Conflict, Fraud, and Distrust in Ethiopian Agricultural Cooperatives

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Abstract

Agricultural cooperatives are seen as an efficient way for smallholder farmers to create bargaining power in order to achieve poverty reduction and food security. However, the success of these cooperatives depends on their ability to maintain their social capital, which is at the core of collective action. A few studies have addressed issues of member participation, commitment, and trust, yet less is known about rural cooperatives in developing countries as a social organization. It is also unclear whether a relationship exists between cooperative size and the incidence of conflict, fraud, and distrust. Using unique data collected from 511 agricultural cooperatives in 12 districts of Tigray region in northern Ethiopia, this paper examines the effects of cooperative size on conflict, fraud, and distrust. We used instrumental variables (IV) probit estimation techniques, accounting for endogeneity of membership size, to confirm that cooperative size does affect the occurrence of conflict, fraud, and trust. The results also indicate that other influencing factors include: cooperative age, number of employees, payment of dividends based on transaction volume, and heterogeneity of member goals.

Keywords: Agricultural cooperatives; cooperative size; conflict; fraud; distrust; Ethiopia.

1. Introduction

Collective action and cooperatives play a significant role in the early development of a society (Kaplan, Gurven, Hill, & Hurtado, 2005; Tomasello, 2014). Individuals cooperate with friends, neighbors, and co-workers to handle problems. Several community-based organizations and legal formations allow individuals to formalize this cooperation (Yildiz et al., 2015). As such cooperatives commit to social principles and values, alongside their aim to make profit (Nilsson, Svendsen, & Svendsen, 2012). Yet, the extent to which social goals are achieved partly depends on the group size that is a key ingredient of collective action (Hwang, 2017) as it determines the size of the collective.

Group size may increase benefits of cooperation (Mao, Mason, Suri, & Watts, 2016). Yet, other studies found inconclusive (e.g., Gautam, 2007; Pecorino & Temimi, 2008) and even negative effects of groups size on cooperative benefits (Grujić, Eke, Cabrales, Cuesta, & Sánchez, 2012; Hardin, 1982; Nosenzo, Quercia, & Sefton, 2015; Olson, 1965). In line with the latter findings, Nilsson et al. (2012) concluded that large cooperatives experience a gradual loss of social capital, reflected in less participation for mutual benefits, less collaboration, and greater distrust

of their cooperatives. Therefore, such social behavior could lead some members to develop a negative attitude towards their cooperatives (Hogeland, 2006a; Nilsson et al., 2012). This, in turn, affects the trust-based relationship between members and leads members to adopt conflict-inducing attitudes (Fulton & Giannakas, 2001). A larger membership may also encourage free-riding as perceived effect of individual detection is lower, which may lead to conflicts due to incentive problems (McArdle, Clements, & Hutchinson-Lendi, 2005). With increasing membership, transaction costs, such as communication and monitoring, may rise significantly (Pecorino & Temimi, 2008), that complicate detecting and mediating free-riding (Yang et al., 2013). Moreover, larger cooperatives with multiple business operations may take investment decisions that are not in all members' best interests. This may induce discontent, alienation, and conflict among members (Nilsson et al., 2012). Despite its importance, studies that analyze cooperatives as social entities or as a form of social behavior are scarce (Yildiz et al., 2015). Only few studies reflect on member participation (Cechin, Bijman, Pascucci, Zylbersztajn, & Omta, 2013b), commitment (Cechin, Bijman, Pascucci, & Omta, 2013a; Cechin et al., 2013b), and trust (Hakelius & Hansson, 2016; Österberg & Nilsson, 2009; Tadesse & Kassie, 2017).

Agricultural cooperatives in developing countries often face problems, as many are organized top-down by external agents as vehicles to support public investment in rural development programs, rather than being driven by farmers themselves (Ruben & Heras, 2012). Because of these policies, most cooperatives in Ethiopia experience persistent disagreements or distrust between members, making them less competent to improve the welfare of farmers (Bernard, Gabre-Madhin, & Taffesse, 2007). Many Ethiopian cooperatives were created in response to government plans and aimed solely at attracting public subsidies, instead of becoming competitive in the market (Francesconi, 2009; Getnet & Anullo, 2012). Such a top-down approach limits real solidarity and self-help among members and tends to reduce their interest in cooperative operations. At the same time, the size of cooperatives in Ethiopia has changed significantly over the past decade due to aggressive membership drives (Bernard, Abate, & Lemma, 2013a). For example, according to the Tigray Cooperative Promotion Agency (TCPA), agricultural cooperatives in the Tigray region almost doubled their membership from 510,624 in 2011 to 1,526,868 in 2017) (TCPA, 2017).

One may expect that such evolutions in membership create challenges in terms of member relationships and may undermine collective action. Yet, as mentioned above, literature is currently inconclusive and studies in African contexts are particularly scare. In response, this paper seeks to identify relationships between membership size and the occurrence of conflict, fraud, and distrust within agricultural cooperatives. Unlike previous studies, we take the cooperative itself as a unit of analysis.

The paper continues as follows. The next section explains the description of the outcome variables used and provides a literature review for conflict, fraud, and distrust in agricultural cooperatives. We then present the study area and data collection and detail the model specification. This is followed by a presentation of the discussion and results. The final section gives some concluding remarks.

2. Literature review

There are theoretical arguments as to whether cooperative size has a negative or positive effect on conflict, fraud, and distrust.

2.1. Conflict in agricultural cooperatives

Conflict, is defined as a perception of incompatibility between values, needs, interests or behavior (Deutsch, 1977; Putnam & Poole, 1987; Wall Jr & Callister, 1995). It is an integral part of our daily lives, both at work and in other situations. The way people deal with conflict or their conflict style, regardless of the context, plays a critical role in affecting both the result of the conflict and future interaction between the parties (Zarankin, 2008).

Conflict has been mentioned in cooperative literature, but it has not been thoroughly investigated (Huybrechts & Mertens, 2014; Yildiz et al., 2015). It is considered inherent to social life and part of its social context (Barley, 1991). Conflict within organizations can be defined broadly as "perception of incompatibility between values, needs, interests or actions" between individuals or groups (Zarankin, 2008). There is no integrative, overarching theory of conflict within cooperatives (Yildiz et al., 2015). Pondy (1967) argues that conflict in an organization can have both positive and negative effects on its productivity and stability. Conflict theory assumes that conflict promotes change (Coser, 1957), which may be welcomed or opposed by members. Conflicts of interest and over the values of the cooperative may be more common during the founding phase when founders and members disagree on goals and motivations (Yildiz et al., 2015), while issues of codetermination and agency may emerge at a later stage with goals and appropriate approaches to governance (Hernandez, 2006). Moreover, cooperatives have multiple, sometimes conflicting, social, and economic goals, as opposed to profit-driven companies (Hogeland, 2006b).

Membership growth in cooperatives calls for new ideas and goals that may increase the divergence between founding members and new member preferences (Cook, 2018). A growing membership also implies a change in governance structures, which may in itself lead to conflicts. Larger cooperatives experience conflicts between members as a result of the implementation of organizational norms and bureaucratic procedures (Galanter & Palay, 1991). Large membership size allows for more differences and disagreements among members, leading to conflicts and emotional exhaustion (Chlebicka & Pietrzak, 2018). Anderson and Henehan (2003) finds a positive relationship between large membership size and conflict in cooperatives. A polarized membership may have conflicting goals. For example, members from different age groups, geographical areas, or wealth groups may not agree on a set of common goals (Anderson & Henehan, 2003). Such differing goals create a conflict of interest within cooperatives (Yildiz et al., 2015). This literature leads us to formulate the following hypothesis to be tested:

Hypothesis 1: Cooperatives with large membership are associated with higher probability of conflict among members.

2.2. Fraud in agricultural cooperatives

Zahra, Priem, and Rasheed (2005) defined fraud from an organizational viewpoint by referring to fraud as deliberate actions taken by management at any level to deceive, con, swindle, or cheat investors or other stakeholders and labeled it as a white-collar crime. This so-called white-collar fraud includes occupational and corporate fraud (Sutherland, 1945). According to Moberg (1997), fraud can take a variety of forms, such as embezzlement, insider trading, self-dealing, lying about facts, inability to reveal facts, corruption, and cover-ups.

Clinard, Quinney, and Wildeman (2014) describe occupational fraud committed against an organization for the advantage of an individual perpetrator as 'internal' or 'insider' fraud. Occupational fraud in cooperatives encompasses a range of transgressions by the board of directors, employees, or members. These include cash embezzlement, fraudulent statements, and asset misappropriation. Fraud has severe effects on stakeholders, employees, and the wider society (Zahra et al., 2005). Studies indicate that organizations that experience fraud have weaker governance mechanisms, such as fewer annual general assembly meetings, than non-fraud organizations (Zahra et al., 2005). Holtfreter (2008) finds that institutional characteristics, such as size and age of the organization, influence the likelihood of fraud.

As a social institution, cooperatives struggle with ways to create ethics, fairness, and trust. Social and economic illegalities, including fraud and bribery, erode the confidence that cooperatives are unique in their business ethics (Lasley, Baumel, Deiter, & Hipple, 1997). In the cooperative literature, little attention has been devoted to fraud and financial misreporting (Fulton & Hueth, 2009). Social entities and cooperatives are not immune to fraud. Cooperatives are supposed to work on a non-profit basis against a limited financial base. Hence, even the smallest losses can significantly impact on the organization. Cooperatives are susceptible to financial fraud, as they may lack basic controls to prevent or detect fraud (Benson, 2014). Some studies show that cooperatives are more prone to fraud, as they rely on trust, have weaker internal controls, and lack financial expertise (Kummer, Singh, & Best, 2015). Kellogg and Kellogg (1991) reported that cooperatives with poor economic performance could induce management to engage in fraud activities in order to ensure their job security and compensation.

Also in Ethiopia, many agricultural cooperatives face several governance challenges, including fraud and property misuse (Spielman, 2008). So far, no study has investigated the link between fraud and membership size in cooperatives. This lack of research may be particularly significant in developing countries where cooperatives are known to be focal points for corruption and government intervention (Farber, 2005). Fraud may even be more prominent with increasing membership size we witness in Ethiopia, as heterogeneity and anonymity may increase and social relationships may weaken (Nilsson, 2001), which, in turn, causes individuals to engage in fraud. This paper sets out to empirically test this relationship and proposes the following hypothesis:

Hypothesis 2: Cooperatives with large membership are more susceptible to fraud than small cooperatives.

2.3. Trust and distrust in agricultural cooperatives

Several scholars have defined distrust as the reverse of trust. Benamati, Serva, and Fuller (2010) defined distrust as unwillingness to become vulnerable to the trustee because the trustee will behave in harmful ways, be neglectful, or incompetent. Lewicki, McAllister, and Bies (1998) defined trust as "confident, positive expectations regarding another's conduct," while distrust as "confident negative expectations regarding another's conduct."

Trust is essential for social interaction and relationships within organizations in general (Greenberg, 2014) and particularly within cooperatives (Hansen, Morrow Jr, & Batista, 2002). Understanding the link between trust and membership size may contribute to understanding the potential benefits of cooperatives compared to other organizations (Yildiz et al., 2015).

Some claim that cooperatives generate trust and enable members to learn behaviors (Stolle, 1998). In this respect, large cooperatives with complex social structures and a different mix of members in terms of production size, type, and preferences may experience more difficulties in trust-building (Ole Borgen, 2001). Substantial research shows the importance of trust in cooperatives, as it enhances willingness to participate in collective actions, increases commitment, helps to avoid inefficiencies, and reduces problems with free-riding (Ostrom, 2000). However, Chlebicka and Pietrzak (2018) conclude that membership size is not the main factor in the longevity of producer organizations. Stolle (1998) finds that membership duration in cooperatives does not have an added linear effect on trust.

According to the Federal Cooperative Agency (FCA), the establishment of cooperatives in Ethiopia is based on the motto of one village one type of cooperative (FCA,2015). The premise was ensuring that no-one would be left without access to agricultural services (Tadesse & Kassie, 2017). As mentioned above, agricultural cooperatives have increased in size, which has resulted in greater complexity and heterogeneity, and social ties have become less prominent (Nilsson, 2001). Moreover, anonymity within a large membership may create ignorance and generate passivity (Österberg & Nilsson, 2009). Until now, however, little attention has been given to the links between membership size and trust (Chlebicka & Pietrzak, 2018). As trust is arguably an essential mechanism for efficient coordination and operation of cooperatives, its relationship with membership size warrants more research. The lack of empirical evidence, motivates us to test the following hypothesis:

Hypothesis 3: Cooperatives with large membership have higher levels of distrust among members.

3. Methodology

3.1. Study area and data collection

The study was carried out in the Tigray region located in northern Ethiopia (Figure 1). It hosts a population of more than 5 million people of whom about a quarter live in urban areas (CSA, 2017). It has four administrative zones, namely, eastern, central, south and southeast, and west and northwestern which are each divided into 46 weredas (districts), 763 tabias/kebeles (sub-districts), of which a majority (702) are rural. According to the report of the Bureau of Planning and Finance of the Tigray, the region's economy is predominately agrarian, with the sector contributing around 40% to the regional GDP. This growing economy (at a growth rate of 9.8% in 2017) constituted 22 % of the national GDP (Woldehanna, 2002). Rainfed crop production in mainly small-scale systems of less than one ha per household is the main economic activity for over 83% of the population, complemented by livestock rearing and mixed farming (Alemu & Yoseph, 2004). Agricultural cooperatives are highly dependent on the cooperative sector for their services such as (a) provision of farm inputs like fertilizer, improved seeds, and credit; (b) facilitate collective marketing of sesame and honey to domestic and foreign buyers; and (c) provision of essential consumer goods like sugar, coffee, cooking oil, etc. The Tigray Cooperative Promotion Agency counted 4,265 cooperatives in the region hosting a membership of 1.5 million people and a total capital of over one billion ETB (37 million USD). Cooperatives were involved in the livestock sector (30% of all cooperatives in the region), services (30%), natural resources (24%) and multipurpose (16%) (TCPA, 2017).

Data for this study were collected through a cross-sectional cooperative-level survey in four zones of Tigray region from April to August 2017. Tigray region was purposively selected due to the presence of the fastest-growing agricultural cooperatives relative to other regional states in Ethiopia (Bernard, Abate, & Lemma, 2013b) and the majority of rural communities (estimated at 35% of the population) are members of agricultural cooperatives (TCPA, 2017). A set of 511 agricultural cooperatives were selected using a three-stage sampling procedure. First, we randomly selected three weredas from Tigray's four zones - eastern, central, south and southeastern (SSE) and west and northwestern (WNW) with variations in agricultural potential (Figure 1). Second, we randomly selected a total of 249 rural tabias from 12 rural weredas, taking into account the number and type of cooperatives functioning (Table 1). Third, based on probability proportional to size, 511 agricultural cooperatives were randomly selected within those 249 tabias. The sample includes cooperatives involved in agricultural production and marketing, which accounts for 65% (n=788) of the entire target agricultural cooperatives.

Table 1
Distribution of sampled agricultural cooperatives across zones and weredas

Number of weredas selected in each zone	Number of tabias selected in each wereda	Number of cooperatives selected from tabias in each wereda
Atsbi Wenberta	33	43
Ganta Afeshum	16	40
Gulomekeda	25	51
Subtotal eastern zone	**74**	**134**
Abergele	22	32
Degua Tembien	17	64
Mereb Leke	14	22
Subtotal central zone	**53**	**118**
Alaje	16	41
Enderta	24	53
Samre	20	41
Subtotal SSE zone	**60**	**135**
Asgede Tsimbla	12	25
Tsegede	25	57
Wolqayt	25	42
Subtotal WNW zone	**62**	**124**
Total	**249**	**511**

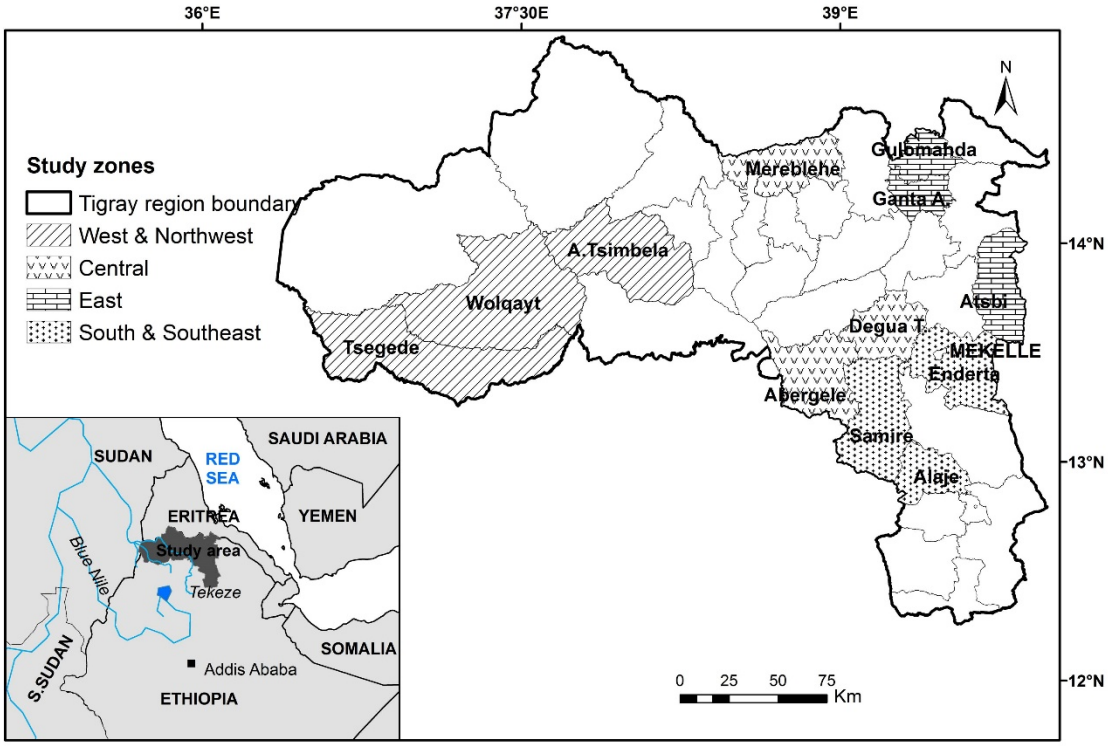

Fig.1. Location of the study area in the Tigray region, Ethiopia

A structured questionnaire was used to collect data on the chairs' characteristics, cooperative-specific characteristics, social capital and governance indicators, and village-level variables. The questionnaire was pretested in September 2016 on 65 randomly selected cooperatives in the study area, the data for which are not included in the final sample. A group of trained enumerators and supervisors, fluent in Tigrigna, the local language in the selected areas, interviewed the cooperative chairs. Where the chair was absent, we interviewed the vice-chair (which occurred in 18% of the sample). All the interviews were held at the offices of the respective cooperatives.

The survey was programmed and completed using Qualtrics Offline survey software. We used STATA (14) for all statistical analyses and tests.

3.2. Measuring outcome variables

We used the total number of members to measure the size of the cooperatives. Several studies support the idea that qualitative measures are instrumental in assessing the performance of small businesses (e.g., Angilella & Mazzù, 2019) and cooperatives (e.g., Hansen et al., 2002). The following outcome variables were identified.

In the survey, respondents were asked the question, "Has there been any conflict between parties in your cooperative?" measured on a binary scale (1= yes; 0= no). This may include conflict between members and the board of directors, between members and employees or the board of directors and employees.

We refer to fraud as internal or occupational fraud committed by someone within the cooperative. We measured fraud using a binary scale (yes=1; no=0) "Has your cooperative experienced any fraud or deceptive activities since its inception?" This referred to fraud committed either by the board of directors, employees or members and examples of internal or occupational fraud. Internal fraud may include cash embezzlement, asset misappropriation, and financial statement manipulation.

The respondents were asked a generalized trust question, "Do you think that most members of your cooperative can be trusted in matters of lending, borrowing, and resource sharing?". The answers were captured in a binary variable (1=lack of trust; 0= trust). This is inspired by the commonly used trust questions "Do you think most people can be trusted" (Grootaert & Van Bastelar, 2002).

3.3. Model specification

Since our dependent variables are binary, we adopted probit models to assess the likelihood of cooperatives experiencing conflict, fraud, and distrust. The building blocks of the model are represented by equation 1; where the membership size is a variable of interest and controls for cooperatives internal and external characteristics:

$$Y = \beta_0 + C'\beta_1 + I'\beta_2 + G'\beta_3 + E'\beta_4 + F'\beta_5 + L'\beta_6 + T'\beta_7 + \varepsilon \quad (1)$$

where *Y* represents *outcome variables (i.e., conflict, fraud, and distrust), C* is a vector of *chairperson characteristics*, *I* a vector of cooperative-specific *institutional characteristics*, *G* a vector of *governance characteristics*, *E* a vector of *external link and heterogeneity*, *F* is a vector of dummies representing three *formation initiatives* to establish cooperatives, *L* is a vector of three dummies representing four *cooperative locations,* and *T* is a vector of dummies representing three *cooperative types.* ε denotes error terms; β_is are vectors of parameters to be estimated. See Table 2 below for the definition and summary statistics of variables used in the analysis.

Reverse causality is possible between the outcome variables and our variable of interest, membership size, because members may be more inclined to self-select into cooperatives with less conflict and fraud and more trust. In this case, the correlation between membership size and the error term is not zero (E(x,u)≠0), so that the results of the estimation are inconsistent (Wooldridge, 2010). To control for endogeneity, we introduce instrumental probit models for which equation (1) is re-written as:

$$Y_{1i}^{*} = \beta M_i + \gamma X_{1i} + u_i \quad (2)$$

$$M_i^{*} = X_{1i}\pi_1 + X_{2i}\pi_2 + v_i \quad (3)$$

where $i = 1,\ldots, N$; M_i is an endogenous variable (membership size), X_{1i} *is* a vector of exogenous variables, X_{2i} is a vector of additional instruments, and the equation for M_i is written in the reduced form. β, γ, π_1, and π_2 are vectors of parameters to be estimated.

A valid instrument should strongly influence the given potential endogenous variable (membership size), but not the outcome variables (conflict, fraud, or distrust) directly. Three variables are included as instruments: lagged membership fee in ETB, board members' average years of education, and a dummy for the cooperative`s membership policy (1= closed membership; and 0= open membership). The implicit assumption is that membership size may be influenced by the level of membership fee paid to the cooperative by new members, which implies that those cooperatives charging small membership fees will have a large membership compared to cooperatives charging a large membership fee. Similarly, cooperatives for which the board members have more years of education are hypothesized to motivate more people to join the cooperative, thinking this will improve the service delivery system and the cooperative performance. Furthermore, cooperative membership policy is considered important. In the study area, several cooperatives have adopted a closed membership policy whereby the membership size is limited by the local government. This size remains fixed and new members cannot join unless an existing member withdraws from the cooperative. Once we have controlled for other regressors, these instrumental variables are expected to directly influence membership levels, but should not affect conflict, fraud, or distrust directly.

In equation (2), we do not observe Y_{1i}^{*}; instead, we observe

$$y_{1i} = \begin{cases} 0 \; if \; Y_{1i}^{*} < 0 \\ 1 \; if \; Y_{1i}^{*} \geq 0 \end{cases} \tag{4}$$

The order condition for identification of the structural parameters requires that k ≥ p, where k and p– are the number of instruments and endogenous explanatory variables, respectively which equals 1 here.

Table 2
Definition and summary statistics of sample cooperatives in the study area (n= 511)

Variable	Definition	Mean	SD
Dependent variables			
Conflict	Equals "1" if the cooperative experienced conflict among the parties within the cooperative, 0 otherwise	0.429	0.495
Fraud	Equals "1" if the cooperative experienced fraud, 0 otherwise	0.225	0.418
Distrust	Equals "1" if the cooperative member lacks trust in other members, 0 otherwise	0.659	0.474
Independent variables			
Chairperson characteristics			
Duration of membership	Total number of years the current chairperson has membership in a cooperative	7.529	5.941
Working experience	Total number of years the current chairperson has served in the position	3.570	2.993
Days worked per year	Total number of days the current chairperson works per annum in a cooperative	65.992	62.034
Training	Equals "1" if the chairperson has received cooperative training, 0 otherwise	0.953	0.212
Institutional characteristics			
Age of cooperative	Total number of years since the establishment of the cooperative	8.646	7.387
Membership size	Total number of cooperative members	375.729	548.936
Landholding size	Total cooperative land in hectares	17.652	97.098

Total employees	Total number of cooperative full-time employees	1.282	2.501
Introducing new service	Equals "1" if the cooperative plans to introduce new products or services for its members, 0 otherwise	0.855	0.353
Membership fee	The amount of membership fees paid (ETB) when members joined a cooperative in 2015	120.548	1533.842
Governance characteristics			
Bank account	Equals "1" if the cooperative has a bank account, 0 otherwise	0.947	0.224
Board compensation	Equals "1" if the cooperative provides cash compensation to the board of directors for their leadership role, 0 otherwise	0.076	0.266
Patronage dividend	Equals "1" if the cooperative dividend distribution over the past few years is based on economic transactions by each member, 0 otherwise	0.591	0.492
General assembly	Natural logarithm of the total number of meetings cooperative convened annually with members	4.294	7.423
Board education	The average years of schooling of the board of directors	5.787	2.087
Size of committees	Total number of committees in a cooperative, which include the board of directors and other sub-committees (e.g. control, loan, audit, savings, etc.)	4.522	1.246
Audited	Equals "1" if the cooperative financial accounts has been audited since its inception, 0 otherwise	0.556	0.497
Membership policy	Equals "1" if the cooperative has adopted closed membership, 0 for open membership	0.301	0.459
External link and heterogeneity			
Community services	Equals "1" if the cooperative provides community-oriented services to the society (such as road and school maintenance, soil bund and stone terrace, etc.), 0 otherwise	0.230	0.421
Heterogeneity of goals	Equals "1" if the members have a perceived heterogeneity in the goal of the cooperative (e.g., service orientation vs. profit orientation), 0 otherwise	0.256	0.437
Heterogeneity of dividend	Equals "1" if the dividend taken among members is heterogeneous, 0 otherwise	0.205	0.404
Formation initiatives			
Member-initiated	Equals "1" if the cooperative was initiated by members themselves, 0 otherwise	0.566	0.496
Government-initiated	Equals "1" if the cooperative was initiated by the government, 0 otherwise	0.362	0.481
NGO-initiated	Equals "1" if the cooperative was initiated by non-governmental organizations, 0 otherwise	0.072	0.259
Location-zone			
Eastern	Equals "1" if the cooperative resides in eastern zone, 0 otherwise	0.264	0.441
Central	Equals "1" if the cooperative resides in central zone, 0 otherwise	0.229	0.421
SSE	Equals "1" if the cooperative resides in south and southeast zone, 0 otherwise	0.264	0.441
WNW	Equals "1" if the cooperative resides in the west and northwestern zone, 0 otherwise	0.243	0.429
Cooperative type			
Multipurpose cooperative	Equals "1" if the cooperative is a multipurpose cooperative, 0 otherwise	0.352	0.478
Livestock cooperative	Equals "1" if the cooperative is a livestock cooperative, 0 otherwise	0.393	0.489
Natural resource cooperative	Equals "1" if the cooperative is a natural resource cooperative, 0 otherwise	0.254	0.436

ETB (Ethiopian Birr currency) exchange rate reported by the commercial bank of Ethiopia as of June 15, 2018; 1 USD = 27.20 ETB.

We estimate two alternative models as robustness checks for each outcome variable (see Appendix Table A1 to A3). The coefficients of these models are similar in both magnitude and significance to those of the full models.

4. Results and Discussion

4.1. Descriptive statistics

Livestock cooperatives represent 39% of our sample (Table 2). About 35% of the cooperatives in our sample were multipurpose cooperatives; they engage in a broader range of activities such as the distribution of farm inputs and services (e.g., fertilizer, improved seed, credit, motor pump, treadle pump, etc.) and facilitate the sale of members farm products. The remainder 25% were natural resource cooperatives engaged in water supply for irrigation and forestry such as harvesting of frankincense and seedling multiplication. The cooperatives were almost evenly distributed across the different zones. There is variability in goals across cooperatives. For example, some members demand more service at an affordable price from their cooperatives, while others may be interested in obtaining dividends by setting a higher price, increasing the amount of capital required by members, or membership fees, etc.

On average, 43% of the surveyed cooperatives have experiences conflicts among members (Table 2). About 22% of the cooperatives reported that they had experienced fraud in the last few years. The majority of the cooperatives (66 %) indicated that there was a lack of trust among members in matters of lending and borrowing activities. The cooperatives differ in chairperson and institutional characteristics.

We split our dataset into two size groups to simplify the description of its characteristics. In small cooperatives, the membership varies from 5 to 30 members, while large cooperatives have between 31 to 2,550 members. Table 3 compares the characteristics of these two groups using the t-test for continuous variables and chi-squared statistics for categorical variables. Conflict and fraud incidence were highest amongst large cooperatives. The chairs of large cooperatives reported a longer duration of membership and working experience than small cooperatives. Although the chairs of large cooperatives spent, on average, more days per annum on cooperative activities than those in small cooperatives, the differences are not statistically significant. The proportion of chairs who have received training within the large cooperatives is relatively higher than in small cooperatives.

In terms of structural characteristics, it is interesting to note that large cooperatives were significantly older and had more land, with more full-time employees. Small cooperatives were slightly more inclined to introduce new services to their members. Large cooperatives provide cash compensation to the board for their leadership role and distribute dividends based on the economic transactions of each member. The proclamation requires cooperatives to convene at least once a year for a general assembly meeting. Frequent meetings of cooperative members may generate trust and reduce negative attitudes towards dishonesty, such as fraud and conflict. In our case, the schedule of meetings varied between cooperatives; for example, large cooperatives had scheduled meetings every six months, on average, while small cooperatives met every 2.4 months and the difference is statistically significant

The principles established by the international cooperative alliance include community development. Large cooperatives seem to be relatively more involved in community development, with activities including home repairs for the elderly and disabled, dryland afforestation, soil and water conservation, and contributions to public goods (such as maintenance of schools, health centers, and local roads) than small cooperatives. Large cooperatives have the highest perceived member heterogeneity of objectives such as service-orientation versus profit-orientation objectives.

Table 3
Summary statistics and comparison of cooperative characteristics by size

Variables	Large size (L) (n=254)		Small size (S) (n=257)		t-test (L-S) Mean (SE)	Pearson Chi2 statistic
	Mean	(SD)	Mean	(SD)		
Dependent variables						
Conflict experience (yes=1)	0.492	(0.501)	0.366	(0.483)	--	8.330***
Incidence of fraud (yes=1)	0.304	(0.461)	0.132	(0.339)	--	22.164***
Lack of trust (yes=1)	0.626	(0.485)	0.639	(0.462)	--	2.525
Chair characteristics						
Duration of membership (years)	10.533	(6.638)	4.560	(2.994)	5.973 (0.455)***	--
Working experience (years)	3.987	(3.504)	3.159	(2.317)	0.828 (0.263)***	--
Days worked per year	68.549	(59.147)	63.435	(64.808)	5.115 (5.516)	--
Received training (yes=1)	0.972	(0.164)	0.934	(0.249)	--	4.210**
Institutional characteristics						
Age of cooperative (years)	13.106	(7.873)	4.237	(2.867)	8.869 (5.223)***	--
Landholding size (ha)	31.296	(136.543)	4.221	(5.297)	27.074 (8.524)***	--
Total number of employees	1.768	(3.152)	0.802	(1.475)	0.966 (0.217)***	--
Introducing new service (yes=1)	0.819	(0.386)	0.891	(0.313)	--	5.288**
Governance characteristics						
Having bank account (yes=1)	0.933	(0.250)	0.962	(0.194)	--	2.004
Board compensation (yes=1)	0.122	(0.328)	0.031	(0.174)	--	14.979***
Patronage dividend (yes=1)	0.654	(0.477)	0.529	(0.500)	--	8.173***
Annual general assembly (number)	2.425	(4.105)	6.140	(9.285)	-3.715 (0.636)***	--
Number of cooperative committees	4.756	(1.154)	4.292	(1.292)	0.464 (0.108)***	--
Audited (yes=1)	0.772	(0.421)	0.342	(0.475)	--	95.334***
Formation initiatives						
Member-initiated	0.598	(0.491)	0.533	(0.499)	--	2.221
Government-initiated	0.770	(0.484)	0.354	(0.479)	--	0.142
NGO-initiated	0.031	(0.175)	0.113	(0.317)	--	12.585***
External and heterogeneity						
Community services (yes=1)	0.284	(0.452)	0.177	(0.383)	--	8.116***
Perceived heterogeneity of goals (yes=1)	0.319	(0.467)	0.195	(0.397)	--	10.361***
Perceived heterogeneity of dividend taken (yes=1)	0.374	(0.485)	0.039	(0.194)	--	87.869***
Instrumental variables						
Lagged membership fee (ETB)	185.165	(2174.157)	56.685	(84.619)	128.481 (135.723)	--
Average board education (years)	5.668	(1.912)	5.904	(2.244)	-0.236 (0.185)	--
Membership policy (closed=1)	0.075	(0.264)	0.525	(0.500)	--	123.131***

Note : ** and *** denote level of significant at 5% and 1% for the t-test and chi-square test, respectively.

4.1.1. Comparison of cooperatives in outcome indicators

On average, 22% of the surveyed cooperatives reported that they had experienced fraud in recent years. In the survey, respondents were also asked to provide information about the types of fraud committed in their cooperatives, the total fraud loss, and the fraud perpetrators. Out of the 115 occupational fraud cases reported by chairs (Table 4), 55% occurred in large cooperatives. Three types of fraud were most common, namely cash embezzlement, asset misappropriation, and fraudulent financial statements. *Cash embezzlement* involved currency, checks, or stealing money from the cash vault or bank account, giving friends cooperative cash sales as loans, and repaying personal debts from cash receipts. *Asset misappropriation* involved

the theft or misuse of cooperative assets, such as theft of food items (e.g., sugar, cooking oil, milk, honey, fodder grasses), theft of property (e.g., office equipment, fuelwood, iron sheet), theft of farm inputs (e.g., beehives, motor pumps, fertilizer, improved seed). *Fraudulent financial statements* involved the use of falsification of records and documents, collecting cash payments using counterfeit receipts, inflated purchase receipts, and reimbursed unapproved travel and purchase requests. Cash embezzlement was the most frequently mentioned cooperative fraud, followed by asset misappropriation.

With regard to fraud, about 50% of the reported frauds were attributed to the board of directors (including chairs, vice-chairs, and cashiers). Employees conducted 24% of the frauds and members 13%; and 10% were listed as committed by an unknown group within the cooperative. There is also some evidence of a collusion form of fraud where two or more members jointly are responsible for fraud. In this respect, only 3% of cases of fraud were committed in collusion between the chair and cashier or chair and vice-chair. The total fraud costs claimed by the cooperatives in the survey amounted to 1.6 million ETB (58,680 USD) and was significantly higher among large cooperatives (79% of the total value of fraud).

Table 4
Occupational fraud type and total fraud losses by cooperatives

Cooperative size	Cash embezzlement (n)	Asset misappropriation (n)	Fraudulent statements (n)	Total (n)	Fraud loss in ETB
Large cooperatives	47	13	3	63	1,267,260
Small cooperatives	29	18	5	52	328,858
Total	76	31	8	115	1,596,118

Note: n refers to the number of fraud activities.

Table 5 presents the results of t-test and chi-square tests that compare the outcome indicators with the main variable of interest - cooperative size. Results show that the two groups have a statistically significant difference in membership size. There are also significant variations in the presence of conflict, fraud, and trust across the cooperatives. Large cooperatives experience the highest incidence of conflict and fraud, while small cooperatives have the highest level of distrust among members. In the next section, we will analyze the influence of cooperative size on conflict, fraud, and distrust, as well as identifying other determinants that affect these outcome variables.

Table 5
Outcome indicators by cooperative size

Cooperative size	Total cooperatives	Average membership	Number of cooperatives answers Yes		
			Conflict	Fraud	Distrust
Large cooperatives	254	16.574	125	81	159
Small cooperatives	257	739.126	94	34	178
Total /mean	511	375.729	219	115	337
t-test (L- S) mean (SE) = 723.552 (36.575)***			Chi-square = 8.330***	25.505***	2.525*

*, **, *** denote level of significant at 10%, 5% and 1% for the t-test and chi-square test, respectively.

4.2. Effects of membership size on conflict, fraud, and trust

We estimate the IV-Probit model using the maximum likelihood (ML) method. The results of both the Durbin-Wu-Hausman and Wald exogeneity tests confirm that membership size is endogenous for the three outcome variables considered; (D-W-H tests results are p= 0.008 for conflict, p=0.036 for fraud, and p=0.039 for distrust; and Wald tests result in p=0.001 for conflict, p=0.011 for fraud and p=0.031 for distrust). We tested the instrumental variables with the two identification restrictions. The Sargan statistics for the over-identification restriction is not significant (p= 0.517 for conflict, 0.876 for fraud and 0.192 for distrust) revealing that the instrumental variables used in the models are valid and are uncorrelated with the error term for the structural equation. The results of the Cragg-Donald Wald F-statistic for the three models is larger than the critical value for the Stock and Yogo (2005) weak identification test, which equals 22.30 for 10% maximal IV size for one endogenous variable and three instruments case, suggesting that the null hypothesis that the instruments are weak is rejected at p<0.005 level, so that our instruments are not considered weak.

Table 6
Effects of membership size and other determinants on the likelihood of cooperative experiencing conflict, fraud, and distrust

	Dependent variables		
Independent variables	**Conflict**	**Fraud**	**Distrust**
Membership size	0.0035 (0.0004)***	-0.0034 (0.0005)***	0.0038 (0.0002)***
Chair characteristics			
Duration of membership	0.0326 (0.0195)*	--0.0100 (0.0229)	0.0278 (0.0190)
Working experience	-0.0192 (0.0206)	-0.0252 (0.0269)	-0.0034 (0.0186)
Days worked	-0.0020 (0.0009)**	0.0012 (0.0007)	-0.0012 (0.0007)*
Training	-0.4392 (0.2175)**	0.2680 (0.2940)	-0.5263 (0.2175)**
Institutional characteristics			
Age of cooperative	-0.0574 (0.0224)**	0.0648 (0.0196)***	-0.0623 (0.0199)***
Landholding size	-0.0001 (0.0016)	-0.0003 (0.0015)	0.0001 (0.0015)
Total employees	-0.0294 (0.0454)**	0.0895 (0.0311)***	-0.0762 (0.0334)**
Introducing new service	0.1990 (0.2211)	0.2304 (0.1950)	-0.1059 (0.1489)
Governance characteristics			
Having bank account	0.4469 (0.2746)	-0.5729 (0.3135)*	0.4330 (0.2721)
Board compensations	-0.4594 (0.2464)*	0.1556 (0.2442)	-0.3019 (0.2338)
Patronage dividend	0.2308 (0.1074)**	-0.3506 (0.1212)***	0.2474 (0.1024)**
ln(yearly general assembly)	-0.0572 (0.0571)	-0.0003 (0.0566)	0.0008 (0.0404)
External link and heterogeneity			
Community services	-0.1188 (0.1699)	0.2858 (0.1444)**	-0.2553 (0.1403)*
Heterogeneity goal	0.6769 (0.2285)***	0.8706 (0.1856)***	-0.8001 (0.1903)***
Location (zone dummies)[a]			
Central	0.2530 (0.1344)*	-0.3220 (0.1574)**	0.2891 (0.1301)**
SSE	-0.4390 (0.1511)***	0.1915 (0.1764)	-0.3625 (0.1325)***
WNW	0.3587 (0.1275)***	-0.2178 (0.1552)	0.3530 (0.1140)***
Cooperative type (dummies)[b]			
Livestock cooperatives	2.2744 (0.3955)***	2.4946 (0.3360)***	2.5764 (0.2652)***
Natural resource cooperatives	2.4224 (0.3287)***	-2.4357 (0.3623)***	2.6321 (0.2364)***
Formation initiative (dummies)[c]			
Government-initiated	0.1799 (0.1070)*	-0.0817 (0.1268)	0.1243 (0.1120)
NGOs-initiated	0.3641 (0.1408)***	-0.2722 (0.1904)	0.2763 (0.1278)**
Constant	-2.5752 (0.5009***	2.1011 (0.6769)***	-2.4076 (0.4993)***
Diagnostic statistics			
Wald chi2	365.57	275.83	441.33
Prob.> chi2	0.000	0.000	0.000
Log likelihood	-3769.479	-3702.1958	-3758.95
Wald test of exogeneity chi2	6.55	6.41	4.63
Prob.> chi2	0.001	0.011	0.031
Number of cooperatives	497	497	497
Test of endogeneity of membership size variable			
Wu-Hausman F-test statistic	5.612***	3.545**	2.740**

Tests for the validity of the instruments			
Weak identification test Cragg-Donnaled Wald F-statistic	24.568	27.156	24.876
Overidentification test Sargan Statistic	1.643	0.230	3.765

Notes: Figures in the table indicate the estimated coefficients and Robust standard errors in parentheses. ***, **, ***** denote level of significance at 10%, 5% and 1% , respectively. [a]denotes the Eastern zone as a base category; [b]Multipurpose cooperatives is a base category; and [c]Self-initiated is a base category.

4.2.1. Effects of membership size on conflict

Membership size is positively correlated with the likelihood that a cooperative experiences conflict (Table 6). As mentioned above, conflicts may occur between members and the board of directors, members and employees, or directors and employees. There are several reasons for conflict in large cooperatives. First, large cooperatives can restrict annual dividend payments due to small amounts of money and treat the actual dividend as accrual dividends that members will get reimbursed only in years to come. Yet, members expect a dividend annually, and such differences in interest may lead to conflicts between members and directors. These findings are also supported by chi2-test results (Table 3) that members of large cooperatives are heterogeneous in dividends taken, suggesting that most members did not receive dividends compared to members of small cooperatives, where most of them received a dividend; this difference is statistically significant (Chi2= 87.87; p=0.001). The finding is consistent with Mojtahed (2007), who concluded that dividends are the main conflict issue for cooperatives. Second, cooperatives in the study area have often been initiated either by the Government or NGOs. Members lack the necessary knowledge and awareness of cooperative laws and regulations. This issue is particularly prominent in large cooperatives, where the absence of training and education can be the cause of conflict. Third, the larger the size of the cooperative, the higher is the risk of heterogeneity of interests among its members. This makes it difficult for large cooperatives to address the needs and problems of members on a one-to-one, personal and informal basis, which in turn leads to disagreement and conflict. Fourthly, participation in general assembly meetings may be lower in large cooperatives because of the sheer number of members (e.g., some multipurpose have 2,550 members). Some members may not even be informed about the meetings. As a result, the cooperative is forced to conduct meetings with a quorum and then has to implement the approved agenda of the general assembly, including penalties for failure to repay loans on the due date. Such practices often lead to conflicts between members and directors. Fifth, the inability of members to repay credit on time is also an often mentioned cause of conflict, particularly in large cooperatives, as it serves many members. Moreover, the loan repayment schedule is not respected by many, making it difficult for the cooperative to have sufficient loanable funds. Some members even refuse to repay the loan because they consider it as a charity and not as an obligation. During the field visits, we heard that some of these conflicts are taken to court. Finally, a large cooperative size induces heterogeneity and bureaucracy, as it is difficult to monitor whether members receive services (such as credit and training), understand their service needs and any specific issues they may have. All in all, in large cooperatives, such features are likely to lead to escalating conflicts.

4.2.2. Effects of membership size on fraud

Estimation results in Table 6 show that membership size is negatively correlated to the likelihood of a cooperative experiencing fraud. Larger cooperatives are more likely to have elected committee members that have task division and accounting skills within their membership; these members may record financial transactions and prepare periodic reports which prevent fraud from occurring. Second, large cooperatives tend to have more internal control, supervision or internal audit functions to reduce fraud risk. Third, large cooperatives are more likely to be audited due to pressure from their large membership for distribution of dividends. The t-test and chi2 results also support the claim that more large cooperatives are audited (*chi2*= 95.33; *p*=0.001) and have more elected committees, such as audit and control committees (0.464; p=0.001) which, in turn, serve to avoid fraud. This result is consistent with the findings of Holtfreter (2008) according to whom fraud decreased significantly as the size of the non-profit organization increased. The Association of Certified Fraud Examiners (ACFE, 2014), on the other hand, point to the different risks of fraud that small organizations face compared to large organizations.

4.2.3. Effects of membership size on trust

The results in Table 6 reveal that membership size is positively related to distrust, indicating that a larger cooperative size tends to increase distrust among members. Larger cooperatives are more likely to experience heterogeneity, as each new member can add diversity on one or more dimensions. Second, distrust may be higher in larger cooperatives because members are less likely to know each other well and have no social relationships that reinforce the spirit of cooperation and mutual support. Soboroff (2012) and Poteete and Ostrom (2004) also found that large group size is associated with lower trust between members. Stolle (1998) did not find evidence that group size affected trust among members.

4.3. Other determinants of conflict, fraud, and distrust in agricultural cooperatives

4.3.1. Chair characteristics

The number of days worked in a cooperative is negatively associated with the likelihood of experiencing conflict and has a positive effect on trust. It is, however, insignificantly correlated to the likelihood of experiencing fraud. Hence, the availability of the chair seems key to reducing the likelihood of conflict and will induce trust; a finding consistent with Stephonson (2001). The fact that the chair undertook training has a negative effect on the likelihood of experiencing conflict and is positively related to the likelihood of trust; the latter was also found by Liang, Huang, Lu, and Wang (2015). Training improves leadership quality and helps chairs to effectively manage their organization, including handling of conflict and building trust among members. The duration of membership is negatively associated with conflict. This implies that the longer the membership of the cooperative, the lower the likelihood of conflict.

4.3.2. Structural characteristics

The age of the cooperative is positively and significantly associated with the likelihood of trust among members and fraud incidence, suggesting that older cooperatives are more prone to experience fraud and trust, which was also found by Tadesse and Kassie (2017). The cooperative lifecycle theory predicts that the relationship between trust and age is n-shaped (Cook, 1995). In the early stages of cooperative formation, trust is likely be low, but trust increases as it gets older and starts declining after reaching a peak. Older cooperatives

experience a lower likelihood of experiencing conflict. This may be due to the above-mentioned trust or to more experience with conflict management and regulations.

Established cooperatives are more susceptible to fraud because of their poor internal control systems to prevent fraud. These findings contradict those reported by Greenlee, Fischer, Gordon, and Keating (2007), who find no significant relationship between fraud and the age of a non-profit organization.

Contrary to our expectations, the number of full-time employees a cooperative has is positively related to the likelihood of experiencing conflict and negatively related to the experience of distrust. While we have not collected evidence in the cooperatives visited, employees may perform their duties poorly and may not behave properly with members at work. This is in line with Mojtahed (2007) conclusion that employees' inefficiency and incompetence are the cause of member-employee conflict. The number of employees is positively correlated with fraud. Cooperatives may fail to provide the necessary opportunities and incentives for a larger number of employees. This may tempt the employees to engage in fraud. Greenlee et al. (2007) found no significant relationship between the number of employees in an organization and fraud.

4.3.3 Governance characteristics

Having a bank account seems to reduce the likelihood of fraud. A bank account protects and guarantees the use of funds and reduces opportunities for misuse. The fact that board members are compensated is negatively related to conflict. Hence, providing directors with cash compensation reduces conflict within the cooperative. Patronage dividends are positively correlated with fraud and trust. This suggests that cooperatives seem to have a lower likelihood of fraud when allocated dividends are in proportion to members' economic transactions, while in the latter case, members' distrust increased.

In addition, the patronage dividend significantly influences the likelihood of conflict. This may be explained by members with a large share of capital in the cooperative who may claim that the dividend distribution should be based on the number of shares members own rather than on the volume of transactions. Such disagreements often lead to conflict. This is consistent with the findings of Hansmann (1988) that conflicts occurred as a result of different relationships between members' capital investments and their level of patronage.

4.3.4. External relationships and heterogeneity

We find a positive relationship between cooperative involvement in community service and fraud and trust, but conflict is not influenced significantly. This suggests that the involvement of cooperatives in providing the community with public goods increased their likelihood of experiencing fraud, which may indicate that some of the community service budgets are lost through fraud. Similarly, Bernard, De Janvry, and Sadoulet (2010) point to the benefit of providing public-good services to cooperatives in order to ensure acceptance in their community. Furthermore, members may differ in terms of cooperative goals.

The likelihood of conflict and fraud is the coefficient of heterogeneity of goals and is highly significant. This means that cooperatives with perceived heterogeneity of member goals (e.g., profit- versus service-oriented) are more likely to experience conflict and fraud.

4.3.5. Cooperative type and location

The results also reveal that location, type of cooperative, and their formation initiative can be significant in explaining the difference in cooperatives' behavior. Specifically, central and WNW cooperatives appear to be more affected by conflict; and results suggest that cooperatives in central and WNW have a higher level of distrust among members. As far as cooperative type is concerned, LVCs and NRCs tend to be more prone to conflict, while LVCs and MPCs (base category) are more susceptible to the risk of fraud, and members of LVCs and NRCs distrust each other. With regards to formation initiative, cooperatives initiated by the government and NGOs are more likely to experience conflict and distrust among members than self-initiated cooperatives.

5. Conclusions

This study presents unique results at the cooperative level on whether membership size affects social behavior in agricultural cooperatives in Ethiopia. Agriculture is the backbone of Ethiopia's economy, and agricultural cooperatives play a significant role in achieving poverty reduction, food security, and development. However, cooperatives' success or failure depends largely on how successful they are at maintaining their social capital.

Our findings are very close to the theoretical basis of cooperatives as a social entity. We find that membership size matters for the social performance of cooperatives in terms of trust and the likelihood of experiencing conflict and fraud. Our results suggest that cooperatives with larger memberships are more prone to experiencing conflict. This may include conflicts between members and boards of directors, members and employees, or boards of directors and employees. The sources of the conflict in large cooperatives can range from a delay in dividend payment, a lack of awareness of cooperative laws and regulations, and a failure to repay credit on time. Moreover, members in larger cooperatives are found to be profoundly distrusted.

Conversely, what is interesting is that, beyond our expectations, we found a negative relationship between membership size and the likelihood of fraud. One possible explanation is that larger cooperatives are less prone to fraud because they have the opportunity to allocate members with knowledge in financial management to different levels of the cooperative, such as within control and audit committees, to ensure that cooperative funds are properly maintained and utilized. However, in large cooperatives, internal control or internal audit functions may not help to reduce distrust.

We propose the following policy suggestions, based on our findings, to enhance the role of cooperatives in transforming smallholder agriculture in Ethiopia. Certain requirements need to be observed by members to be able to achieve their objectives. One of these requirements is the minimum membership size. The size should be determined not only to achieve economies of scale but also to address social relationships. Regulations should, therefore, set a limit for the maximum membership that would be sufficient to guarantee the sustainability of the cooperative for both economic and social objectives. An appropriate internal control system should be established to safeguard against misuse of cooperative funds. Cooperative management should create efficient internal controls, such as task segregation and audit and control committees. Such efforts allow cooperatives to provide members with the desired services to increase their income and improve their livelihoods. Finally, all the required efforts must be made by the Regional Cooperative Promotion Agency to increase the awareness and knowledge of employees, boards of directors and members in order to properly implement the

regulations and build their capacity to reduce conflict and fraud and to resolve conflicts by undertaking educational workshops on conflict management and resolution.

Limitations of study and suggestions for future research

The Tigray region is expected to represent northern Ethiopia's circumstances. We have demonstrated a relationship between membership size and the occurrence of conflict, fraud, and distrust in complex organizations such as agricultural cooperatives. However, our study has several limitations. First, our research is based on a cross-sectional analysis that does not allow us to understand the effect of change in the relationship between membership size and social behavior. Second, in our study, all the outcome variables are derived from self-assessment by the chair (or vice-chair) elected to lead the cooperatives. This suggests potential biases, because these measures are subjective and affected by the respondents' psychological state. They may vary over time with cooperative relationships and may not be revealed quickly. Finally, our research does not use member-level survey data to triangulate information, and the results would be higher or lower with the inclusion of such information. Consequently, the links between membership size and conflicts, fraud, and distrust are harder to generalize with other agricultural cooperatives.

This study has generated several avenues for future research. First, given that our research was based on cross-sectional data focuses on the cooperative level, a complete picture of the relationship between membership size and behavior at the cooperative and member level using a panel survey data would be of interest for further study. Secondly, our findings are based on core agricultural cooperatives, so the inclusion of urban cooperatives such as savings and credit and consumer cooperatives in future research is advisable. Finally, future studies should also look at the links between membership size, commitment, and free-riding in agricultural cooperatives.

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Appendix

Table A1
Probit model and models for checking the robustness of the conflict model

Independent variables	Probit Model	IV-Probit: Robustness checks	
		Model 1	Model 2
Membership size	-0.0001 (0.0161)	0.0035 (0.0004)***	0.0035 (0.0004)***
Chair characteristics			
Duration of membership	0.0195 (0.0177)	0.0329 (0.0195)*	0.0272 (0.0183)
Working experience	-0.0433 (0.0239)*	-0.0197 (0.0204)	--
Days worked	-0.0019 (0.0010)*	-0.0019 (0.0009)**	-0.0019 (0.0009)**
Training	0.0358 (0.2960)	-0.4365 (0.2209)**	-0.4878 (0.2083)**
Institutional characteristics			
Age of cooperative	0.0026 (0.0161)	-0.0574 (0.0224)**	-0.0556 (0.0213)***
Landholding size	-0.0006 (0.0006)	-0.0001 (0.0016)	--
Total employees	0.1203 (0.0353)***	0.0335 (0.0446)**	-0.0345 (0.0448)**
Introducing new service	0.7759 (0.2118)***	0.1980 (0.2186)	--
Governance characteristics			
Having bank account	0.1108 (0.2688)	0.4100 (0.2698)	0.4018 (0.2724)
Board compensations	-0.4969 (0.2359)**	-0.4315 (0.2478)*	-0.4502 (0.2455)*
Patronage dividend	0.0252 (0.1373)	0.1771 (0.1027)*	0.2512 (0.1057)**
ln(yearly general assembly)	-0.1423 (0.0845)	-0.0668 (0.0568)	-0.0488 (0.0529)
External link and heterogeneity			
Community services	0.2994 (0.1463)**	-0.1043 (0.1671)	-0.1049 (0.1711)
Heterogeneity goal	0.1620 (0.1834)	-0.6594 (0.2249)***	-0.6771 (0.2273)***
Location-zone[a]			
Central	-0.0649 (0.1802)	0.2326 (0.1352)*	0.2416 (0.1283)*
SSE	-0.2499 (0.1796)	-0.4455 (0.1499)***	-0.4744 (0.1587)***
WNW	0.0771 (0.1760)	0.3214 (0.1269)**	0.3538 (0.1283)***
Cooperative type[b]			
Livestock cooperatives	-0.3507 (0.2656)	2.3178 (0.3918)***	2.3078 (0.3699)***
Natural resource cooperatives	-0.0673 (0.2656)	2.4276 (0.3292)***	2.4280 (0.3164)***
Formation initiative[c]			
Government-initiated	0.1399 (0.1377)	--	0.1729 (0.1026)*
NGOs-initiated	0.2606 (0.2551)	--	0.3361 (0.1349)**
Constant	-0.7665 (0.5243)	-2.4111 (0.5002)***	-2.3833 (0.5417)***
Diagnostic statistics:			
Pseudo R2	0.133	--	--
Wald chi2	78.31	356.99	310.90
Prob.> chi2	0.000	0.000	0.000
Log likelihood	-294.469	-3772.027	-3794.647
Wald test of exogeneity chi2	--	6.75	6.89
Prob.> chi2	--	0.009	0.008
Number of cooperatives	497	497	499

Model-1 without formation-initiative dummies; Model 2- excluding three insignificant variables.

Table A2
Probit model and models for checking the robustness of the fraud model

Independent variables	Probit Model	IV-Probit: Robustness checks	
		Model 1	Model 2
Membership size	-0.0002 (0.0002)	-0.0034 (0.0005)***	-0.0033 (0.0007)***
Chair characteristics			
Duration of membership	0.0340 (0.0177)*	-0.0103 (0.0233)	-0.0123 (0.0210)
Working experience	-0.0668 (0.0283)**	-0.0250 (0.0276)	--
Days worked	-0.0001 (0.0011)	0.0011 (0.0007)	0.0011 (0.0008)*
Training	-0.3651 (0.3226)	0.2702 (0.2954)	0.1442 (0.3486)
Institutional characteristics			
Age of cooperative	0.0188 (0.0165)	0.0652 (0.0197)***	0.0621 (0.0195)***
Landholding size	-0.0005 (0.0006)	-0.0003 (0.0015)	--
Total employees	0.0475 (0.0322)	0.0909 (0.0304)***	0.0887 (0.0324)***
Introducing new service	0.3294 (0.2277)	0.2328 (0.1955)	--
Governance characteristics			

Having bank account	-0.4029 (0.3050)	-0.5454 (0.3100)*	-0.4836 (0.3017)
Board compensations	-0.2779 (0.2412)	0.1472 (0.2397)	0.1377 (0.2542)
Patronage dividend	-0.3172 (0.1583)**	-0.3234 (0.1186)***	- 0.3388 (0.1260)***
ln(yearly general assembly)	-0.0145 (0.0962)	0.0066 (0.0562)	-0.0011 (0.0619)
External link and heterogeneity			
Community services	0.1682 (0.1598)	0.2765 (0.1450)*	0.3018 (0.1431)**
Heterogeneity goal	0.3775 (0.1962)*	0.8626 (0.1840)***	0.8477 (0.1937)***
Location-zone[a]			
Central	-0.1225 (0.2039)	-0.3119 (0.1607)*	-0.2854 (0.1595)*
SSE	-0.3443 (0.2142)	0.2015 (0.1770)	0.1307 (0.2060)
WNW	0.2153 (0.1919)	-0.1909 (0.1539)	-0.1596 (0.1772)
Cooperative type[b]			
Livestock cooperatives	-0.4232 (0.2851)	-2.5273 (0.3387)***	-2.4492 (0.4215)***
Natural resource cooperatives	-0.1969 (0.2864)	-2.4423 (0.3678)***	-2.3927 (0.4580)***
Formation initiative[c]			
Government-initiated	0.1084 (0.1534)	--	-0.0515 (0.1368)
NGOs-initiated	-0.0146 (0.3138)	--	-0.2925 (0.2063)
Constant	-0.2393 (0.5879)	2.006 (0.6620)***	2.1062 (0.7526)***
Diagnostic statistics			
Pseudo R2	0.152	--	--
Wald chi2	78.64	278.15	209.03
Prob.> chi2	0.000	0.000	0.000
Log likelihood	-224.961	-3704.287	-3722.908
Wald test of exogeneity chi2	--	6.11	4.08
Prob.> chi2	--	0.013	0.043
Number of cooperatives	497	497	499

Model-1 without formation-initiative dummies; Model 2- excluding three insignificant variables in fraud

Table A3

Probit model and models for checking the robustness of the distrust model

Independent variables	Probit Model	IV-Probit: Robustness checks	
		Model 1	Model 2
Membership size	0.0001 (0.0002)	0.0037 (0.0002)***	0.0034 (0.0005)***
Chair characteristics			
Duration of membership	-0.0001 (0.0163)	0.0281 (0.0191)	0.0226 (0.0180)
Working experience	0.0252 (0.0251)	-0.0041 (0.0186)	--
Days worked	0.0034 (0.0013)***	-0.0013 (0.0007)*	-0.0021 (0.0008)**
Training	-1.1393 (0.4079)***	-0.5118 (0.2079)**	-0.4621 (0.2164)**
Institutional characteristics			
Age of cooperative	0.0117 (0.0152)	0.0625 (0.0201)***	0.0568 (0.0199)***
Landholding size	0.0006 (0.0005)	0.0001 (0.0015)	--
Total employees	0.0047 (0.0310)	-0.0788 (0.0327)**	-0.0934 (0.0291)***
Introducing new service	-0.3495 (0.1977)*	0.1026 (0.1463)	--
Governance characteristics			
Having bank account	-0.1489 (0.2999)	0.4076 (0.2704)	0.3546 (0.3019)
Board compensations	0.0444 (0.2331)	-0.2848 (0.2330)	-0.2156 (0.2339)
Patronage dividend	0.2959 (0.1386)**	0.2049 (0.0962)**	- 0.3388 (0.1260)**
ln(yearly general assembly)	0.1987 (0.0918)**	-0.0089 (0.0377)	-0.0018 (0.0609)
External link and heterogeneity			
Community services	-0.4118 (0.1496)***	0.2377 (0.1375)*	0.2234 (0.1406)*
Heterogeneity goal	-0.4623 (0.1827)**	0.7826 (0.1878)***	0.6893 (0.2265)***
Location-zone[a]			
Central	-0.1469 (0.1828)	0.2754 (0.1320)**	0.2833 (0.1623)*
SSE	0.1959 (0.1789)	-0.3720 (0.1316)***	0.3793 (0.1303)***
WNW	-0.0712 (0.1834)	-0.3255 (0.1130)***	-0.3327 (0.1211)***
Cooperative type[b]			
Livestock cooperatives	0.1950 (0.2647)	2.6072 (0.2678)***	2.1362 (0.4919)***
Natural resource cooperatives	0.2648 (0.2668)	2.6343 (0.2407)***	-2.367 (0.2502)***
Formation-initiative[c]			
Government-initiated	-0.4337 (0.1363)***	--	0.1931 (0.1116)*
NGOs-initiated	-0.3904 (0.2485)	--	0.3076 (0.1410)**
Constant	1.3619 (0.6027)**	-2.3031 (0.4859)***	-1.5818 (0.9142)***
Diagnostic statistics			

Pseudo R2	0.122	--	--
Wald chi2	75.01	405.94	300.10
Prob.> chi2	0.000	0.000	0.000
Log likelihood	-279.852	-3765.558	-3754.880
Wald test of exogeneity chi2	--	16.12	4.90
Prob.> chi2	--	0.000	0.026
Number of cooperatives	497	497	499

Model-1 without formation-initiative dummies; Model 2- excluding three insignificant variables