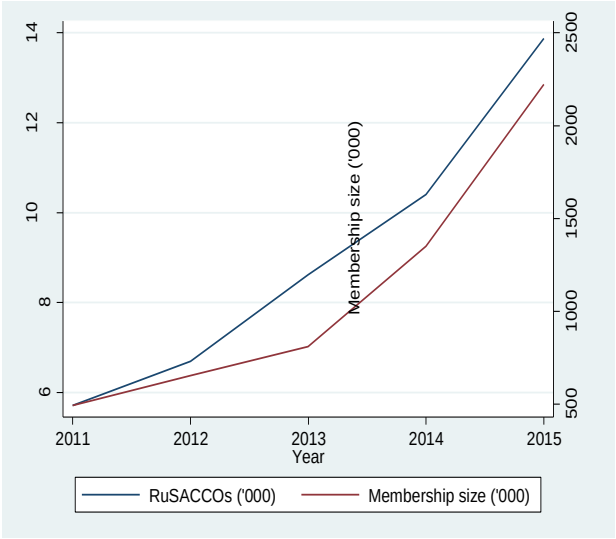
2. Rural Savings and Credit Cooperatives in Ethiopia: Recent Developments

Rural savings and credit cooperatives have a long and turbulent history in Ethiopia. They have passed through different political regimes and have been at times perceived as extended arms of

the state in certain regimes, which results in sizable dissolution during the transition period. It was only after the economic reform in the 1990s that RuSACCOs received renewed interest and were revitalized as self-standing financial institutions that provide microfinance services to rural population. RuSACCOs in Ethiopia are commonly formed through government initiatives, and sometimes through local initiatives, for the purpose of mobilizing savings and credit facilities, distributing farm inputs and marketing farm outputs (FDRE, 2002; Emana, 2009; Bernard et al., 2008). Most of the financial cooperatives in Ethiopia provide only the basic financial intermediation services, savings and credit, which is commendable given their limited institutional and managerial capabilities. Some of the RuSACCOs in Ethiopia recently started providing credit insurance services, albeit in the form of pilot/experiment. In general, these institutions have been integrated into government agricultural policies and are ‘‘ambitiously’’ trusted to facilitate financial inclusion of the rural poor. The Government of Ethiopia oversees the functioning of these institutions through the Federal Cooperatives Agency (FCA) established in 2002.

Rural savings and credit cooperatives in Ethiopia are smaller than banks and microfinance institutions and deal with a member clientele that most banks would not be willing to serve. They generally cover a smaller geographic area, usually a *kebele*.[3] In principle, very few farmers, as small as ten, can form a rural savings and credit cooperative in Ethiopia. As a result the average size of a primary saving and credit cooperative in the country is not that large (see Table 1). More recently, RuSACCOs have enjoyed successive growth both in number and membership base. As shown in Figure 1, the growth of primary RuSACCOs and their unions over the last five years has been unprecedented. Currently there are about 14,000 RuSACCOs and more than 100 RuSACCO unions that are serving a large number of rural households in Ethiopia.

[3] *Kebele* is the smallest administrative unit in Ethiopia.



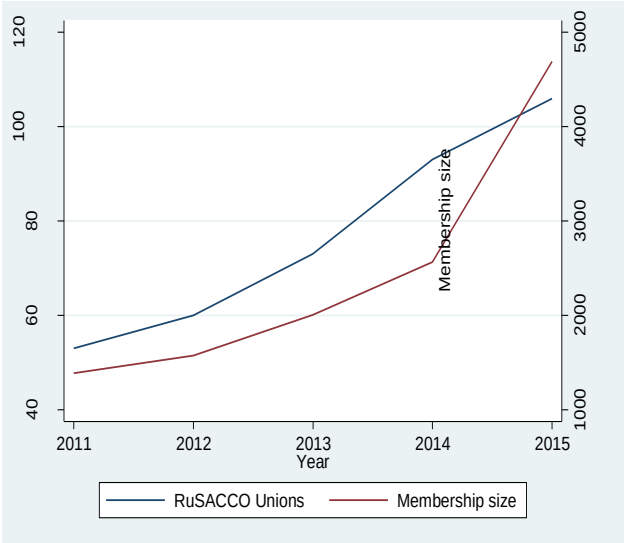


Figure 1: Number of RuSACCOs and RuSACCO unions and their membership size in Ethiopia (2011-2015).

Source: Federal Cooperative Agency (FCA) of Ethiopia.

In terms of market share, while RuSACCOs account for a sizable amount of savings by non-bank financial institutions, their share to the total credit is limited to one percent (Amha and Peck, 2010). In addition, while the average loan size is larger than the loan amount provided by other non-bank financial institutions in Ethiopia, it is not large enough for long-term investments that could sustainably raise members' income. These figures are in sharp contrast to global scenario where financial cooperatives surpass other providers of microfinance both in loans and

number of clients (Gaul, 2011). Nonetheless, the institutional and product size indicators in Table 1 show a positive trend in the growth of RuSACCOs in the country.

Table 1: Aggregate Trends of RuSACCOs in Ethiopia

	2011	2015	Average annual growth rate (%)
Membership size (average)	86.4	160.1	17
Capital base (Birr, average, per member)	209.5	478.3	26
Deposit size (Birr, average, per member)	411.8	699.6	14
Loan size (Birr, average, per borrower)	9877.4	14125.9	9

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

Besides to the common savings and credit services, the Federal Cooperative Agency of Ethiopia (through the Household Asset Building Program (HABP)) is recently introducing and piloting provision of a micro-insurance scheme, namely credit life insurance, to be provided through RuSACCOs. Throughout the four major regions of Ethiopia (Oromiya, Tigray, Amhara, and Southern Nations, Nationalities and Peoples (SNNP)), RuSACCOs with better institutional capabilities are selected to deliver this micro-insurance scheme which is exclusively related with credit. These RuSACCOs who are delegated to sell this credit life insurance require subscription to this insurance for loans from the RuSACCOs. This insurance offers protection against specific risks in return for payment of regular premiums by extinguishing (indemnifying) outstanding debt in case a borrower dies. Implicitly, this credit life insurance is linked with mortality risk and hence protects transfer of outstanding debts to family members. This type of insurance protects the whole family by self-insuring the credit life risks.

3. Alternative Formation of Rural Savings and Credit Cooperatives: Review

Theoretically, rural savings and credit cooperatives own important features that can be intrinsically associated with their performance in serving their members. These attributes are expected to contribute to the mixed record and heterogeneous performance of rural savings and credit cooperatives across different institutional settings. These attributes include size and coverage, social cohesion among members, compositional and organizational structure. This section provides a brief review of the theoretical implications of these attributes on various product ranges (financial services) that rural savings and credit cooperatives commonly provide.

(a) Size and Coverage

Intuitively, size and coverage of RuSACCOs have some implication on their performance and hence pose substantial trade-off. On the one hand, large membership and geographic coverage make rural cooperatives financially strong by increasing their capital base and options for risk diversifications. Larger size and coverage can enhance cooperatives' ability to raise loanable funds which is crucial for their existence since they heavily relay on members' deposits as a primary source of loanable funds. Previous studies argue that financial cooperatives with large membership bases and geography have more growth opportunity and are potentially more resilient to members' economic reversals than their counterparts (Adams, 1995; Armendáriz de Aghion and Morduch, 2010). On the other hand, small membership and geographic coverage may enhance smooth flow of information and enforcement capabilities. Small membership size and geographic area implies operating in an environment where members have considerable knowledge of each other, and these social and economic relationships can be used as cheap and effective screening, monitoring and enforcement mechanisms (Hoff and Stiglitz, 1990; Guinnane, 2001). Therefore, the choice of size of rural community-based organizations may involve trade-off between effective peer monitoring and financial strength.[4]

These two arguments imply that the optimal size and coverage of RuSACCOs may vary depending on: (i) product range and type of financial services these cooperatives provide, (ii) the required peer-monitoring and enforcement efforts required to ensure effective delivery of these services, (iii) product size (i.e. size of loans and deposits) and availability of resources (physical and human) and investment opportunities in the locality. For instance, larger sizes and coverage may enable cooperatives build strong institutional capacity to mobilize domestic savings, while this may jeopardize peer-monitoring and enforcement capacities in credit services.

(b) Composition

Previous theoretical predictions assert that homogenous or positive assortative matching 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). They argue that loans made to homogenous, self-selected groups of individuals residing in the same

[4] To ensure effective peer monitoring and enforcements, membership should be homogenous and restricted to a relatively small, but at the same time small membership base and lack of heterogeneity are constraints to financial efficiency (Krahnen and Schmidt, 1995).

village tend to be more successful than others (Huppi and Feder, 1990; Karlan, 2007; Wydick, 1999).

However, compositional heterogeneity among members, in terms of wealth, risk, and need for financial services (deposit 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 rural savings and credit cooperatives that heavily rely on members both as providers of the demand for and the supply of loanable funds, which is the case for RuSACCOs in Ethiopia. As they do not pursue the traditional bank-client relationship, in order for some members to borrow, other members should continuously save and such a design inherently entails heterogeneity. Although it dilutes monitoring and enforcement capabilities, heterogeneity, along geographic coverage (serving more and varying villages) can also be imperative for financial cooperatives in terms of broadening their capital base and risk diversification.[5]

The above two arguments imply that compositional heterogeneity of RuSACCOs may also involve substantial trade-off, and hence the net effect of compositional heterogeneity (including wealth diversity) may depend on which effect dominates.

In a broader setting, general (e.g., ethnic) diversity and heterogeneity in wealth (or earning) among group members are shown to significantly predict economic outcomes and performance of group members (Varughese and Ostrom, 2001; La Ferrara, 2002; Alesina and La Ferrara, 2005; Marx et al., 2015; Abay and Berhane, 2016). While these studies show that heterogeneity among group members (including wealth and earnings) may hamper economic performance, this may not be expected for the case of RuSACCOs members because of the aforementioned two conflicting effects of compositional differences.

(c) Social Cohesion and acquaintances among members

Social cohesion is an integral aspect of social wellbeing which stands for established long–term links within a community, demonstrated by shared understanding, mutual support and reciprocity in relationships (Berhane et al., 2009; Lensink and Mehrteab, 2003; Karlan, 2007; Armendariz de Aghion and Gollier, 2000). In the context of rural credit and saving institution, social

[5] In a broader sense, heterogeneous compositions of rural cooperatives may generate economic opportunities among members and hence enable them to provide wide range of services (Newman, 2003; Page, 2007; Eagle et al., 2010).

connections are vital instruments in reducing transaction costs and information asymmetries. Social connections may also serve as substitutes for collaterals, which in turn facilitate peer monitoring and enforcement among members. While theoretical works extensively assert social cohesion as a main requisite for mitigating information asymmetries and enhancing peer monitoring and enforcement in serving the poor (Ghatak and Guinnane, 1999; Wydrick, 1999; Basley and Coate, 1995; Floro and Yotopolous, 1991; Hoff and Stiglitz, 1990; Stiglitz, 1990), existing empirical findings are mixed.

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. The study by Cassar et al. (2007) in particular shed light on the importance of disentangling the difference 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 institution that may risk the enforcement incentives (Paxton et al., 2000; Sharma and Zeller, 1997. However, in the case of RuSACCOs these negative implications of social cohesion are less likely to be substantial for the reason that members in cooperatives are providers of loanable funds.

Besides the above three key attributes, RuSACCOs own some additional features that make them peculiar, compared to other community-based and member-owned financial associations in Ethiopia and beyond. Most of them are legally registered with the government, although lightly supervised and generally self-regulated.[6] While regulation can increase savings through protecting depositor's interest, it could be prohibitively costly (given their small size and ubiquity) and could also have adverse consequences. More specifically, legal registration and formalization of RuSACCOs may improve accountability and hence members' trust. In a slightly different context, RuSACCOs entry and exit policies and restrictions are crucial features that may affect the performance of members. RuSACCOs with open membership policies can be preferable for intermediating deficit and surplus clienteles, although this can undermine monitoring and enforcement capabilities and hence induce adverse effects on credit because of potential free-riding. Thus, our empirical characterizations also consider these attributes of RuSACCOs.

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

Another interesting feature of RuSACCOs in Ethiopia is related with the source and genesis of these institutions. Due to strong government effort to promote cooperatives, the decision to establish any type of cooperatives in Ethiopia is largely based on external considerations. Bernard et al. (2008) indicate that the members themselves initiate only 26 percent of agricultural cooperatives in Ethiopia (see also, Table 2 for our data). The remainder are externally initiated and supported by either the government or non-governmental organizations. While external assistance provides an opportunity of overcoming the barriers to growth that are inherent in a self-help organizations, it undermines the monitoring and enforcement advantages that cooperatives potentially have over other microfinance providers—i.e. cooperatives that resort to external sources of funding tend to abandon the principle of reciprocity and peer monitoring (Guinnane, 1994; Krahnen and Schmidt, 1995).[7]

4. Data Sources and Descriptive Statistics

Our empirical analysis is based on a two-round survey conducted on rural saving and credit cooperatives (RuSACCOs) in Ethiopia. The data is collected by the International Food Policy Research Institute in collaboration with the Ethiopian Development Research Institute. The survey covers RuSACCOs operating in the four major regional states of Ethiopia, namely Oromiya, Tigray, Amhara, and Southern Nations, Nationalities and Peoples (SNNP). These are the regions which were selected to run the micro-insurance pilot, namely credit life insurance, introduced by the Federal Cooperative Agency of Ethiopia. The first round survey was collected for evaluating the potential of RuSACCOs to deliver and channel this micro-insurance scheme. Hence, the sampling design considers RuSACCOs which are selected for providing credit life insurance and comparable RuSACCOs which are 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 are RuSACCOs selected to sell credit life insurance. From each *woreda*, two RuSACCOs selling insurance credit life insurance and up to two adjacent RuSACCOs in the area are randomly selected. Around 16 households from each

[7] 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).

RuSACCOs were randomly selected and interviewed using the household-level questionnaire. The first round was collected in 2014 from 38 RuSACCOs and the second round (conducted in 2015) tracked the same RuSACCOs and households.

The surveys administered detailed household and RuSACCO-level questionnaires. The household-level questionnaire extracts information on households' access to financial services from their RuSACCOs. The RuSACCO-level questionnaire provides detail information about the operation of RuSACCOs, their structure and organizational profile. The same questionnaire was administered in both rounds with few additional questions included in the second round. Interestingly, we can properly link the household and RuSACCO-level data.

Table 2 provides descriptive aggregate figures of RuSACCO in our data. On average, RuSACCOs include 337 members and 76% of these members are from the same *kebele*. Table 2 also shows that 63 percent of the RUSACCOs have religious and traditional leaders as members, and 74 percent of the members know each other before being a member to their cooperative. In terms of capital, the average current capital is fairly large. On average RuSACCO in our sample existed for 9 years and most of them are legally registered. As expected most RuSACCO are established through external initiative, mainly through government and nongovernmental organizations. More than 70% of the RuSACCOs have some restrictions for entry. Compared to the national averages in Table 1, the aggregate figures in Table 2 show higher overall capital, capital base (per member), average loan size per member and larger membership size. This is anticipated given that our sampling design oversamples successful RuSACCOs, for the reason that more successful cooperatives are chosen to sell credit life insurance.

Table 2: RuSACCO-level Summary Statistics

Variable of interest	***Variable description***	***Mean***	***SD***
RuSACCO size and composition			
Total RuSACCO members	Number of members	337	373
Proportion of members from the same Kebele	Proportion of members from same Kebele	0.76	0.39
Heterogeneity in wealth among members	Standard deviation in wealth among members	1.24	0.21
Members know each other	Dummy=1 if most HH members know each other	0.74	0.44
Presence of religion/traditional leader	Dummy=1 if religion/traditional leaders included	0.63	0.48
RuSACCO capital, structure and establishment			
Total Capital	Current capital (Birr)	462353	574277
Ratio of total capital to members	Capital to member ratio	1983	3567
Total current RUSACCO savings	Deposit in Birr	346681	541927

Average loan size given in the last 12 month	Average loan, per member	10636	18766
Years since RuSACCO established	Number of years since establishment	9.18	3.30
RuSACCO legally registered	Dummy=1 if RuSACCO is legally registered	0.97	0.16
RuSACCOs establishment type	Dummy=1 if RuSACCO established by member initiative	0.35	0.48
RuSACCOs established type	Dummy=1 if RuSACCO established by external help	0.65	0.47
External assistance	Dummy=1 if RuSACCO received external help	0.55	0.50
Frequency of members meeting	Annually, biannually, quarterly, monthly	2.40	0.99
RuSACCO entry policy	Dummy=1 if no restriction to join RuSACCO	0.27	0.44
Number of observations (38*2)		76	

Notes: This table provides RUSACCO-level summary statistics. The first column presents mean values while the second column provides standard deviations. SD stands for standard deviation.

In Table 3 we provide household-level summary statistics. The first few rows of this table present our outcome variables. We use a number of outcome variables measuring households' access to financial services from their RuSACCOs. As discussed in Section 2, RuSACCOs in Ethiopia are mandated to provide financial services to poor rural households who have limited access to conventional banks and microfinances. They mainly provide savings and credit services, and to a limited extent micro-insurance services to members. They perform financial intermediation, particularly mediating net savers and net borrowers while ensuring that loan resources remain in the communities from which the savings were mobilized. Table 3 shows that, on average, households have some good level of savings in their RuSACCOs, albeit the monthly savings are not large. We can observe that a substantially large share of households have access to credit services from their cooperatives.

Table 3: Household-Level Summary Statistics

Variable of interest	***Variable description***	***Mean***	***SD***
Outcome variables (financial services)			
HH total savings	Amount of total savings in Birr	2649	10719
HH saving per month	Amount of monthly savings in Birr	59.00	104.00
Credit	Dummy=1 if HH received loan from RuSACCO	0.77	0.42
HH bought credit life insurance	Dummy=1 if HH bought credit life insurance	0.31	0.46
Household affiliation and trust on RuSACCOs			
HH has position in RuSACCO	Dummy=1 if HH has any position in RUS.	0.19	0.39
Years since member of RuSACCO	Number of years since RuSACCO member	6.00	3.00
Trust on RuSACCO leaders	Leaders do what is right for the RuSACCO	0.89	0.30
Distance to RuSACCO office	Distance in minutes	18.00	21.00
Household characteristics and resources			
Age of HHH	Age of household head	45.00	11.00

Gender of HHH	Gender of the household head (1=male)	0.80	0.40
Education of HHH	0=none, adult education, religious education, first cycle, second cycle, secondary, preparatory, Diploma	0.75	0.43
Household size	Number of household members	5.50	2.10
Total land size (ha)	Size of total landholding of the household	1.22	1.20
Mobile	Dummy=1 if HH own mobile	0.66	0.47
Total asset	Value of total asset in Birr	8078	27404
Value of livestock asset	Value of livestock in Birr	15258	23669
Self-reported wealth status	Self-reported ranking of wealth (1=very poor, 7=very rich)	4.90	1.30
Number of observations	Number of observations (*N***T*)	1269	

Notes: This table provides descriptive statistics of the explanatory variables considered in the analysis. The first column presents mean values while the second column provides standard deviations. HH stands for household while HHH stands for household head. SD stands for standard deviation.

Before embarking on the main characterizations, we provide some simple non-parametric polynomial regressions to show some unconditional associations between our outcomes of interest and one of the key attributes of RuSACCOs, size. Figure 3 provides local non-parametric regressions and associations between households' monthly savings and size of RuSACCOs. Figure 4 provides similar cross-plot of associations between households' total savings and size of RuSACCOs. Figure 5 provides similar non-parametric associations between households' access to credit and size of RuSACCOs, while Figure 6 depicts the association between households' access to credit life insurance and size of RuSACCOs. These figures highlight at least two interesting insights. First, the association between size of RuSACCOs and households' access to financial services, including savings, credit and insurance, appears to be substantially nonlinear. As shown in the figures, linear fit (association) between households' access to financial services and size of RuSACCOs provides incomplete and misleading inference on the implication of size of RuSACCOs. Second, the curvatures and degree of nonlinearities appear to vary across product ranges, showing that an increase in the size of RuSACCOs may have varying implications on households' access to the various financial services (product ranges) that RuSACCOs provide. Observing the turning points in figures 3-6 one may argue that the optimal size of RuSACCOs may differ depending on the product range they are meant to deliver. This further complicates the choice of optimal size of RuSACCOs and related community-based organizations.

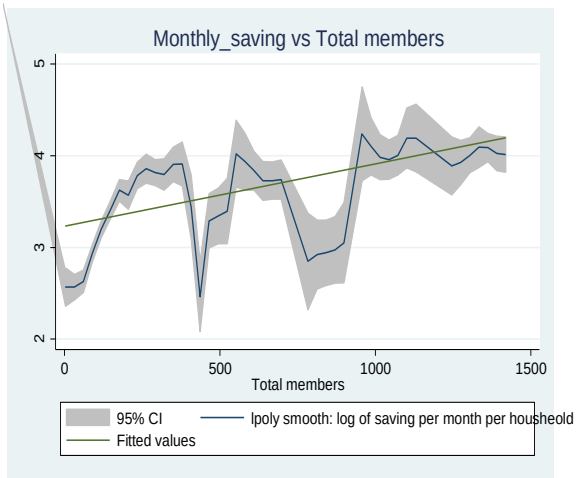


Figure 3: Monthly savings and size of RuSACCOs.

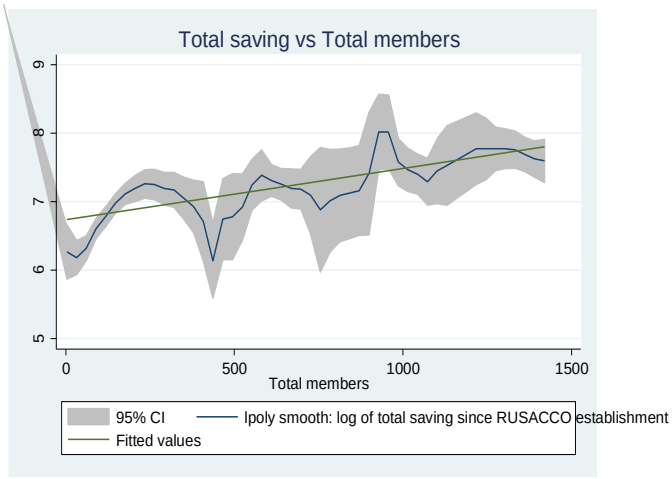


Figure 4: Total savings and size of RuSACCOs

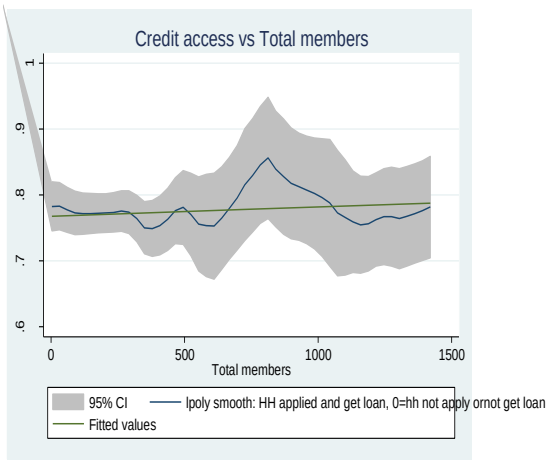


Figure 5: Credit access and size of RuSACCOs.

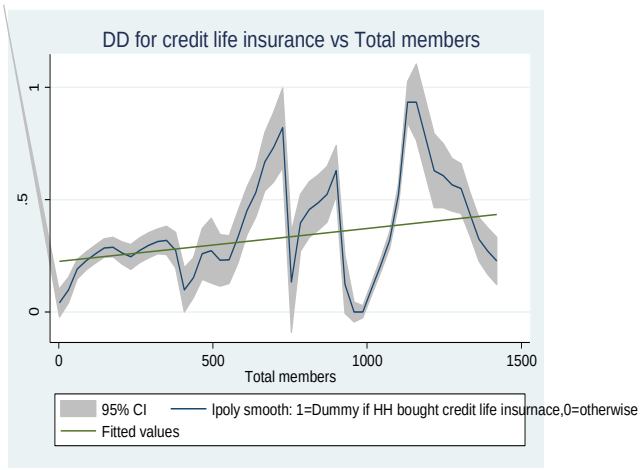


Figure 6: Credit life insurance and size of RuSACCOs

5. Empirical Characterization and Econometric Methods

Considering the financial services (savings, credit, and insurance) that RuSACCOs in Ethiopia commonly provide, we empirically characterize the implication of alternative formation of rural saving and credit cooperatives on households' access to these financial services. We particularly investigate the implication of the various attributes of RuSACCOs 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 endogenous formation of these networks (Manski, 1993). This problem includes self-selection of individuals into a these community-based networks (organizations) as well as endogenous choice of network (institutional) type. As we aim to characterize alternative formation of these community-based

organizations, the former is not a major concern in our case. Thus, we focus on addressing and discussing the implication of the second problem. In doing so, we provide two key contextual and empirical justifications that support the validity of our empirical exercise. First, in the context of Ethiopia, although the decision to join RuSACCOs might be endogenous, the choice of cooperative type is potentially exogenous to members for the reason that a large share of cooperatives are established through external support (see also, Bernard et al., 2008) and households have very limited choice to cooperative type in their village. Government and external initiatives commonly aim to establish one rural savings and credit cooperative for each *kebele* (village). Indeed, our data shows that most of the RuSACCOs in our data are established through externa initiatives from governmental and non-governmental agents. However, the placement of RuSACCOs and these initiatives may not be random. We capture these types of placement selections using regional and district-level dummies. We also have information about households' motives (and objectives) for subscribing to their RuSACCOs and we can control for potential households' strategic network (type) choice. Second, even with the above problems and caveats, our empirical characterization are informative to predict successful formation of rural savings and credit cooperatives. Even with endogenous choice of cooperative type, we can still deduce important implications on the potential of rural savings and credit cooperatives in ensuring financial inclusion of rural households.

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

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

Where Y_{hrt} stands for access to financial service (savings, credit or insurance) for each household h in each RuSACCO r and at time t. α_h stands for household-level random effects. $RuSACCO_{rt}$ comprises various attributes of RuSACCOs, including size, composition, social cohesion among members, and organizational structure. X_{hrt} captures household-level covariates that may affect savings behavior and 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 indictor variables measuring the size and composition of RuSACCOs, and latter extend the specification by adding other attributes of cooperatives and households. Members of the same RuSACCO are expected to share some unobservable effects, and hence in all regressions we cluster standard errors at RuSACCO level. For this reason, we will mainly focus on linear regressions approaches, although some of our outcome variables assume binary nature. Following the unconditional non-parametric regressions in Figures 3-6 and observed nonlinearities, we initially allow for sufficiently higher order polynomials of some of the important covariates of RuSACCOs and stepwise exclude those statistically insignificant terms.

Technically speaking, we can also estimate equation (1) using panel data fixed effects approaches by controlling for household and RuSACCO fixed effects. As we are more interested in characterizing alternative formation of rural financial cooperatives controlling for RuSACCO fixed effects is more important than controlling for household-fixed effects. While this can be considered as more robust characterization, we do not seem to have sufficient RuSACCO-level variation in one year, to identify its implication on households' access to financial services. However, as we have 2-3 RuSACCOs within each district (*woreda*), including the district-level fixed effects in our empirical specification can capture potential endogeneities related with placement of RuSACCOs.

6. Results and Discussion

Rural savings and credit cooperatives in Ethiopia typically provide three types of services to their members, including saving, credit, and insurance services. Hence, we discuss the implication of the various attributes of RuSACCOs in terms of delivering these financial services. By doing so, we characterize alternative formation of RuSACCOs to ensure financial inclusion of poor rural households.

5.1 Savings

Savings in RuSACCOs require substantial commitment and it may be influenced by members' affiliation with their cooperatives, as well as by the size, composition and organizational structure of these cooperatives. One can relate this decision to an investment in a common pool resource, which is expected to be a function of attributes related to investor, the members, and the nature of the common pool resource. However, since the members are simultaneously investors and users of this investment pool, characterizing the implication of these attributes

makes it slightly complex. We hypothesize three key elements to explain households' savings (investment) behavior in their RuSACCOs: (i) the size, composition, and structure of RUSACCOs; (ii) households' association and sphere of influence in these networks; and (iii) households' human and physical resources. Empirical characterization of households' saving behavior as a function of these attributes is given in Table 4. In column 1 we characterize households' monthly savings as a function of RuSACCOs' size and composition. Columns 2 and 3 extend this empirical specification by adding other characteristics of cooperatives and households.

Table 4 shows that several features of RuSACCOs' 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 implication of size RuSACCOs on households' monthly savings. This is intuitive for several reasons. Larger size of cooperatives may enable to build strong financial base and capital that may imply higher profitability in investments made for every member of the cooperatives. Larger cooperatives may also be more trusted for financial viability by members and hence can demand higher monthly savings. The nonlinear effects associated with size of RuSACCOs imply that an increase membership beyond some level may create managerial problems and hence negatively affect the effectiveness of RuSACCOs in mobilizing domestic 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, strong social connection among members and households' affiliation with these cooperatives seem to significantly predict higher saving behavior. More specially, those households joining rural cooperatives where members know each other, those households with longer affiliation with their cooperatives and those with higher sphere of influence over these institutions are more likely to commit higher amount of monthly savings. This sounds plausible given that savings require trust and commitment, which can be built through social ties. Those RuSACCOs with legal status are more likely to mobilize higher domestic savings from their members. This supports the value of formality in these institutions.

Besides to the RuSACCO-level attributes and households' affiliation with cooperatives, households' level of human and physical resources significantly predict investments in these institutions. Table 4 shows that wealthier households and those headed by educated household

heads tend to save more in RuSACCOs. As expected, those households with higher level of total asset and wealth commit higher amount of monthly savings in their RuSACCOs.

We also characterize households' total savings in their RuSACCOs and Table 5 provides these estimates. Broadly, these estimates are consistent with those estimates associated with monthly saving rates. Those households joining larger cooperatives, those with higher record of membership and those with higher sphere of influence on their cooperatives accumulate higher amount of overall savings. As expected, those households with longer membership record have higher amount of total savings.

Table 4: Households' Monthly Savings in RuSACCOs

Explanatory variables	*Log (monthly savings)*	*Log (monthly savings)*	*Log (monthly savings)*
RUSACCO size, composition and structure			
Total RuSACCO members	0.003***	0.003***	0.002***
	(0.001)	(0.001)	(0.001)
Total RuSACCO members square /10000	-0.011**	-0.009*	-0.008*
	0.000	0.000	0.000
Proportion of members from the same *Kebele*	0.090	0.115	0.009
	(0.215)	(0.210)	(0.198)
Diversity in wealth among members	-0.453	-0.435	-0.275
	(0.313)	(0.308)	(0.291)
Most members know each other (1=yes)	1.082***	0.980***	0.714***
	(0.299)	(0.287)	(0.255)
Presence of religion/traditional leader(1=yes)	0.107	0.128	0.186**
	(0.092)	(0.092)	(0.094)
Number of years since membership in RuSACCO	0.029*	0.029*	0.031**
	(0.017)	(0.017)	(0.015)
HH has any position in RUSACCO (1=yes)	0.219***	0.233***	0.134
	(0.082)	(0.080)	(0.082)
HH trust on RuSACCO leaders	-0.095	-0.088	-0.051
	(0.067)	(0.067)	(0.058)
HH distance to RUSACCO (Minutes)	-0.002	-0.002	-0.001
	(0.002)	(0.002)	(0.002)
RuSACCO is legally registered (1=yes)		0.618***	0.594***
		(0.219)	(0.194)
RuSACCO received external help (1=yes)		0.023	0.053
		(0.106)	(0.106)
Open policy(1=no restriction to join RUSACCO)		0.113	0.137*
		(0.089)	(0.078)
Reason to join RuSACCO (1=saving, 0=otherwise)		0.068	0.045
		(0.057)	(0.060)
RuSACCO selected to sell insurance in the first pilot (1=yes)		-0.075	-0.069
		(0.140)	(0.131)

Household Characteristics and resources			
Gender of household head (1=male)			0.080
			(0.095)
Age of household head			-0.004
			(0.003)
Household size			-0.024
			(0.019)
Education of household head			0.051**
			(0.021)
Total land size(Ha)			0.024
			(0.027)
Household owns mobile phone (1=yes)			0.054
			(0.056)
Log value of total asset (Birr)			0.030**
			(0.015)
Self-reported wealth status			0.060***
			(0.019)
Constant	2.384***	1.734***	1.207*
	(0.631)	(0.525)	(0.622)
Time dummy	Yes	Yes	Yes
Woreda (district) dummies	Yes	Yes	Yes
R-squared	0.18	0.221	0.304
Number of observations	1093	1093	1093

Notes: This table provides empirical characterization of households' monthly savings. In the first column we characterize these savings as a function of mainly RuSACCO-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.

Table 5: Households' Total Savings in RuSACCOs

Explanatory variables	*Log (total savings)*	*Log (total savings)*	*Log (total savings)*
RUSACCO size, composition and structure			
Total RuSACCO members	0.003***	0.003***	0.002***
	(0.001)	(0.001)	(0.001)
Total RuSACCO members square /10000	-0.009	-0.006	-0.004
	(0.006)	(0.005)	0.000
Proportion of members from same *Kebele*	0.185	0.259	0.15
	(0.181)	(0.164)	(0.148)
Diversity in wealth among members	-0.565	-0.432	-0.232
	(0.483)	(0.450)	(0.460)
Dummy most members know each other (1=yes)	1.463***	1.480***	1.272***
	(0.475)	(0.441)	(0.426)
Dummy presence of religion/traditional leader(1=yes)	-0.061	-0.145	-0.11
	(0.143)	(0.149)	(0.144)
Number of years since HH are members in RuSACCO	0.112***	0.114***	0.112***
	(0.022)	(0.022)	(0.022)
HH has any position in RUSACCO (1=yes)	0.436***	0.446***	0.291**
	(0.144)	(0.137)	(0.132)
HH Trust on RuSACCO leaders	-0.048	-0.04	-0.005
	(0.079)	(0.080)	(0.076)
HH distance to RUSACCO (Minutes)	-0.004*	-0.003	-0.003
	(0.002)	(0.002)	(0.002)
Dummy RUS has legally registered (1=yes)		0.947***	0.918***
		(0.260)	(0.272)
RUSACCO received external help (1=yes)		-0.017	0.015
		(0.132)	(0.130)
Open policy(1=No restriction to join RUSACCO)		0.102	0.105
		(0.140)	(0.136)
Reason to Join RUS (1=saving. 0=Otherwise)		0.057	0.028
		(0.084)	(0.080)
RuSACCO selected to sell insurance in the first pilot (1=yes)		-0.323*	-0.283*

		(0.168)	(0.171)
Household characteristics and resources			
Gender of household head (1=male)			-0.011
			(0.170)
Age of household head			0.000
			(0.005)
Household size			0.004
			(0.032)
Education of household head			0.073**
			(0.029)
Total land size(Ha)			0.044
			(0.056)
Household owns mobile phone(1=yes)			0.017
			(0.126)
Log (value of total asset (Birr))			0.026
			(0.030)
Self-reported wealth status			0.108***
			(0.038)
Constant	4.959***	3.872***	2.850***
	(0.969)	(0.890)	(1.070)
Time dummy	Yes	Yes	Yes
Woreda (district) dummies	Yes	Yes	Yes
R-squared	0.18	0.221	0.304
Number of observations	1093	1093	1093

Notes: This table provides empirical characterization of households' total savings. In the first column we characterize these savings as a function of mainly RuSACCO-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.

5.2 Credit

RuSACCOs are also entrusted to provide access to credit for rural households who may not have access to formal banks and microfinances. Thus, we also characterize the performance of RuSACCOs in terms of improving households' (members') access to credit. Interestingly, this characterization is expected to provide slightly different insights for the reason that some attributes of financial cooperatives are more important to deliver credit than savings mobilization. For instance, cooperatives covering large membership and geographic area are expected to be financially strong in terms of loanable funds (Armendáriz de Aghion and Morduch, 2010; Adams, 1995), while more likely to suffer from screening and enforcement problems (Hoff and Stiglitz, 1990; Guinnane, 2001). This implies that the implication of size of cooperatives on members' access to credit is not straightforward and may vary depending on which of the above force dominates.

Similarly, the composition of RuSACCOs may have slightly different in terms of facilitating credit services to members. Homogenous composition of members facilitates proper screening and peer-monitoring among members. However, since RuSACCOs heavily rely on members deposits as primary source of loanable funds, heterogeneous composition and asymmetric partnerships may provide economic (borrowing and depositing) opportunities among members by availing potential creditors and borrowers (Krahnen and Schmidt, 1995; Krishnan and Patnam, 2009). Thus, the overall implication of RuSACCOs' composition on members' access to credit may also depend on the relative sizes of these two effects.

Social cohesion among members may effectively facilitate peer-monitoring and enforcement among each other and hence improve households' access to credit service from their RuSACCOs. Along a similar line of reasoning longer investments and memberships in RuSACCOs may help households earn trust and social ties among members which can help them enjoy better access to credit services.

Table 6 provides estimates characterizing households' access to credit from their cooperatives as a function of various attributes of RuSACCOs and households. These estimates are linear probability model estimates for households' access to credit from their cooperatives. The estimates in column 1 show that the size of RuSACCOs significantly but nonlinearly predicts households' access to credit from their cooperatives. These nonlinear effects may suggest that an increase in RuSACCOs membership base can improve households' access to credit up to some level while an increase beyond this level may jeopardize monitoring of credit services. This is plausible, since larger RuSACCOs may imply limited social and economic interaction among members, which is the necessary condition for delegated monitoring and enforcement in serving collateral poor borrowers (Hoff and Stiglitz, 1990; Guinnane, 2001).

The estimates in column 1 also indicate that households joining financial cooperatives dominated by members from the same village (*Kebele*) have lesser likelihood of getting credit access from their cooperatives. More interestingly, diversity in wealth among members of RuSACCOs is strongly associated with higher households' access to credit services. This is intuitive given that RuSACCOs 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 underpinnings that emphasize heterogeneous formation of social networks and rural cooperatives

for creating market opportunities among members. Although contextually intuitive, these results may apparently sound in contrast to previous studies who 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 imply that the impact of compositional heterogeneity among group members may vary across the type of groups (credit, savings, or self-help) and product ranges these groups provide. For instance, our results show that compositional heterogeneity has no significant implication members' access to savings.

As expected, social cohesion among members is associated with higher access to credit services. Those RuSACCOs with members who know each other and potentially with social ties among members are better suited in improving households' access to credit services. This is consistent with the broader literature which generally acknowledges the potential of social cohesion and social capital in group-based microfinancing (Wydick, 1999; Cassar et al., 2007; Karlan, 2007). We can also observe that those households with longer record of membership have higher access to credit from their cooperatives. This is intuitive considering that RuSACCOs are expected to receive excess demand for credit services and it requires careful monitoring and screening of potential borrowers, a process which may take some good time and effort.[8]

Interestingly, column 3 of Table 6 shows that households' characteristics and resources have little implications on their demand for (access to) credit services from their cooperatives. This is in contrast to the results in Table 5 characterizing households' savings, which broadly show that households with higher human and physical resource are more likely to save more. Given that rural saving and credit cooperatives provide credit services at low interest rates, the demand curve for credit service is expected to be inelastic to the various attributes of households, including physical and human capital.

[8] Column 2 of Table 6 also shows that formality of financial cooperatives has no significant implication on households' access to credit services. This implies that while formality of RuSACCOs is crucial for mobilizing domestic savings for the reason that savings entail some level of trust, it may not matter a lot in terms of households' access to credit. The results in Table 6 also show that households' motive for joining RuSACCOs does not significantly predict their access to credit, suggesting that potential strategic (endogenous) network choice can be ruled out.

Table 6: Households' Access to Credit from their RuSACCOs

Explanatory variables	*Access to credit*	*Access to credit*	*Access to credit*
RuSACCO size, composition and structure			
Total RuSACCO members	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Total RuSACCO members square /10000	-0.003**	-0.003**	-0.003**
	(0.000)	(0.000)	(0.000)
Proportion of members from same *Kebele*	-0.086***	-0.097***	-0.097***
	(0.033)	(0.032)	(0.034)
Diversity in wealth among members	0.223***	0.197***	0.172***
	(0.063)	(0.060)	(0.060)
Most members know each other (1=yes)	0.225***	0.197**	0.206**
	(0.082)	(0.090)	(0.092)
Presence of religion/traditional leader(1=yes)	0.042	0.056	0.065
	(0.047)	(0.052)	(0.057)
Number of years since HH are members in RuSACCO	0.038***	0.038***	0.040***
	(0.006)	(0.006)	(0.005)
HH has any position in RuSACCO (1=yes)	0.033	0.03	0.045
	(0.029)	(0.028)	(0.028)
HH Trust on RuSACCO leaders	-0.005	-0.006	-0.005
	(0.023)	(0.023)	(0.023)
HH distance to RuSACCO (minutes)	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
RuSACCO has legally registered (1=yes)		-0.04	-0.027
		(0.079)	(0.073)
RuSACCO received external help (1=yes)		0.021	0.029
		(0.044)	(0.045)
Open policy (1=no restriction to join RuSACCO)		-0.031	-0.025
		(0.032)	(0.031)
Reason to join RuSACCO (1=saving, 0=otherwise)		-0.018	-0.014

		(0.029)	(0.030)
RuSACCO selected to sell insurance in the first pilot		0.052	0.045
		(0.051)	(0.050)
Household characteristics and resources			
Gender of household head (1=male)			-0.009
			(0.033)
Age of household head			0.000
			(0.001)
Household size			0.006
			(0.007)
Education of household head			-0.001
			(0.009)
Total land size(Ha)			-0.013
			(0.011)
Household owns a mobile phone(1=yes)			-0.003
			(0.026)
Log Value of total asset(Birr)			-0.004
			(0.005)
Self-reported wealth status			-0.016
			(0.011)
Constant	0.391*	-0.302	-0.209
	(0.206)	(0.220)	(0.257)
Time dummy	Yes	Yes	Yes
Woreda (district) dummies	Yes	Yes	Yes
R-squared	0.144	0.162	0.164
Number of observations	1093	1093	1093

Notes: This table provides empirical characterization of households' credit access. In the first column we characterize households' access to credit as a function of mainly RuSACCO-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.

5.3 Insurance (Credit Life Insurance)

Besides providing the basic financial intermediation services to their members, RuSACCOs are well-positioned to support the provision of micro-insurances to rural households. Given their close links to and experience with rural households, RuSACCOs can overcome information asymmetry and moral hazard problems. Along this line of justification, the Federal Cooperative Agency (FCA) of Ethiopia (through the Household Asset Building Program (HABP)) is recently piloting the provision of micro-insurance schemes to smallholders through RuSACCOs and their Unions. Currently, the FCA is implementing a national micro-insurance pilot known as credit life insurance provided through RuSACCOs. RuSACCOs are entrusted to deliver this credit life insurance for credit services they provide to their members.

Despite at its piloting stage, we also investigate households' demand for this type of insurance as a function of detail attributes of RuSACCOs and households. The results given in

Table 7 provide slightly distinct features and evidence compared to the results in Tables 4-6.[9] The size effect does not seem statistically significant, in contrast to the effects of size of RuSACCOs 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 RuSACCOs and those with higher membership record are more likely to buy credit life insurance.

Column 2 of Table 7 further highlights that organizational entry policies associated with RuSACCOs may also explain households demand for the pilot credit life insurance, while their legal status appears to be statistically insignificant. This is consistent with the demand for credit. Given that the credit life insurance is loan-linked, entry policies of RuSACCOs 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. RuSACCOs without any entry restrictions may also susceptible for potential free-riding problems.

Column 3 of Table 7 suggests that household demographic characteristics and observable resources have limited implication 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 RuSACCOs. One intuitive explanation is related with the elasticity of demand for credit and credit life insurance with respect to these attributes. Given that most RuSACCOs provide credit services at 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 equilibrium market price and take-up of credit and associated insurance heavily rely on supply-side attributes, which in turn rely on RuSACCO characteristics.

To sum up, the results in Table 4 through 7 highlight that some features of RuSACCOs are more suited for delivering some specific financial services than others. The results

[9] We also conduct these empirical characterizations by restricting the sample to those RuSACCOs which were selected to sell credit life insurance in the first pilot. These results are consistent with the full sample results and given in Table A1 (in the appendix).

particularly suggest that some features of RuSACCOs have varying and sometimes conflicting implications for delivering various financial services (savings, credit and insurance). Our results show substantial nonlinear and varying effects associated with the sizes of RuSACCOs across the various financial services that RuSACCOs provide. Similarly, while compositional heterogeneities among members (including diversity in wealth) seem to improve households access to credit services, potentially by availing potential borrowers and lenders, these heterogeneities have little implication in improving households' savings behavior. Similarly, strong social cohesion among members is shown to improve households' access to financial services, particularly savings and credit access. The results also underpin that in areas with limited access to financial services, the supply-side attributes of the market (and hence qualities and attributes RuSACCOs) appear to be crucial in explaining equilibrium take-up and price of these products. This is partly observed in our empirical exercises which show that while savings behavior are significantly explained by households' human and physical resources, these attributes provide limited implication in explaining demand for credit and insurance. For instance, the empirical characterizations associated with households' access to credit life insurance show that institutional trust, particularly trust on RuSACCOs and RuSACCOs leaders appear to be significant predictors of households' demand for insurance. Furthermore, we also find that households' motives for joining their RuSACCOs do not significantly predict higher access to the financial services, suggesting that strategic (endogenous) choice of RuSACCO type might be ruled out.

In general, the results associated with the implication of the various attributes of RuSACCOs on households' access to financial services, suggest that rural cooperatives may benefit from customized and tailored support for achieving a specific financial objective and financial inclusion of rural households. These pieces of evidence provide some new insights on how to ensure financial inclusion among smallholders in remote and rural areas, a pressing agenda and priority of policy makers in developing countries, including Ethiopia. The results also provide some insights into rural microfinancing operations and saving cooperatives which are struggling to improve their customers' saving rates.

Table 7: **Households' Demand for Credit Life insurance**

Explanatory variables	*Bought credit life insurance*	*Bought credit life insurance*	*Bought credit life insurance*
RUSACCO size, composition and structure			
Total RuSACCO members	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Total RuSACCO members square /10000	0.001	(0.002)	(0.001)
	(0.003)	(-0.003)	(-0.003)
Proportion of members from same *Kebele*	-0.169***	-0.189***	-0.189***
	(0.044)	(0.032)	(0.028)
Diversity in wealth among members	0.325**	0.256*	0.252*
	(0.144)	(0.135)	(0.132)
Most members know each other (1=yes)	-0.097	-0.075	-0.137
	(0.116)	(0.165)	(0.156)
Presence of religion/traditional leader(1=yes)	-0.022	-0.03	-0.011
	(0.126)	(0.144)	(0.143)
Number of years since HH are members in RuSACCO	0.015**	0.012*	0.012**
	(0.007)	(0.006)	(0.006)
HH has any position in RuSACCO (1=yes)	-0.011	-0.019	-0.024
	(0.026)	(0.026)	(0.026)
HH distance to RuSACCO (minutes)	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)
HH trust on RuSACCO (1=yes)	0.171***	0.116***	0.114***
	(0.044)	(0.038)	(0.038)
RuSSACCO trusted when it comes to insurance(1=yes)	0.262***	0.326***	0.317***
	(0.042)	(0.047)	(0.046)
RuSSACCO legally registered (1=yes)		-0.013	0.005
		(0.119)	(0.123)
RuSSACCO received external help (1=yes)		-0.01	-0.003

		(0.071)	(0.073)
Open policy(1=no restriction to join RuSACCO)		-0.170***	-0.160***
		(0.05)	(0.049)
Reason to join RuSSACCO (1=saving. 0=Otherwise)		0.012	0.005
		(0.02)	(0.024)
RuSSACCO selected to sell insurance in the first pilot		0.151*	0.150**
		(0.08)	(0.073)
Household Characteristics and resources			
Gender of household head (1=male)			0.011
			(0.027)
Age of household head			-0.001
			(0.001)
Household size			0.000
			(0.006)
Education of household head			-0.003
			(0.006)
Total land size(Ha)			-0.015
			(0.011)
Household own a mobile phone(1=yes)			-0.033
			(0.025)
Log (value of total asset (Birr))			-0.003
			(0.007)
Self-reported wealth status			0.024*
			(0.013)
Constant	-0.239	-0.046	-0.068
	(0.234)	(0.239)	(0.383)
Time dummy	Yes	Yes	Yes
Woreda (district) dummies	Yes	Yes	Yes
R-squared	0.417	0.475	0.480
Number of observation	1093	1093	1093

Notes: This table provides empirical characterization of households' access to credit life insurance. In the first column we characterize households' demand for credit life insurance as a function of mainly RuSACCO-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.

6. Concluding Remarks

In this paper we empirically investigate the implication of the alternative formation of rural savings and credit cooperatives on households' access to financial services. Implicitly, we also investigate the role of these rural saving and credit cooperatives in improving poor households' access to financial services and hence financial inclusion of poor rural households. By doing so, we contribute to addressing on-going central 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 rural savings and credit cooperatives. We find that some features of RuSACCOs have varying and sometimes conflicting implications for delivering various financial services (savings, credit and insurance). For instance, the sizes of RuSACCOs have nonlinear and varying implication across the various financial services that RuSACCOs provide. This implies that the optimal size of RuSACCOs may differ depending on the product range they are meant to deliver. On the other hand, compositional heterogeneity among members (including diversity wealth) is associated with higher access to credit, probably by availing potential borrowers and lenders, while this has no implication in improving households' savings behavior. This corroborates previous theoretical predictions which emphasize that heterogeneous group formation can create economic opportunities among members (Page, 2007; 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 RuSACCOs may vary across the domains of financial services they are meant to provide. The results also reinforce that in areas with limited access to financial services, the supply-side of attributes of the market (and hence qualities and attributes RuSACCOs) appear to be more crucial in explaining equilibrium take-up and price of these products than demand-side attributes. While savings decisions are significantly explained by households' human and physical resources, these attributes provide limited implication in explaining demand for credit and insurance.

The empirical characterizations particularly highlight that RuSACCOs need customized support that fits their product range. For example, introducing diversity in the formation of rural saving and credit cooperatives may help them generate economic (depositing and borrowing) opportunities. In a slightly different context, RuSACCOs formed by homogenous groups of households living in the same village might not be more effective in providing credit services unless they are supported to mobilize external resources (see also, Bernier and Meinzen-Dick, 2014). Similarly, embracing larger membership size and coverage may help mobilize domestic savings. The results also hint 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). These pieces of evidence may help in scaling-up good practices and qualities of these organizations. The results also provide some insights into

rural microfinancing operations and financial cooperatives which are struggling to improve their customers' saving rates. For instance, establishing trustworthy financial cooperatives may help these institutions mobilize domestic savings from their members.

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Appendix

Table A1: Households' Demand for Credit Life Insurance for those RuSACCOs Selected to Sell Insurance in the first Pilot

	Bought credit life insurance	Bought credit life insurance	Bought credit life insurance
RUSACCO size, composition and structure			
Total RUSACCO members	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Total RuSACCO members square /10000	-0.001	-0.002	0.001
	(0.003)	(0.003)	(0.003)
Proportion of members from same *Kebele*	-0.202***	-0.201***	-0.177***
	(0.065)	(0.064)	(0.064)
Diversity in wealth among members	0.149	0.283	0.278
	(0.133)	(0.192)	(0.181)
Most members know each other (1=yes)	-0.128	0.049	-0.014
	(0.165)	(0.163)	(0.166)
Presence of religion/traditional leader(1=yes)	-0.060	-0.231	-0.269
	(0.272)	(0.258)	(0.303)
Number of years since membership in RUSACCO	0.012	0.010	0.003
	(0.010)	(0.009)	(0.008)
HH has any position in RuSACCO (1=yes)	-0.020	-0.040	-0.052
	(0.046)	(0.043)	(0.048)
HH distance to RuSACCO (minutes)	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Trust on RuSACCO (1=yes)	0.168***	0.119***	0.129***
	(0.042)	(0.042)	(0.046)
RuSSACO trusted when it comes to its insurance(1=yes)	0.409***	0.485***	0.507***

	(0.053)	(0.060)	(0.067)
RuSSACCO legally registered (1=yes)		0.001	0.001
		(0.001)	(0.000)
RuSSACCO received external help (1=yes)		-0.128	-0.143
		(0.098)	(0.107)
Open policy (1=no restriction to join RuSACCO)		-0.199***	-0.178***
		(0.058)	(0.059)
Reason to join RuSSACCO (1=credit, 0=otherwise)		0.023	0.024
		(0.040)	(0.041)
Household characteristics and resources			
Gender of household head (1=male)			-0.017
			(0.043)
Age of household head			0.000
			(0.002)
Household size			0.003
			(0.009)
Education of household head			0.004
			(0.009)
Total land size(Ha)			-0.006
			(0.014)
Household owns mobile phone(1=yes)			-0.038
			(0.040)
Log Value of total asset(Birr)			-0.004
			(0.008)
Self-reported wealth status			0.031
			(0.021)
Constant	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Time dummy	Yes	Yes	Yes
Woreda (district) dummies	Yes	Yes	Yes
Number of Observation	605	605	605

Notes: This table provides empirical characterization of households' access to credit life insurance, by restricting the sample to those RuSACCOs who were selected to sell this micro-insurance in the first pilot. In the first column we characterize households' demand for credit life insurance as a function of mainly RuSACCO-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.