Cooperative Networks:
Altruism, Group Solidarity, Reciprocity, and Sanctioning
in Ugandan Producer Organizations*

Delia Baldassarri
Department of Sociology
New York University

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Abstract
Repeated interaction and social networks are commonly considered viable solutions to collective action problems. Although previous scholarship has identified few mechanisms that may facilitate cooperation among interconnected actors, these mechanisms are rarely compared with each other, or tested across diverse settings. This paper identifies and systematically measures four general mechanisms, i.e., generalized altruism, group solidarity, reciprocity, and the threat of sanctioning, and tests which of them brings about cooperation in the context of Ugandan producer organizations. Using an innovative methodological framework that combines “lab-in-the-field” experiments with survey interviews and complete social networks data, the paper goes beyond the assessment of a relationship between social networks and collective outcomes to study the mechanisms that favor cooperative behavior. The paper first establishes a positive relationship between position in the network structure and propensity to cooperate in the producer organization, and then uses farmers’ behavior in dictator and public goods games to test different mechanisms that may account for such relationship. Results show that cooperation is not induced by other-regarding preferences like altruism or group solidarity. Rather, repeated interaction favors the development of mechanisms of reciprocity.

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Introduction

Repeated interaction and social networks are commonly considered viable solutions to collective action problems (Diani and McAdam, 2003; Gould, 1993; Kim and Bearman, 1997; Marwell and Oliver, 1993). In a related vein, many studies of social capital assume that social networks and associational life are beneficial to the collectivity (Coleman, 1990; Lin, 2002; Lin et al., 2001; Portes, 1998; Putnam, 2000). However, assessing the relationship between social networks and pro-social behavior is not sufficient in order to determine the building blocks of cooperation. If one wants to understand how cooperation emerges in a specific social setting, it is important to focus on how patterns of social relations affect actors’ motives and their expectations about others’ behavior. In other words, we need to go beyond the observation that patterns of social relations matter for cooperation, to study the mechanisms through which social relations may enhance collective outcomes.

Scholars have advanced different theories. On the one hand, there are interest-based explanations according to which repeated interactions set the basis for reciprocity and mutual sanctioning – repeated interaction makes it convenient for individuals to cooperate because long-term gains will off-set the benefit of one-shot free-riding. On the other, there are other-regarding explanations based on altruism, group solidarity, and norms of fairness (Axelrod, 1984; Fehr and Gächter, 2002; Gambetta, 1988; Nowak and Sigmund, 2005; Ostrom, 2000). However, both in the literature on collective action and that on social capital, these mechanisms are rarely compared with each other, or tested across diverse settings (Cook et al., 2009). In this paper I identify and systematically measure four general mechanisms, i.e., generalized altruism, group solidarity, reciprocity, and the threat of sanctioning.

The theoretical contribution of this paper is threefold. First, it organizes the vast, multidis-
ciplinary literature on decentralized solutions to collective action problems into four distinctive mechanisms, and discusses their scope conditions. Second, it articulates the different ways in which social networks are implicated in each of the four mechanisms, thus contributing to our general understanding of the role of social networks in bringing about cooperation in small groups. Third, it connects the literature on collective action and social capital to some recent developments in behavioral economics, providing a blueprint for research design in this area.

I test the four alternative mechanisms in a context uniquely suited to this goal: Ugandan farmer cooperatives that face collective action problems on a regular basis. These producer organizations were created as part of the Uganda’s largest recent rural development intervention, whose goal was to support small farmers integration into commercial farming by exploiting economies of scale and improving their productivity and management skills. By adopting an innovative methodological framework that combines “lab-in-the-field” experiments with survey interviews and complete social networks data, this paper goes beyond the assessment of a relationship between social networks and collective outcomes to study the mechanisms that undergird cooperative behavior. To achieve this goal, I took behavioral games, typically conducted in a laboratory environment, to the field. Members of farmer cooperatives participated in different variants of the dictator game (DG) and public goods game (PGG), providing reliable behavioral measures of their other-regarding preferences and cooperative capacity.

The paper unfolds as follows. First, relying on detailed social network information, I assess the relationship between social network position and collective outcomes, showing that farmers with greater network centrality and non-redundant social ties are more cooperative and participate more to the life of their producer organization. Second, I use lab-in-the-field experiments to distinguish between different mechanisms, such as generalized altruism, group solidarity, reciprocity, and threat of sanctioning. This experimental component of the research makes it possible to establish the causal effect of group attachment on pro-social behavior, and the causal effects that repeated interaction and the threat of sanctioning both have on cooperation.

Performing laboratory experiments in a field setting with members of pre-existing groups does
not only increase the external and ecological validity of the findings; more importantly, it makes it possible to relate experimental behavior to ‘real life’, observational behavior. Namely, in the third part of the analysis I relate farmers’ behavior in behavioral games to their level of cooperation in the producer organization in order to identify which mechanisms are more likely to account for the relationship between social networks and cooperation. In this framework, the experimental intervention is therefore used as a ‘petri dish’ to isolate the mechanisms that are likely to be at work in ‘real life’. Results show that, in the context of the farmer organizations object of this study, cooperation is not induced by other-regarding mechanisms such as generalized altruism or group solidarity. Rather, it is the mechanism of reciprocity that emerges through sustained interaction that facilitates cooperation among local producers.

**Cooperation from First Principles**

Public goods provision is usually framed as a problem of cooperation between self-interested actors: in a context in which public goods are non-excludable, rational, self-interested actors would rather free-ride on others’ contribution than cooperate (Olson, 1965). The success of this analytical framework is due to its capacity to capture the tension between individual and collective interest – “the disparity between individual optimization and collective optimality” (Coleman, 1989, p. 5) –, and therefore reveal the social dilemma that limits the occurrence of many instances of collective action.\(^1\) However, even supporters of rational choice approach(es) have conceded that we see more cooperation than expected under the assumption of selfish actors (Elster, 2007; Fehr and Gintis, 2007; Kronenberg and Kalter, 2012; Opp, 1999), and, over the years, the debate on the problem of collective action has expanded to include aspects that transcend its original formulation (Baldassarri, 2009; Gould, 1993; Heckathorn, 1996; Marwell and Oliver, 1993; Ostrom, 1998). Various solutions have been advanced to explain how individuals could possibly overcome collective action problems. Here, I organize them along two analytical dimensions: (a) the motives actors have

\(^1\)A social dilemma is “a situation in which actions that are individually rational can lead to outcomes that are collectively irrational” (Heckathorn, 1996, p. 250).
for cooperation, and (b) the beliefs actors hold about others’ behavior. In general, the mechanisms here identified should not be simply considered as cognitive or motivational, because they are also affected by actors’ expectations about other actors, and by their definition of the situation (cfr. Ostrom’s concept of ‘action situation’ (2010)). Moreover, they should also be conceived as orientations that develop as a consequence of group membership, repeated interaction, etc. instead of being conceived as enduring qualities of the person.

Motives. Scholars have ranged the entire spectrum from selfish to altruistic behavior in discussing the motives actors have for cooperation. Without necessarily abandoning the assumption of self-interested actors, scholars have advanced solutions to the collective action problem based on selective incentives (Olson, 1965), as well as population heterogeneity and the shape of the production function (Marwell and Oliver, 1993). On the opposite side of the motivation spectrum, there are arguments and empirical evidence supporting the altruistic, prosocial nature of human behavior (Fehr and Gächter, 2002; Fehr and Gintis, 2007; Gintis et al., 2005; Henrich et al., 2006; Ostrom, 2000). Finally, evolutionary models have often relied on the heterogeneity of social preferences, arguing that cooperation in society may be due to a balance between egoistic and altruistic types (Fehr and Gintis, 2007; Ostrom, 2000).

In between purely selfish and purely altruistic alternatives, there are intermediate solutions based on the idea that individuals do not act solely on the basis of selfish motivations but tend to include other-regarding preferences in their cost-benefit calculation, to reflect their level of inequity aversion (Barr et al., 2009b; Fehr and Schmidt, 1999), or their attachment toward kin, social groups, or members of their social networks (Chen and Li, 2009; Gould, 1993; Kim and Bearman, 1997). Social life is in fact regulated by norms of fairness that constrain selfish behavior (Baldassarri and Grossman, 2013; Coleman, 1988; Durkheim, 1984 [1893]; Elster, 1989; Henrich et al., 2004; Ohtsuki et al., 2006; Ostrom, 1990). Recent studies have demonstrated that generosity increases as the social distance between ego and alter diminishes. Individuals are most generous toward people they are directly connected to, and exhibit greater prosocial behavior toward people who are a few steps removed in their social network (e.g., friends of friends) than toward
more distant others (Apicella et al., 2012; Brañas-Garza et al., 2010; Goeree et al., 2010; Leider et al., 2009). More generally, individuals are more generous toward in-group than out-group members. In-group favoritism has been observed not only in field-settings where group membership is based on ascribed categories, such as, for instance, ethnicity (Habyarimana et al., 2007; Whitt and Wilson, 2007) and religion (Adida et al., 2010), but also in cases where group membership was randomly assigned (Goette et al., 2006), and even in laboratory settings where scholars induced ‘minimal’ or trivial group identities (Bohnet and Frey, 1999; Chen and Li, 2009; Tajfel and Turner, 1979).²

In this research I consider two types of motives that deviate from selfish behavior: generalized altruism, which identifies pro-social behavior toward unidentified ‘others’, and group solidarity, which identifies pro-social behavior toward members of one’s social group.

Expectations. The second relevant dimension in the analysis of collective action dilemmas concerns the expectations actors hold about others. Under certain conditions, cooperation can emerge even among self-interested actors. And, on the contrary, “even if people’s motives are not unquestioningly egoistic, cooperation might still encounter many obstacles” (Gambetta, 1988, p 216). For instance, in the classic Prisoner’s Dilemma situation, the expectation that the other actor would defect, might actually induce a potentially cooperative actor to defect as well. “The problem, therefore, is essentially one of communication: even if people have perfectly adequate motives for cooperation they still need to know about each other’s motives and to trust each other, or at least the effectiveness of their motives. It is necessary not only to trust others before acting cooperatively, but also to believe that one is trusted by others” (Gambetta, 1988, p. 216).

Almost all formal models of collective action subsequent to Olson’s seminal work included some form of interdependence between actors. Interdependence, in most conditions, reduces the

²Analytically, it is important to note that in-group favoritism can be brought about by two distinct, although interdependent, processes: social proximity, which is related to the frequency of interaction and the nature of the relationship between actors, and group-attachment, which derives from the strength of one’s identification with a group (Baldassarri and Grossman, 2013). Though both social proximity and group attachment may lead to in-group favoritism, proximity is based on particularized past experiences, while group attachment derives from a process of categorization in which individuals generalize their interpersonal experiences to a broader class of alters and relate to others even in the absence of a personal relationship (Tajfel and Turner, 1979).
uncertainty ego faces about alter’s behavior, thus making it easier to establish whether alter will cooperate or not, as well as to persuade alter of ego’s cooperative intentions. Repeated interaction represents the simplest form of interdependence and can in itself foster cooperative behavior by allowing reciprocity to evolve, as demonstrated by Axelrod’s *The evolution of cooperation* (1984) via a two-person iterated prisoner dilemma (i.e., Rapoport’s tit for tat strategy). While in a one-shot interaction individuals might benefit from selfish behavior, in repeated interaction defection might no longer be the best strategy for a self-regarding actor, because his defection might lead to alter’s defection in future interactions. The successful strategy in the longer run is to elicit cooperation from the other actor.

Mechanisms of direct (A → B, B → A) and indirect (A → B, B → C) reciprocity predicated on the same logic have acquired a central role in evolutionary biology in recent years as they are often used to explain altruistic behavior toward non-kin and the evolution of cooperation in relatively large social groups (Nowak, 2006; Nowak and Sigmund, 2005; Trivers, 1971). Similarly, social exchange theorists have highlighted the consequences of reciprocal and generalized exchange on collective outcomes (Bearman, 1997; Molm, 2010; Yamagishi and Cook, 1993). It should be noticed that reciprocity, as conceived here, does not necessarily require actors to carry other-regarding preferences. Indeed, in the context of repeated interaction, reciprocity might constitute the most effective behavior even for a fully selfish actor.

Mechanisms of direct and indirect reciprocity may emerge through contact between actors, since communication could enable individuals to coordinate, persuade, pre-commit, and signal trustworthiness. Although verbal commitment is not binding, in certain instances communication has been shown to be sufficient to trigger cooperation, by affecting the beliefs actors have about each other’s behavior (Ostrom et al., 1992). Formal models of collective action that incorporate a network structure (Gould, 1993; Kim and Bearman, 1997; Marwell and Oliver, 1993) as well as threshold models and cascades (Chwe, 1999; Granovetter, 1978; Macy, 1991; Schelling, 1978; Watts and Dodds, 2007) often rely on this mechanism.

However, as forcefully argued by rational choice theory scholars, communication is not binding
and can actually be deceptive – it is “cheap talk” –, and thus may not necessarily affect actors’ behavior, or lead to Pareto-efficient outcomes (Farrell and Rabin, 1996). Monetary and social sanctioning is often considered to be a more effective mechanism to foster cooperation in a context of repeated interaction (Fehr and Gächter, 2002; Sigmund, 2007). The threat of a fine, or loss of reputation, or exclusion from the group serves as a deterrent from free-riding because they change individuals pay-off function, increasing the cost of defection (Heckathorn, 1990, 1993; Obershall, 1973; Willer, 2009). Moreover, the presence of a sanctioning system also serves as a reassurance for potential cooperators that defection would not go unpunished, and strengthen people’s beliefs that others would cooperate. Coercion is a way “to circumscribe the extent to which we need to trust agents or cope with them in case of distrust” (Gambetta, 1988, p. 220).

In addition to generalized altruism and group solidarity, in this research I consider two other mechanisms that might lead to greater cooperation in a context of repeated interaction: reciprocity based on verbal commitment and the threat of sanctioning. Both mechanisms affect the beliefs actors have about other actors’ behavior.

**Scope conditions.** These mechanisms are derived from different theories of collective action that span a few disciplines, and, unfortunately, have been seldom compared to each other. A discussion of their scope conditions is also missing. For sure, from a theoretical standpoint, generalized altruism, group solidarity, reciprocity and the threat of sanctioning are not mutually exclusive; indeed, several instances of collective action may be brought about by a combination of these mechanisms (Ostrom, 2005). Moreover, instead of comparing them in the abstract, we should specify their scope conditions by identifying the actual collective action forms and contexts in which they are more likely to operate.

First of all, all these mechanisms generally apply to small, and medium size groups, in which horizontal, decentralized solutions to collective action problems emerge more easily. Instead, in large groups (e.g., countries, large markets etc.) centralized solutions (e.g., the police, taxation, central banks etc.) are often necessary (Scholz and Gray (1997); but see Nee and Opper (2012) for an exception).
While scope conditions are rarely discussed, we can infer them from the substantive research areas from which these theories have originated. Scholars stressing the importance of group solidarity and interpersonal influence are often concerned with instances of collective action that are political in nature, e.g., volunteering, protest mobilization, political participation etc., where group dynamics and the symbolic meaning of the collective goal may accrue disproportionate importance over instrumental considerations (Bearman, 1991; Diani and McAdam, 2003; Gould, 1995). This is especially the case when considering high-risk forms of collective action, such as in the case of participation to violent protests, revolutions, suicide missions etc., in which the effect of peer pressure and the importance of group solidarity are fundamental in explaining participation (Gambetta, 2005; McAdam, 1986).

Although recognizing the importance of group membership and shared norms, studies that examine collective action problems in the context of primarily economic activities have instead focused mainly on instrumental reasons – consider, for instance, the vast literature on common-pool resources, which addresses problems of overuse of resources such as fisheries, pastures, water, atmosphere etc. (Hardin, 1968; Ostrom, 1990). In this context, monitoring and sanctioning are usually regarded as the most effective solution to collective action problems (Camerer, 2003; Fehr and Gächter, 2002; Habyarimana et al., 2007; Sigmund, 2007). However, the empirical work of Elinor Ostrom and her collaborators also greatly contributed to show that communication and mechanisms of reciprocity help promote and sustain cooperation, either by themselves or in combination with peer sanctioning (Ostrom, 2010; Ostrom et al., 1992). In addition, group size and heterogeneity are likely to affect which of these mechanisms is more effective. Namely, as the size (and/or heterogeneity) of the group increases and connections become sparser, reciprocity based on communication becomes more difficult to sustain, and sanctioning mechanisms must be put in place to discourage free-riding (Poteete et al., 2010; Ruttan, 2008).

Finally, explanations of collective action based on generalized altruism may be advanced in the presence of strong selection (or self-selection) processes, in which ‘altruistic types’ combine their cooperative efforts, i.e., in the case of volunteering. In addition, differences in levels of generalized
altruism, or in the proportion of altruistic types in a population, are sometimes useful to understand cross-cultural comparisons, and it is probably at this macro-level that this type of explanation is most effective (Henrich et al., 2001, 2010; Herrmann et al., 2008; Yamagishi et al., 1998).

Networks, Social Capital, and Pro-social Behavior

Social networks may be implicated in all the mechanisms discussed so far, although the way in which networks could matter is different for each of them. Let’s consider group solidarity. As reviewed before, social ties to and from alters contribute to shape ego’s motives and his/her other-regarding preferences. The mechanism of group solidarity is indeed predicated on the idea that the extent to which ego takes into account alters’ welfare is a function of ego’s social distance from alter (Tajfel and Turner, 1979). Norms of fairness toward a social group depend upon the attachment, and frequency of exposure to the members of the group (Baldassarri and Grossman, 2013; Goette et al., 2006; Whitt and Wilson, 2007). For instance, the extent to which people would forego possible gains to benefit family members or close friends is usually greater than if they were to sacrifice for their coworkers, or casual acquaintances. We can therefore expect that, the more connections one has to members of a group and the more embedded he is in such group, the more he is likely to develop group solidarity, and behave pro-socially toward members of such group.

The relation between social network position and generalized altruism is instead less obvious. There is experimental evidence suggesting that having social ties that extend beyond the family and a close circle of friends is likely to induce greater trust in strangers, while intense family and group ties prevent trust from developing beyond group boundaries (Ermisch and Gambetta, 2010; Yamagishi et al., 1998; Yamagishi and Yamagishi, 1994). Similarly, network centrality has been found to be associated to greater trusting and trustworthy behavior in an investment game (Barr et al., 2009a). It is possible to expect other-regarding preferences to be similarly affected. Namely, individuals with more extensive networks may display greater levels of generalized altruism. Extant scholarship relating network centrality to generosity and cooperative behavior offers rather mixed empirical evidence (Apicella et al., 2012; D’Exelle and Riedl, 2010). One should also con-
sider a reversed causality pattern: namely altruistic individuals may be more likely to have broad social networks. Either way, we cannot exclude, a priori, the possibility of a relationship between social network position and generalized altruism.

Let us now consider how networks can affect the remaining two mechanisms: reciprocity based on communication and the threat of sanctioning. Social networks govern actors’ interdependence and favor repeated interaction, thus contributing to determine ego’s beliefs about alters’ motives. Social networks are pipelines through which individuals exchange information. They also enable mechanisms of interpersonal influence, and peer-pressure. Patterns of relationship are therefore vital for the development of forms of direct and indirect reciprocity (Apicella et al., 2012; Nowak and Sigmund, 2005; Ohtsuki et al., 2006). Similarly, sanctioning systems are often more effective in the presence of interpersonal relationships, which allow for better enforcement and greater social control (Boyd et al., 2010; Coleman, 1988; Fershtman and Gneezy, 2001; Greif, 1993; Habyarimana et al., 2007; Sigmund, 2007).

In the light of these considerations, it becomes clear that assessing the relationship between social networks and pro-social behavior is not sufficient in order to determine the building blocks of cooperation. If one wants to understand the mechanisms through which cooperation emerges in a specific social setting, it is important to focus on how patterns of social relations affect actors’ motives, i.e., increasing group solidarity and/or generalized altruism, or their expectations about others’ behavior, i.e. facilitating reciprocity and sanctioning mechanisms.

Advancements in this direction would not only contribute to the research on collective action, but also to the large scholarship on social capital. Although it is beyond the scope of this section to cover the various strands of this popular concept in the social sciences, it should suffice to say that, at their core, most conceptions of social capital stem from the idea that social relationships and associational life can positively affect individual and group outcomes. Unfortunately, most

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3Social capital has become a very popular concept in the social sciences in the last twenty years, with wide application in sociology (Bourdieu, 1980; Coleman, 1990; Lin et al., 2001; Portes, 1998), as well as political science (Foley and Edwards, 1996; Fukuyama, 1995; Krishna, 2002; Putnam, 2000) and economics (Durlauf and Fafchamps, 2005; Woolcock, 1998). Its diffusion testifies to its success in explaining social processes. Simultaneously, social capital has also become an all-encompassing, umbrella concept, often vaguely defined and carelessly deployed.

4As Portes puts it, social capital can be defined as “the ability of actors [individuals or groups] to secure benefits
scholars have based their arguments on the generic assumption that social capital nurtures trust and norms of reciprocity, without specifying the micro-level mechanisms through which social capital informs social and economic behavior (cf., for instance, Putnam (2000) and Fukuyama (1995)). These macro-level and cultural approaches quite often also rely on tautological explanations and fail to analytically distinguish between social capital and its consequences (for an account of these problems, see Portes (1998)).

In contrast, scholars who have devoted attention to the micro-level mechanisms at the basis of social capital’s positive outcomes (Burt, 2005; Durlauf and Fafchamps, 2005; Lin, 2002; Lin et al., 2001; Portes, 1998), tend to adopt a framework similar to the one discussed in the previous section. For instance, in his widely cited review of the literature, Alejandro Portes (1998) points to the relational nature of social capital: it is the fact that alters will behave according to certain norms of conduct that allows ego to secure benefits through his social network. Moreover, Portes organizes the sources of social capital in two broad categories: consummatory sources, which are based on mechanisms of value introjection or bounded solidarity at the community level, and instrumental sources, based instead on norms of reciprocity and enforceable trust. These four mechanisms closely resemble the four mechanisms considered in this research.

In sum, both collective action and social capital scholarship suggest that there are multiple ways in which social networks may affect collective outcomes and cooperation. Identifying which mechanism is at work, i.e., generalized altruism, group solidarity, reciprocity based on verbal commitment, or the threat of sanctioning is crucial in order to understand the contextual and institutional factors that bring about cooperation in specific social settings.

**Behavioral Games and lab-in-the-field Experiments**

Motives and expectations are not immediately observable. However, it is possible to infer them from the way people behave in controlled, experimental settings, and in behavioral games (BGs) in particular. BGs are abstract situations in which individuals have to allocate resources between by virtue of membership in social networks or other social structures” (Portes, 1998, 6).
themselves and other players. BGs are uniquely suited to capture actors’ interdependence in decision making, because in order to define their own strategies, participants must take into account their expectations concerning the behavior of other players.

Despite the scarce use of BGs in sociology (which, I believe, is partly due to their initial association with Economics and rational choice theory), in recent years, there has been an interesting evolution in the use of BGs that has made them a promising tool for the social sciences, and sociology in particular. Initially, behavioral experiments were developed to reveal general patterns of human behavior (Camerer, 2003; Fehr and Gächter, 2002; Fehr and Gintis, 2007; Marwell and Ames, 1979; Ostrom and Walker, 2003), using convenience samples (often college students), and experimental settings and protocols that guaranteed complete anonymity and, as much as possible, ‘stripped’ participants of their background characteristics and experiences. Over the last two decades, instead, some scholars have shifted their interest toward macro-cultural variations and started to play BGs with diverse populations around the world (Henrich et al., 2001, 2010; Herrmann et al., 2008; Yamagishi et al., 1998). Finally, in the last ten years, BGs have started to be used to measure individual and group differences that stem from micro-contextual variations as well as personal and group experiences (Baldassarri and Grossman, 2013; Barr, 2003; Carpenter et al., 2004; Ermisch and Gambetta, 2010; Fearon et al., 2009; Grossman and Baldassarri, 2012; Karlan, 2005). This last development is critical: that BGs have been shown to be sufficiently sensitive to detect differences between individuals within a society makes them an exceptionally powerful tool for research in those fields of sociology that rely on “hard-to-measure” concepts, such as trust, altruism, reciprocity, and solidarity, among others.

Secondly, the shift in BGs’ use from a tool to detect universal patterns of human behavior to a measurement instrument that allows researchers to capture individual and group differences has made the identity and ‘real life’ experiences of the game participants an integral part of the research design, and has led to a move from the aseptic walls of experimental lab to natural settings.

5While a certain skepticism regarding the origins of BGs is understandable, most of the criticisms that motivated the disciplinary rejection of rational choice theory (RCT) do not apply to more recent use of BGs. Moreover, and quite ironically, behavioral experiments have greatly contributed to the debunking of some basic assumptions at the basis of RCT.
In general, lab-in-the-field behavioral experiments have greater external validity than lab-based BGs (Jones, 2010; Levitt and List, 2007), because they are carried out with subjects in their natural settings, retaining, to the greatest possible degree, their social identities and context. Moreover, when combined with observational data, they greatly facilitate the inferential process, the identification of social mechanisms, and, under certain conditions, the assessment of causal effects (Baldassarri and Grossman, 2011; Grossman and Baldassarri, 2012).

Adopting this new framework, I used lab-in-the-field BGs to measure farmer group members’ levels of generalized altruism and group solidarity, as well as their cooperation propensity under reciprocity and threat of sanctioning conditions. Namely, I used different variants of the Dictator Game (DG) to differentiate between different motives for pro-social behavior. Traditionally, in a classic DG two subjects are given a common endowment. One of the players, randomly chosen, has to decide how to divide the money between him/herself and the other player, the receiver. The decider keeps whatever s/he has decided to allocate to him/herself, while the receiver takes home whatever s/he has been given. The DG is conducted under conditions of anonymity. If deciders were completely selfish, they would keep the entire endowment to themselves. In contrast, individuals share, on average, between 20 to 30% of their endowment. A few share up to a half, whereas the modal behavior is to give nothing. Behavior in DG is usually interpreted as an expression of other-regarding preferences (or inequality aversion) and used to classify individuals as selfish or altruistic types (Barr et al., 2009b; Camerer, 2003).\footnote{Some scholars have argued that behavior in DG can be influenced by social norms (e.g., individuals do what the average person will do), and suggested that individuals might have different preferences but prefer to follow group norms (Konow, 2010). In this paper I interpret individuals behavior in DG as an indicator of their level of pro-social behavior and remain agnostic as to whether this behavior reflects individuals’ preferences or is in part affected by social norms.}

Although some people are more altruistic than others, individuals are not universally altruistic, or selfish. In contrast, a few studies have documented that pro-social behavior is contingent on the perceived social distance between the giver and the receiver. By changing the information set about the actors, scholars have tested whether norms of fairness vary as a function of the recipient’s identity, and the level of anonymity of the sender. Some studies have elicited more or
less fictional group identities in laboratory settings (Bohnet and Frey, 1999), while others have shown the positive effect of group identification on pro-social behavior with respect to ascribed categories, such as ethnicity and gender (Habyarimana et al., 2007; Whitt and Wilson, 2007), randomly assigned memberships (Chen and Li, 2009; Goette et al., 2012), or shared experiences (Gilligan et al., 2011). In addition to group-based conceptions of social distance, scholars have also considered proximity in social networks, and results have shown greater levels of pro-social behavior between individuals who are directly connected, especially if the tie is particularly strong (Apicella et al., 2012; Goeree et al., 2010; Leider et al., 2009). In this research, I follow the strategy of changing the identity of the recipient to distinguish between generalized altruism and group solidarity. Namely, participants will be asked to divide their endowment between themselves and a stranger, to measure their level of generalized altruism, and between themselves and a member of their farmer group, to measure their group solidarity.

I use different versions of an iterated Public Goods Game (PGG) to study the evolution of cooperation under different conditions of interdependence. In a classic PGG, participants anonymously decide how to split an initial endowment between private and public accounts. What players put in the private account remains theirs, while what is contributed to the public account is doubled and redistributed evenly among all group members, regardless of their level of contribution. The most profitable outcome for the group occurs when all players contribute their entire endowment. Nonetheless, regardless of what other people contribute, the most profitable strategy for the individual is to keep the entire endowment in his private account and benefit from what everyone else contributes to the public account. Designed to induce a social dilemma, PGGs captures how players balance self-interest and the wellbeing of the group (Camerer, 2003).

Experimental evidence shows that, in PGGs participants initially contribute, on average, between 40 and 60% of their endowment. In repeated games, however, conditional cooperators who wish to avoid being exploited by free-riders gradually refrain from cooperation, leading to a drop in contributions in subsequent rounds (Fischbacher et al., 2001; Ostrom, 2000). By contrast, when participants are allowed to punish other subjects, overall levels of contribution increase, since con-
ditional cooperators can discipline defectors (Fehr and Gächter, 2002; Gintis et al., 2005; Lubell and Scholz, 2001). While sanctioning is widely considered the most common solution to collective action problems, scholars have also shown that face-to-face communication produces substantial increases in cooperation, thus disconfirming the rational choice expectation that communication without binding commitment is ’cheap talk’ and would not have any effect on cooperation (Bohnet and Frey, 1999; Frank et al., 1993; Ostrom et al., 1992). In this research, I implement a communication variant of the PGG to test whether repeated interaction is per se capable of leading members of producer organizations to greater levels of cooperation, and I implement a centralized sanctioning variant to measure the extent to which group members are sensitive to the threat of sanctioning.

**Economic Development and Social Capital**

Development scholars regard producer organizations as a core component of poverty reduction strategies (Birchall, 2003; Narayan-Parker, 2002). State withdrawal (Bates, 1981) and the (relative) democratization of public life in many developing countries have encouraged the rapid proliferation of local-level, voluntary-based organizations, which are created to provide collective goods to their members. This proliferation was also driven by the active support of the World Bank, INGOs, and other agencies, which have been working since the mid-1990s with a paradigm that stresses the positive effects of participatory and community-driven development, decentralization, and social capital on development (Birchall, 2003; Hussi, 1993; Stockbridge et al., 2003).

Early rural development studies aimed mainly at showing the benefits of organizing farmers (Deininger, 1995), while more recent scientific research has increasingly focused on intervention design, and the comparison of different intervention strategies, often relying on randomized evaluation (Banerjee and Duflo, 2010; Bingen et al., 2003). Instead of focusing on average intervention effects or variation across interventions, this paper focuses on *within-intervention variation* and aims at identifying the endogenous social factors that affect the level of success of an intervention. The farmer organizations object of this study were all created by the same development interven-
tion and were given very similar organizational structures, directives, and goals. However, the rate of success greatly varied across farmer groups, and such variation in outcomes is not accounted for by pre-existing conditions (like the level of development of the area), the physical characteristics of the land (e.g., elevation, rainfall, and quality of soil) or ethnic and cultural differences. My working hypothesis is that emerging patterns of social relations have helped certain farmer organizations to overcome collective action problems by facilitating the spread of information, trust, and accountability practices.

Development scholars have already documented the role of social capital in reducing the effects of poverty and inequalities by showing how informal relations and voluntary organizations can favor the spontaneous creation of protection systems and help to overcome collective action problems (Collier, 1998; Gittell and Vidal, 1998; Grootaert and Bastelaer, 2002; Krishna, 2002), facilitate the diffusion of information and adoption of agricultural innovations (Fafchamps and Minten, 1999; Isham, 2000), develop microcredit programs (Khandker, 1998; Yunus, 1998), and foster civic engagement and the democratic process (Carrol, 2001; Gittell and Vidal, 1998). Despite its achievements, the economic development research has important limitations. Mostly dominated by a macro (or functionalist) approach to social capital, this research rarely goes beyond the intuition that ‘better-connected people do better’ to investigate the actual network characteristics from which individuals derive their positional advantage (Sobel, 2002). In addition, scholars base their arguments on the generic assumption that social capital nurtures trust and norms of reciprocity, without specifying the mechanisms through which social capital operates, or trust is produced. Finally, the measurement of the concept is far from satisfying. Scholars usually rely on survey-based measures of trust and membership in formal and informal associations, while more appropriate measurements – i.e., behavioral experiments (Durlauf and Fafchamps, 2005) and social networks surveys (Burt, 2000; Sobel, 2002) – are rarely pursued.
The Study Context: Producer Organizations in Uganda

For its scope, relative uniformity of the intervention, and focus on collective marketing, the Agriculture Productivity Enhancement Project (APEP), offers an extraordinary opportunity to study the building blocks of economic cooperation. One of Uganda’s largest recent rural development interventions, between 2004 and 2009 APEP helped organize over 60,000 farmers into about 2,500 village-level groups (known as producer organizations, or POs). These groups were further organized into more than 200 farmer associations (known as Depot Committees, or DCs), serving, on average, 200 members from ten neighboring POs. The process of group formation occurred under the guidance of a few project field-trainers. As a consequence, APEP groups have similar organizational and governance structure. All strategic decisions are taken at the DC level by a farmer association council which is lead by a few executives – usually a manager, chairperson, and secretary – under the supervision of two elected farmer representatives per PO.

The goal of these farmer associations was to support the integration of smallholder producers into commercial farming, by exploiting economies of scale, increasing productivity, and bargaining for better prices. Their major activity was collective marketing, also referred to as ‘bulking’, or selling in bulk. Given the high costs of transportation and market information, in the absence of producer organizations small farmers’ only option is to sell their crops to local middlemen, who likely exploit information asymmetries and bargaining power, offering unorganized farmers below-market prices. By contrast, organized farmers can bypass these middlemen and obtain higher prices through collective marketing (Staatz, 1987).

Thus, the most common problem for small producers in rural Uganda (as well as in many other underdeveloped regions around the world) is to bypass these speculative middlemen and sell their

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7 APEP was funded by USAID, and implemented by Chemonics, a Washington DC consultancy.
8 While village-level POs had neither the organizational capacity nor the volume to become significant economic entities, DCs were better positioned to exploit economies of scale.
9 This DC council meets 2-4 times a year, and is responsible for connecting village-level POs to the DC. It is also responsible for providing oversight and monitoring of the DC manager, the most important officeholder, whose responsibilities range from overseeing all wholesale marketing activities, to negotiating prices, coordinating the diffusion of information, and organizing training sections. Village-level POs are implementing bodies, mainly responsible for carrying out decisions made at the DC level, passing information from and to the farmers, and training them.
products at competitive market prices. Some of the farmer organizations were able to achieve high levels of collective marketing, others did not. Depending on their success, these organizations were also able to provide several other services, from training, to input procurement (e.g., buying seedlings, fertilizers, and herbicides in bulk), and offer small loans to their members.

Though highly valuable, most of these activities are subjected to various social dilemma. First of all, these groups have to overcome coordination problems. For instance, in order to sell their crop in bulk, farmers need to agree on a place, day and time in which all of them will convene to a central location to pool their produce together. Second, they have to overcome threshold problems, which are situations in which a sufficient number of other participants is needed for the collective activity to become beneficial. For instance, renting a truck to bring the crop to the market becomes convenient only if a sufficient number of other farmers share its cost. Similarly, switching to a more remunerative crop (e.g., coffee) becomes convenient only if enough other farmers actually do the same.

Finally, they have to overcome the quintessential social dilemma, the free-rider problem, which is a situation in which everybody would benefit from the provision of a public good, but it is better if others bear the cost of its provision. Collective marketing offers a good example of how these farmer groups constantly face free-rider problems. Through collective marketing, farmer organizations can sell their produce directly to buyers in major markets, bypassing the local middleman. Once a farmer group is in place, however, local middlemen tend to raise their offers to remain competitive. Since middlemen, unlike most farmer groups, collect crops at the farmers’ gate and pay cash on delivery, members have a private interest in selling to middlemen.\(^{10}\) The private gain of selling to middlemen (‘defecting’), however, is conditional on a sufficient number of other members selling their crops via the farmer group (‘cooperating’). Yet, if too many members defect, collective marketing collapses, and the middlemen will lower their price.\(^{11}\) Farmer organizations

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\(^{10}\) In contrast, when selling their crop through the farmer organization, farmers entrust their produce to the manager and usually have to wait a few weeks before receiving their payment.

\(^{11}\) This is because the price offered by middlemen depends on the price that the farmer group secures (‘yardstick effect’), which itself crucially depends on volume. Some groups manage to overcome this tension between private and group interests, while many others fail.
face the free rider problems in other situations as well. For instance, to increase the quality of their crop, and therefore the selling price, farmers have to use fertilizers and follow labor-intensive procedures, such as hand picking coffee beans, drying them on specific carpets etc. Since farmers mix their coffee and then sell it collectively, the overall quality of the produce depends on everybody’s effort. Thus, individual farmers face a constant trade-off between working hard to increase the quality of their produce, or instead free-ride on the work of others.

A stratified, random, multistage cluster design was used to sample research participants. First, I sampled 50 farmer organizations (DCs). Within each organization, all the members of the farmer association council were interviewed (N = 1,447). Although the research also included a representative sample of farmers that were drawn from six POs per DC. Results reported in this paper concerns members of the DC councils exclusively. Each of them was surveyed in person by trained interviewers in the respondents’ language (i.e., Basoga, Luganda, and Ranyankole) and participated in a series of BGs. The surveys included a social network module that provides complete network information for each of the 50 farmer councils in the sample. Additional information about the farmer organization was collected in group interviews with the DC executives. Data on the DCs’ economic activities were also assembled from the associations’ books and records when available.

**Expectations.** In the light of the previous discussion on the building blocks of cooperation and their scope conditions, which are the mechanisms that make it possible to overcome free-rider problems in the context of Ugandan farmer cooperatives? Given the economic nature of the activity of these farmer groups, I expect instrumental considerations, and thus mechanisms of reciprocity based on verbal commitment and the threat of sanctioning to play a leading role. Research on regular farmer members has shown that sanctioning and leader’s legitimacy play an important role in explaining cooperation rates (Grossman and Baldassarri, 2012). While regular members do not

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12 A detailed description of the sampling scheme including a map showing the farmer groups’ location can be found in Appendix I, along with additional information in the research implementation.

13 Only 1,097 of the subjects interviewed participated in the BGs. This gap is due to the fact that the experiments were conducted, in each DC, in a single day in a central location, while to reduce attrition, interviewers returned to villages several times to locate members who were not present during the main day of data-collection.
maintain stable relationships with each other, nor they participate directly to the activity of the council, the subjects of the current analysis are active members of the DC councils, and experience repeated interaction with other members of the farmer group on a regular basis, thus, they may have developed mechanisms of reciprocity based on verbal commitments. The small size of DC councils may also enhance the capacity of direct communication, and even make it more effective than sanctioning (Ostrom, 2010).

In addition, given their commitment to represent their villages in the farmer cooperatives meetings, one can also expect that they have developed a meaningful identification with the farmer organization, which could lead to greater group solidarity. Instead, I exclude generalized altruism as an explanation for different rates of cooperation in the farmer cooperatives. There is no reason to believe that cooperative types are differently distributed across villages, nor that they would join the farmer groups at different rates. In other words, in the absence of specific selection processes, it is hard to believe that generalized altruism would make a difference at the group level. I will, however, control for levels of generalized altruism in the analyses.

Results

The first step of the analysis is to establish a positive relationship, based on observational data, between social network position and cooperation. I then use lab-in-the-field experiments to distinguish different mechanisms (i.e., generalized altruism, group solidarity, reciprocity, threat of sanctioning) that might account for the relationship between networks and collective outcomes. Finally, I relate individuals’ behavior in BG to their level of cooperation in real life to identify which mechanisms is more likely to account for the relationship between social networks and cooperation.
Social Networks and Cooperation in the Producer Organization

Theories of collective action and social capital both suggest a relationship between social network structure and collective outcomes. In particular, network centralization and non-redundancy of network ties are considered to be network properties important for the provision of public goods (Burt, 2004; Gould, 1993; Marwell and Oliver, 1993).

In each of the 50 farmer organizations, I collected complete network information on the relationships among members of the DC council. Each member of the council was presented with the complete list of other members’ names, and, for each of them, was asked whether they speak frequently, consider alter a close friend, have his/her phone number, and go to him/her for advice. For descriptive purposes, Figure 1 reports the network structure of the advice network for 6 DCs.

For each of the four network relationships –speak, friendship, phone, advice–, I consider four network measures: degree centrality, betweenness centrality, eigenvector centrality, and Burt’s constraint. Degree centrality, or ‘totaldegree’, is the simple count of in- and out-ties and is usually considered as a basic measure of ego’s centrality, or popularity. Betweenness centrality is based on geodesic distance, and captures the extent to which ego is instrumental in connecting otherwise disconnected alters, thus facilitating the flow of information and communication (Freeman, 1979). Eigenvector centrality instead, takes into account not only ego’s degree, but also the centrality of the people connected to him/her, and is commonly interpreted as a measure of prestige (Bonacich, 1972). Finally, Burt’s constraint captures the extent to which individuals are embedded in redundant relationships, thus constraining their capacity to reach out to a large set of alters. Burt’s

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14“Do you speak to [NAME] on a regular basis?”
15“Is [NAME] a close friend or do you just know him or her? By close friend, I mean that you (a) eat together regularly; (b) you can leave your child with him or her if you need to travel for several days; and (c) he or she will help you in case of a family death.”
16“Do you have [NAME]’s phone number?”
17“In the past 12 months, have you asked [NAME] for information or advice on matters related to the farmer association?”
18The eigenvector centrality of a node is its corresponding entry in the eigenvector associated with the largest eigenvalue of an adjacency matrix. While measures of centrality based on degree weight every contact equally, eigenvector centrality weights links according to their centralities. Eigenvector centrality can be conceived as a weighted sum of both direct and indirect connections, and is a measure that takes into account the entire network structure.
Figure 1: Example of Advice Networks in 6 DCs. These are the first 6 DCs in the sample.

constraint is higher if ego has less, or mutually related (i.e. more redundant) ties (Burt, 2004). In general, my expectation is that the more central actors are in the farmer network, the more likely they will be to participate to the life of the farmer cooperative. In contrast, high levels of constraint should lead to less cooperation, since individuals find themselves embedded in a limited set of relations.

While most studies connecting network features to collective outcomes rely on a single network, in this case I test this relationship on individual level observations coming from 50 different networks, thus making the findings more robust. We should, however, keep in mind that this part of the analysis is strictly descriptive. And, since the network data has been collected at the same time of the outcome variables, we should also acknowledge the possible existence of a feedback loop: while, on the one hand, social relationships facilitate the emergence of cooperation, on the other hand, the experience of cooperation is likely to strengthen social relationships. The two effects

19 Other measures have been considered, such as indegree, outdegree, closeness, clustering coefficient etc. and they lead to results that are similar to those presented here.

20 I used three different measures of centrality in order to assess the robustness of the results.
cannot be decoupled with the data at my disposal, although, there are reasons to believe that the latter is less pronounced.

There are two key collective outcomes that are particularly relevant for the life of the farmer organizations. The most important is the extent to which members sell their coffee through the producer organization. On average, 70% of the members sold their coffee in bulk. There is, however, a fair amount of variation across DCs. In some producer organizations only a mere 10% of the members sell in bulk, in others almost all of them rely on the producer organization. Our second measure concerns farmer participation to the life of the producer organization. In particular, we consider whether they attended the last general assembly. On average, almost 3/4 of the members attended the assembly. The correlation between these two measures is .23 (p = 0.030), suggesting that they are related, but likely to capture different facets of cooperation in the farmer group.

I model the relationship between network position and cooperation using multilevel logistic regressions (varying-intercept models) in which individuals are nested within producer organizations (DC) and the probability of a) of selling via farmer group, and b) participating to the general assembly is estimated as a function of network position, controlling for individual level characteristics, such as wealth, education, gender, age, and church attendance.

Figure 2 shows the percentage change in the probability of selling via farmer group (panel A), and participating to the general assembly (panel B) as a function of one standard deviation change in the network measure for every type of network. Results show, for instance, that a standard deviation increase in betweenness centrality in the friendship network is related to a 4.5% (ci,1–8) increase in the probability of selling one’s coffee through the farmer association, and a 10.2% (ci 5–15.4) increase in the probability of attending the general assembly. In general, the results show that greater network centrality, either in terms of number of ties, betweenness, and

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21 Here I use a binary variable. Similar results are obtained using the proportion of the crop that is sold in bulk.
22 Among regular member, 61% sell in bulk, and 57% attended the last general assembly. Thus, the behavior of the farmer representatives is slightly more ‘virtuous’ than that of regular members, but not dramatically more so.
23 Formally,  \[ \log \left( \frac{P(selling\ via\ group)}{P(side\ selling)} \right) = \mu_0 + \beta_1 * Network\ Measure + \beta_2 * Individual\ Controls + \epsilon_1 + \epsilon_{DC} \]
24 For instance, considering the total degree measure, one standard deviation corresponds, approximately, to 13 ties in the friend, speak and advice networks, and to 7 ties in the phone network.
Figure 2: Relationship between Position in the Farmer Network and Cooperation. Percentage change in the probability of selling in bulk (panel A) and attending the general assembly (panel B) as a function of one standard deviation change in the corresponding network measure. Black plots for significant coefficients. 95% CI.

prestige, is associated with greater chances of cooperation, both with respect to selling in bulk, and participating to the group activities, while having redundant ties is associated with lower likelihood of cooperation. Individuals who span across a larger portion of the cooperative networks are more likely to bypass free-rider opportunities, and contribute to public goods production.

**Measuring Mechanisms with Lab-in-the-Field Experiments**

Having assessed the relationship between social network position and cooperation, I turn now to consider the different mechanisms that might account for such relationship. Local producers took part in lab-in-the-field BGs through which I measured their level of prosocial behavior, distinguishing between generalized altruism and group solidarity, and their cooperation propensity, distinguishing between a reciprocity mechanism based on communication, and the threat of sanc-
tioning.

As described in the previous section, the Dictator Game (DG) is traditionally used to measure other-regarding behavior, as participants decide under conditions of anonymity and are not exposed to the risk of sanctioning or loss of reputation. The basic version of the DG, in which deciders have to divide the endowment between themselves and a stranger, is commonly used as a measure of generalized altruism, while versions of the DG in which the identity of the recipient is specified (e.g., ethnicity, gender, etc.), have been used to measure prosocial behavior toward specific groups (Adida et al., 2010; Camerer, 2003; Whitt and Wilson, 2007). In my lab-in-the-field DG each farmer group member was invited to divide two endowments between her/himself and two different alters, whose identity was unknown. Each endowment was 10 coins of 100 Ugandan Shillings (aka 10 Monetary Units, MUs), which are equivalent to half a day’s wage in rural Uganda.

In each of the 50 farmer groups, half of the participants were randomly assigned to an experimental variant in which participants had to divide a first endowment between themselves and a stranger, and a second endowment between themselves and another member of the producer organization. The scenario in which people give to a stranger provides a measure of generalized altruism, while the scenario in which the recipient is a member of the producer association constitutes a measure of group solidarity. The expectation is, of course, that individuals would give more to a member of their group than to a stranger.

However, the difference between the contribution to a stranger and contribution to a group member might not necessarily be due to group solidarity per se, rather it might simply reflect the fact that the social distance between giver and receiver is much smaller in the case of a group member rather than a stranger. To consider this possibility, the other half of the participants were assigned to a second variant of the DG, in which deciders divided their endowment with a stranger, and, differently from the first variant, with someone from their village. Overall, the familiarity

\[25\] I also randomized the order in which subjects were confronted with the choices, asking half of the subjects to first allocate the endowment to a stranger, and then to a co-member or co-villager, and asking the other half to allocate first to a co-member/co-villager, and then to a stranger. The order in which the choice was made does not influence the results.
and frequency of interaction with co-villagers is similar to that with members of the farmer group.\(^\text{26}\)

If membership in the farmer organization has triggered a strong sense of group-attachment, we would expect our subjects to show greater solidarity toward co-members than co-villagers (see Appendix III for the DG script).

![Figure 3: Average Contribution to Stranger and Member of the In-Group in DG. Participants in DG give 1.12 MUs more to members of their producer organizations (red bar) and only .48 MUs more to co-villagers (green bar) than to strangers (blue bars), suggesting that group-attachment, and not only familiarity with the in-group, triggers prosocial behavior. Average treatment effects are estimated using multilevel models as described in Table 2 in the appendix.

Figure 3 reports results for both variants of the DG. Confirming previous scholarship, respondents give, on average, almost 30\% of their endowment to a stranger. More interestingly, compared to their contribution to strangers, group members give half a coin more to a co-villager (.48 MUs; \(p < .001\)), and more than a coin to another member of the producer organization (1.12 MUs; \(p < .001\)). Changing the identity of the recipient, namely moving from a generalized other to a member of the in-group, increases contributions. Moreover, group members give .64 MUs more to

\(^{26}\)See Baldassarri and Grossman (2013) for further details on this aspect.
a co-member than a co-villager \((p < .001)\), thus confirming the expectation that group solidarity among members of the farmer organization is triggered by a sense of attachment to the group that goes beyond mere familiarity with or exposure to the other members, as it might be the case with co-villagers. Table 2 in the appendix reports results for the estimation of the average treatment effect in tabular form as obtained from a three-level random intercept linear regression model that controls for group and interviewers’ effect.

The emergence of cooperation over repeated interaction is traditionally captured using PGGs. Accordingly, I run a lab-in-the-field PGG in order to assess the extent to which reciprocity through communication and the threat of sanctioning are mechanisms that affect farmer groups’ cooperative capacity.27 All farmer group members participated in 6 rounds of a PGG. In each round, they were endowed with 10 MUs and had to decide how much to keep to themselves, and how much to put in a common pot, whose content would be doubled and redistributed equally among the participants. In each producer organization, group members were randomly assigned to one of three variants of the PGG. In the baseline condition, subjects participated in 6 rounds of a PGG without punishment or communication. In the second condition, after two preliminary rounds of play, one of the participants was elected to become a monitor endowed with sanctioning power. Namely, monitors were able to spend 1 MU to take away 3 MUs from subjects whose contribution level they disapproved.28 In the third condition, after two preliminary rounds of play, players were allowed to publicly discuss their strategy for three minutes. This communication took place at the end of every successive round (see Appendix IV for the PGG script).

This setting allows for the assessment of the causal effect of communication and sanctioning on levels of cooperation. Figure 4 reports the trend in the average contribution to the public good for each of the three variants. Solid lines report the observed trend for the baseline (black line), communication (red line) and sanctioning (blue line) conditions. According to our research design, we would expect no differences between variants in the first two preliminary rounds. This is the

27While there are previous instances of lab-in-the-field DGs, to my knowledge this is the first instance of a PGG that has been performed in the field.
28Monitors received the same endowment as the other subjects, but could not contribute to the PGG, or receive part of the common endowment. See Baldassarri and Grossman (2011) for additional information on the game.
Figure 4: Average Contribution in the PGG. Solid lines report the observed trend for the baseline (black line), communication (red line) and sanctioning (blue line) conditions. The dashed line reproduces a fictional trend that could be expected under optimal experimental conditions. The average difference in contributions between communication and baseline condition is 1.91 MUs, while the difference between sanctioning and baseline is 1.55 MUs. Estimates come from multilevel models reported in Table 3 of the Appendix.

Results show that in the baseline condition, in which subjects participate in multiple rounds of the PGG without any type of interaction, contributions decline by almost 10%, in line with

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Footnote: Since small deviations from a BG script can lead to substantial variations in the game outcomes, interviewers were instructed to follow the game script closely. However, two interviewers, who served mainly in the PGG monitor variant, slipped into the description of the game some encouragement that led participants to contribute more.
previous experiments. In contrast, when participants were allowed to communicate, there is a visible increase in contributions: on average, the contribution in the communication condition is 1.91 MUs higher ($p < .001$) than in the baseline condition. Repeated interaction supported by communication is therefore effective in triggering mechanisms of reciprocity, and increase the overall level of cooperation. Although less effective, the threat of punishment leads to similar results. Subjects in the sanctioning condition tend to give, on average, 1.55 MUs more than subjects in the baseline condition ($p < .001$). I therefore conclude that both communication and the threat of sanctioning positively affect the overall level of cooperation, but, in the farmer organizations object of this study, communication seems to have a greater impact.

Overall, I conclude that various dispositional mechanisms could be at the basis of farmer group members’ prosocial behavior and cooperative capacity. As in many other studies, I have found that subjects display altruistic behavior toward strangers. I also found that giving to a member of one’s farmer organization leads to significantly greater donations, suggesting the existence of a mechanism of group solidarity. Moreover, in iterated strategic interactions, the threat of sanctioning increases the likelihood of cooperation. Finally, communication between participants is sufficient to elicit mechanisms of reciprocity, even in the absence of binding agreements, or the threat of sanctioning.

According to my research design, BGs are deployed in order to elicit mechanisms that could be at work in ‘real life’, and, specifically, the mechanisms that are responsible for inducing greater cooperation in the producer organization. It is now time to ask to what extent, if any, behavior in the experimental setting maps into our subjects’ behavior in real life. Are more altruistic farmers, or those who show greater attachment to the group also more likely to cooperate? Or are instead mechanisms of reciprocity and sanctioning that lead to greater cooperation among farmer producers?
**Cooperation in the lab and in ‘real life’**

The last step in the analysis consists in connecting pro-social behavior in the experimental setting to levels of cooperation in the farmer group. The assumption driving this analysis is that whenever we find a correlation between behavior in the BGs and behavior in the farmer group, we can reasonably infer that the mechanisms that were isolated in the experimental setting might be at the basis of real world outcomes (Poteete et al., 2010).

Figure 5 presents results from multilevel logistic regression models in which the two measures of collective outcome introduced before, namely whether farmers sold their coffee through the producer organization (panel A) and whether they attended the last general assembly (panel B), are modeled as a function of individuals’ behavior in BGs, controlling for individual and group level predictors (as in previous models). Since subjects were assigned to different variants of the BGs, it is necessary to compute separate models for each variant. For instance, the left plot of Panel A reports the percentage change in the probability of selling in bulk as a function of 1 MU change in the contribution to a stranger, to a co-member or co-villager, and average contribution (in rounds 3 to 6) in the baseline condition of the PGG game. The center plot shows the same analysis for those subjects that were assigned to the communication condition in the PGG, and the right plot reports results for those assigned to the sanctioning condition. Tables 4 and 5 in the appendix reports results for these models in tabular form.

Findings suggest that neither generalized altruism, as measured by the contribution to a stranger, nor group solidarity, as measured by the contribution to a member of the producer organization (or village), are good predictors of whether group members will sell in bulk. In contrast, subjects’ reciprocity in an experimental setting is predictive of their behavior in the farmer group. In particular, those subjects who were more likely to cooperate in the PGG with communication, were also more likely to sell via their farmer group: 1 MU increase in contribution in the communication variant of the PGG corresponds to a 3.5% increase in the likelihood of selling via the farmer group.

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30I have collapsed the two variants of the DG in this analysis in order to have a larger N, and improve the quality of the estimates. Considering the distinction between the two types of recipients in the DG does not lead to substantively different results.
The corresponding figure for the baseline variant of the PGG is -1.7% ($p = .161$) and for the sanctioning variant is 2.5% ($p = .174$). The last two, however, do not meet minimal criteria for statistical significance.

![Graphs showing the relationship between behavior in BGs and cooperation in the Producer Organization](image)

Figure 5: Relationship between Behavior in BGs and Cooperation in the Producer Organization. Percentage change in the probability of selling in bulk (panel A) and attending the general assembly (panel B) as a function of 1 MU change in the corresponding BG. Tables 4 and 5 in the Appendix report these results in tabular form. Black plots for significant coefficients. 90% CI.

A similar pattern can be observed with respect to the likelihood of attending the general assembly (Figure 5, panel B). The only mechanism that is significantly correlated with participation to the life of the farmer organization is reciprocity: individuals who were more cooperative in the PGG with communication were also more likely to have attended the group meeting. 1 MU in-

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31 Although not particularly large, the magnitude of the effect is not trivial. Moreover, no socio-demographic predictor, when controlling for the level of contribution in behavioral games, is consistently significant (cfr. Appendix tables 4 and 5). In a model that includes only socio-demographic predictors, namely gender, age, education, religiosity and wealth, the latter is the only significant predictor of selling in bulk, and its estimated effect is smaller than the one reported for the contribution in the PGG with communication: a unit change in the standardized measure of wealth corresponds to a 3.3% in the likelihood of selling via the farmer group ($p = .025$).
crease in the contribution in the communication variant of the PGG corresponds to a 1.9% increase in the probability of attending the general assembly ($p = .086$). Once again, the corresponding figure for the sanctioning variant of the PGG is only slightly smaller in magnitude (1.4%), but non significant ($p = .317$).

In sum, of the different mechanisms considered, reciprocity is the one that stands out as being significantly correlated with cooperation in real life. Although results from this part of the analysis cannot be considered conclusive due to sample size (N ranges from 197 to 370, depending on the model), similar analyses conducted on a representative sample of regular members (who are not member of the DC council) confirm that levels of generalized altruism and group solidarity are not related to cooperation in the farmer group.\textsuperscript{32} While among regular farmers sanctioning and the legitimacy of the group leadership are positively related to levels of cooperation (Grossman and Baldassarri, 2012),\textsuperscript{33} among members of the DC council verbal communication turns out as the most viable solution to collective action dilemmas. In line with findings from research on common-pool resources, in small groups with a sufficient level of commitment, face-to-face interaction can be even more effective than sanctioning in overcoming free-rider problems (Ostrom, 2000; Ostrom et al., 1992).

**Discussion**

The study of the non-contractual preconditions of economic exchanges, and, in more general terms, the embeddedness of markets in social life has been at the center of sociologists’ and economic historians’ understanding of economic life for centuries (Burt, 2005; Granovetter, 1985; Greif, 1993; Polanyi, 1944; Uzzi, 1996; Weber, 1905 [1930]). In this research I have focused on the establishment of a novel market institution – the producer organization – to understand how local producers in development countries solve classic problems of collective action. This setting has

\textsuperscript{32}Results available from the author.
\textsuperscript{33}Regular farmers did not participate to the communication version of the PGG because the experience of repeated interaction with other farmer group members is not as diffused among them as it is among village representatives to the DC council.
provided a vantage point to test theories of social networks, collective action, and social capital through an innovative research design.

Extant theories widely recognize the role of repeated interaction and social networks in bringing about cooperation. Accordingly, my analysis confirms that individuals who occupy more central positions and those who are better able to span across a large portion of the organization network tend to participate more in the production of public goods. The novelty of my contribution consists in going beyond the empirical assessment of this relationship, to identify the specific mechanisms that bring about cooperation in a specific social setting. Considering both the motives actors have for cooperation, and the beliefs they hold about others’ behavior, I have identified four general mechanisms: generalized altruism, group solidarity, reciprocity based on verbal commitment, and the threat of sanctioning, and proceeded to test their effectiveness using behavioral games.

Namely, I took behavioral games out of the aseptic walls of the laboratory and brought them to the field. By adopting an innovative methodological framework that combines behavioral games, network data, and survey interviews with members of Ugandan producer organizations, I was able to isolate the mechanisms that make group members cooperate in real life. This research design fulfills sociology’s important aspiration, recently revived under the label of analytical sociology, to move beyond the simple assessment of correlations to investigate the mechanisms that bring about important social phenomena (Gambetta, 1988; Hedström, 2005; Hedström and Bearman, 2009; Merton, 1957). To my knowledge, this paper is the first to use lab-in-the-field experiments to achieve this purpose. The payoff, I believe, is substantial.

Through a novel adaptation of the DG and PGG in which members of the farmer organizations were randomly assigned to different game variants, I was able to demonstrate that, in our population of interest, group attachment leads to levels of solidarity toward members of the group that are substantially higher than general levels of altruism toward strangers, and toward non-members, and that both mechanisms of reciprocity and the threat of sanctioning lead to greater public goods provision. This experimental component allows us to decouple these different mechanisms and to
draw causal conclusions about their effects in the population of interest.

The value added of carrying out behavioral experiments in a field setting is the capacity to relate behavior observed in the real setting to the mechanisms captured in the controlled experimental setting. In this analytical framework, the lab-in-the-field experiment is therefore used as a ‘petri dish’ in order to isolate the mechanisms that are likely to be at work in ‘real life’. In the context of producer organizations, other-regarding preferences, either in the form of generalized altruism, or group solidarity, do not seem to be the motivations that trigger cooperation among local farmers. Rather, reciprocity emerging through communication is the mechanism most strongly related to cooperation in the producer organization. From which I conclude that sustained interaction and verbal commitment are therefore sufficient conditions, in this context, for making cooperation convenient, and discouraging free-riding. Finally, among the farmer representatives object of this study, the threat of sanctioning, although effective in an experimental setting, does not appear to be the mechanism at the basis of cooperation in real life.

Given the economic nature of these producer organizations, the finding that cooperation is likely to emerge from strategic considerations, rather than altruistic motivations, may be not particularly surprising. However, as suggested in the discussion of the scope conditions of the various collective action theories, I do expect a similar research design to lead to different conclusions if we were to consider other types of groups facing collective action problems. For instance, in the context of political mobilization or high-risk activism, I expect that prosocial motivations, and group solidarity in particular, would play a more important role; in the context of large groups, with sparse networks and rare social interactions, I expect the threat of sanctioning to be more effective than reciprocity. In sum, this approach can be applied to different instances of public goods provision, thus allowing for an assessment of the scope conditions of our theories of collective action and social capital.

A systematic comparison of the different mechanisms that bring about cooperation should benefit the literature on collective action, which has developed a rich emporium of such mechanisms, but has not yet developed a systematic way to assess between them empirically. Greater focus on
the motivations and strategic considerations that favor cooperation among interconnected actors will also greatly advance the literature on social capital. The latter, in fact, often relies on the general assumption that social networks and associational life have a positive impact on individual and group outcomes, but rarely goes beyond the use of attitudinal measures of trust or self-reported measures of social relations, and rarely makes any serious attempt at documenting the specific mechanisms through which social relations bring about trusting and cooperative behavior. This, however, is of outmost importance in fields such as economic development, in which social capital scholarship can inform policy interventions and has therefore the potential of affecting the life outcomes of individuals and their communities. While for academic scholarship observing a relationship between networks and outcomes might suffice, to devise effective social interventions it is important to know the motivations, strategies, and incentives that affect the behavior of interconnected actors in specific settings.

Finally, social network research could find an important ally in behavioral games to advance its research agenda, moving beyond demonstrations that network position and overall network structure ’matter’ to better assess the motivations, patterns of strategic interaction, and group dynamics that inform individual and group behavior. While in the research here presented network data have been used exclusively to show the existence of a positive relationship between network position and cooperation, pre-existent social relations can be incorporated in lab-in-the-field research designs, thus systematically subjecting network measures of interest to experimental variation. Along with the study of network evolution, which may be in certain cases unfeasible, network-based lab-in-the-field experiments can facilitate the causal assessment of network effects in specific social settings.

References


Appendix I: Sampling, Data, and Research Implementation

Sampling Strategy

This section briefly describes the sampling scheme used in the research. Focusing exclusively on farmer associations that were created as part of the Agriculture Productivity Enhancement Project (APEP), we used the following steps to conduct a stratified, random, multistage cluster design to select the study’s sample.

Step 1: Define Target Population. To reduce crop-related variability, we limited the target population to only those associations that marketed the same crop. Coffee was selected since it was the most common cash crop marketed by the APEP groups. Limiting the sample to coffee producers reduced the universe of farmer associations from 204 to 113. In addition, we excluded (a) two farmer associations from Bugiri district because coffee was found to be very peripheral in that district; (b) five farmer associations from Busheni district because those groups were formed many years before APEP began operating in the area, and were not comparable in terms of their organizational capacity; and (c) one association from Kamwenge district because it was the single DC in that remote district and surveying it would have been logistically complicated and prohibitively expensive. The final universe of cases comprises of 105 coffee growing farmer associations.

Step 2: Define Strata. Though the universe of farmer associations is spread over 9 districts, we grouped the 105 farmer associations into 5 strata. Strata were defined by meaningful district-areas: neighboring districts that were historically part of the same district. The location of the sampled associations is presented in Figure 6.

Step 3: Sample Farmer Associations (DCs). Based on power calculations performed on simulated data, we sampled 50 farmer associations. We used unequal probability sampling without replacement to sample associations within strata (proportional to their size). The number of sampled associations from each stratum was proportional to the number of associations in each strata. Accordingly, each sampled association is representative of its strata without a need for further weighting.

Step 4: Sample Village-level Producer Organizations (POs). We used an independent random sample to select six producer organizations (or POs) from each sampled farmer association, for a total of 287 POs. In some cases where a farmer association had fewer than seven POs, all of its village-level groups were included within the sample.

Step 5: Sample Group members. We sampled 6 ‘ordinary’ members, on average, from each of the sampled POs, for a total of 36 sampled member per farmer association. The exact number of sampled members from each of the six sampled POs was proportional to the size of those farmer groups, assuring that the sample is self-weighted. The total sample size of DC members is, therefore, 50 DCs X 6 POs X 6 members per PO = 1,800, of which the survey team succeeded in surveying 1,781.

Step 6: DC committee: A significant effort was made to survey each of the DC board members whether or not their PO was selected into the sample. In each sampled DC we surveyed (i) the four executives, (ii) the chairmen of all POs, whether or not their group was sampled, and (iii) one or two representatives from
Implementation

The survey instruments were piloted during the first two weeks in July 2009, and were translated to one of three local languages. Data was collected between late July 2009 and September 2009 by a group of 60 experienced local interviewers (interviewers), who administered all instruments in the respondents’ native language. Hired directly by the PI, the interviewers were divided into three “language” teams. The eastern team covered 16 farmer associations in Iganga and Kamuli districts, where Basoga is the primary local language. The central team covered 20 DCs from Mubende, Mityana, Masaka and Rakai districts, where Luganda is the lingua franca. Finally, the western team covered 14 DC from Kiruhura, Mbarara and Ibanda districts, where Ranyankole is the lingua franca. Interviewers went through training in class (4 days) and in

Figure 6: Location of Sampled Associations. Colors indicate strata, while numbers indicate the number of farmer associations sampled from within each district.
Table 1: **Sampling Design**

<table>
<thead>
<tr>
<th>Step</th>
<th>Sampling Unit (SU)</th>
<th>Number of SUs</th>
<th>Sampling Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Target Population</td>
<td>105 DCs</td>
<td>Coffee growers</td>
</tr>
<tr>
<td>2</td>
<td>District-area</td>
<td>5</td>
<td>Stratified – proportional to # of DCs in strata</td>
</tr>
<tr>
<td>3</td>
<td>Farmer Associations (DCs)</td>
<td>50</td>
<td>Unequal probability without replacement</td>
</tr>
<tr>
<td>4</td>
<td>Produce Organizations (POs)</td>
<td>6 per DC</td>
<td>Clustered – simple random sample.</td>
</tr>
<tr>
<td>5</td>
<td>Group members</td>
<td>36 per DC</td>
<td>Clustered – probab proportional to group size.</td>
</tr>
<tr>
<td>6</td>
<td>DC Board directors</td>
<td>~ 28 per DC</td>
<td>No sample: Complete Network.</td>
</tr>
</tbody>
</table>

In each sampled association, data was collected in four rounds. First, an interviewer scheduled a meeting with the DC executives. In that meeting the interviewer introduced the study and asked for the association’s cooperation. In addition, in that meeting s/he administered the DC-level questionnaire, and obtained a list of all DC committee members. In the second day of enumeration, the research team conducted interviews with DC committee members and with the chairmen of all village-level groups (POs), who were mobilized by the DC executives to a central location. In addition to individual-level interviews, leaders from each sampled village-group were asked to respond to a PO questionnaire, and to provide a complete list of all group members. Between the second and third round, the research team sampled 36 members from each sampled DC (including 8 replacements). Immediately after the sampling procedure, an interviewer travelled back to meet with the associations’ leadership. In that meeting, the interviewer gave the DC leaders the list of sampled members and coordinated with them the next round of interviews. Once again, we relied on the DC leadership to mobilize the sampled members to a centralized location. In the third day of enumeration, individual-level interviews were conducted with the sampled members and with board directors who were not present in day 2. Finally, the survey team traveled to each association for an additional day to reach sampled members and board directors who, for any reason, were not present in the main enumeration days.
Appendix II: Supporting Analysis

## ATE of the Dictator Game Experiment

<table>
<thead>
<tr>
<th></th>
<th>β</th>
<th>st. err.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATE (Co-member vs. Co-villager)</td>
<td>0.880***</td>
<td>(0.17)</td>
</tr>
<tr>
<td>Stranger</td>
<td>-0.554***</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Male</td>
<td>0.158</td>
<td>(0.16)</td>
</tr>
<tr>
<td>Age (units of 10)</td>
<td>-0.034</td>
<td>(0.05)</td>
</tr>
<tr>
<td>Church attendance</td>
<td>0.127</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Education (Std.)</td>
<td>-0.104</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Wealth (Std.)</td>
<td>0.009</td>
<td>(0.07)</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.656***</td>
<td>(0.47)</td>
</tr>
<tr>
<td>$\sqrt{\psi(a)}$</td>
<td>-0.911**</td>
<td>(0.42)</td>
</tr>
<tr>
<td>$\sqrt{\psi(b)}$</td>
<td>-0.350**</td>
<td>(0.16)</td>
</tr>
<tr>
<td>$\sigma_e$</td>
<td>0.525***</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-1697</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>839</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Average treatment effect of different variants of the DG. DV: Difference in the contribution to group/village member and stranger. Table reports results from a three-level random intercept linear regression model, in which individuals are nested within producer organizations and interviewers, in order to control for group and interviewer effects. $\sqrt{\psi(a)}$ refers to variability between farmer groups, $\sqrt{\psi(b)}$ refers to between interviewers variability, and $\sigma_e$ is the estimated standard deviation of the overall error term.
### ATE of the Public Goods Game Experiment

<table>
<thead>
<tr>
<th></th>
<th>Communication − Baseline</th>
<th>Monitor − Baseline</th>
<th>Communication − Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
<td>(A)</td>
</tr>
<tr>
<td><strong>ATE</strong></td>
<td>191.393***</td>
<td>191.083***</td>
<td>162.258***</td>
</tr>
<tr>
<td></td>
<td>(17.10)</td>
<td>(18.18)</td>
<td>(18.94)</td>
</tr>
<tr>
<td>Round ( t − 1 )</td>
<td>3.806</td>
<td>3.891</td>
<td>2.509</td>
</tr>
<tr>
<td></td>
<td>(3.72)</td>
<td>(3.94)</td>
<td>(3.70)</td>
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<tr>
<td>N. subjects in session</td>
<td>10.021</td>
<td>10.259</td>
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</tr>
<tr>
<td></td>
<td>(8.58)</td>
<td>(8.97)</td>
<td>(8.45)</td>
</tr>
<tr>
<td>Prelim contribution</td>
<td>0.519***</td>
<td>0.512***</td>
<td>0.494***</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Male</td>
<td>9.245</td>
<td>-12.119</td>
<td>24.604***</td>
</tr>
<tr>
<td></td>
<td>(20.37)</td>
<td>(19.17)</td>
<td>(21.87)</td>
</tr>
<tr>
<td>Age (units of 10)</td>
<td>10.629</td>
<td>1.917</td>
<td>7.533</td>
</tr>
<tr>
<td></td>
<td>(7.09)</td>
<td>(6.54)</td>
<td>(6.96)</td>
</tr>
<tr>
<td>Church attendance</td>
<td>-2.977</td>
<td>7.533</td>
<td>-2.121</td>
</tr>
<tr>
<td></td>
<td>(16.37)</td>
<td>(14.76)</td>
<td>(18.94)</td>
</tr>
<tr>
<td>Education (Std.)</td>
<td>15.242*</td>
<td>2.546</td>
<td>9.444</td>
</tr>
<tr>
<td></td>
<td>(8.64)</td>
<td>(7.96)</td>
<td>(8.45)</td>
</tr>
<tr>
<td>Wealth (Std.)</td>
<td>-17.250*</td>
<td>0.798</td>
<td>-4.177</td>
</tr>
<tr>
<td></td>
<td>(9.37)</td>
<td>(8.97)</td>
<td>(10.55)</td>
</tr>
<tr>
<td>Intercept</td>
<td>83.872</td>
<td>41.354</td>
<td>222.261**</td>
</tr>
<tr>
<td></td>
<td>(88.02)</td>
<td>(109.79)</td>
<td>(87.03)</td>
</tr>
<tr>
<td>( \sqrt{\psi_{(3)}^2} )</td>
<td>4.475***</td>
<td>4.516***</td>
<td>4.486***</td>
</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.15)</td>
<td>(0.15)</td>
</tr>
<tr>
<td>( \sqrt{\psi_{(2)}^2} )</td>
<td>5.008***</td>
<td>4.991***</td>
<td>4.822***</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.07)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>( \sigma_e )</td>
<td>5.365***</td>
<td>5.372***</td>
<td>5.345***</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-19373</td>
<td>-17478</td>
<td>-18484</td>
</tr>
<tr>
<td></td>
<td>-13492</td>
<td>-12109</td>
<td>-13492</td>
</tr>
<tr>
<td>N</td>
<td>2816</td>
<td>2544</td>
<td>2712</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1992</td>
</tr>
</tbody>
</table>

Standard errors in parentheses. * \( p < 0.05 \) ** \( p < 0.01 \) *** \( p < 0.001 \)

Table 3: Average treatment effect of different variants of the public goods games. DV: PGG contribution in rounds \( t \), considering rounds 3 to 6. Table reports results from a series of three-level random intercept models, in which contributions in round \( t \) (level-1) are nested within individuals (level-2), who themselves are nested within producer organizations (level-3). Communication − Baseline refers to the the Average Treatment Effects (ATE) of communication compared to baseline, Monitor − Baseline refers to the the ATE of elected monitor compared to baseline, and Communication − Monitor refers to the the ATE of communication compared to elected monitor. \( \sqrt{\psi_{(3)}^2} \) refers to between subjects variability, \( \sqrt{\psi_{(2)}^2} \) refers to variability between farmer groups and \( \sigma_e \) is the estimated standard deviation of the overall error term. Given the panel setup, the multi-level regression models further assume that the errors have an autoregressive structure of order 1.
## Relationship between BGs’ Contribution and Selling in Bulk

<table>
<thead>
<tr>
<th></th>
<th>( PGBaseline )</th>
<th>( PGCommunication )</th>
<th>( PGSanctioning )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( (A) )</td>
<td>( (B) )</td>
<td>( (A) )</td>
</tr>
<tr>
<td>PG Contribution</td>
<td>-0.088</td>
<td>-0.090</td>
<td>0.174**</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>Prelim contribution</td>
<td>-0.002</td>
<td>-0.001</td>
<td>-0.136*</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.06)</td>
<td>(0.07)</td>
</tr>
<tr>
<td>DG Stranger</td>
<td>0.012</td>
<td>0.015</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>DG Co-Member/Villager</td>
<td>-0.020</td>
<td>-0.034</td>
<td>0.088</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Male</td>
<td>0.138</td>
<td>0.596</td>
<td>-0.301*</td>
</tr>
<tr>
<td></td>
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<td>(0.44)</td>
<td>(0.16)</td>
</tr>
<tr>
<td>Age (units of 10)</td>
<td>0.033</td>
<td>-0.301*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.16)</td>
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</tr>
<tr>
<td>Church attendance</td>
<td>-0.193</td>
<td>-0.256</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.26)</td>
<td>(0.36)</td>
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</tr>
<tr>
<td>Education (Std.)</td>
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<td>-0.321</td>
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<td></td>
<td>(0.14)</td>
<td>(0.24)</td>
<td></td>
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<tr>
<td>Wealth (Std.)</td>
<td>-0.008</td>
<td>0.174</td>
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</tr>
<tr>
<td></td>
<td>(0.15)</td>
<td>(0.21)</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>1.532***</td>
<td>1.876*</td>
<td>0.222</td>
</tr>
<tr>
<td></td>
<td>(0.37)</td>
<td>(1.05)</td>
<td>(0.57)</td>
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<tr>
<td>( \sqrt{\psi} )</td>
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<td>-0.121</td>
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<tr>
<td></td>
<td>(0.24)</td>
<td>(0.25)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Log Likelihood</td>
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<td>-204</td>
<td>-121</td>
</tr>
<tr>
<td>N</td>
<td>365</td>
<td>362</td>
<td>214</td>
</tr>
</tbody>
</table>

Standard errors in parentheses. * \( p < 0.1 \) ** \( p < 0.05 \) *** \( p < 0.01 \)

Table 4: DV: Selling in bulk vs side-selling. Multilevel logistic regressions (varying intercept models) modeling individuals nested within producer organizations. \( \sqrt{\psi} \) refers to variability between producer organizations. Note: given the small N, * corresponds to \( p < 0.1 \) level of significance, etc.
### Relationship between BGs’ Contribution and Attending the General Assembly

<table>
<thead>
<tr>
<th></th>
<th>PGBaseline</th>
<th></th>
<th>PGCommunication</th>
<th></th>
<th>PGSanctioning</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
<td>(A)</td>
<td>(B)</td>
<td>(A)</td>
<td>(B)</td>
</tr>
<tr>
<td>PG Contribution</td>
<td>-0.051</td>
<td>-0.079</td>
<td>0.207*</td>
<td>0.172</td>
<td>0.092</td>
<td>0.130</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.07)</td>
<td>(0.10)</td>
<td>(0.10)</td>
<td>(0.13)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Prelim contribution</td>
<td>0.071</td>
<td>0.093</td>
<td>-0.151</td>
<td>-0.114</td>
<td>0.078</td>
<td>0.059</td>
</tr>
<tr>
<td></td>
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<td>(0.07)</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.10)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>DG Stranger</td>
<td>-0.055</td>
<td>-0.042</td>
<td>-0.116</td>
<td>-0.107</td>
<td>0.152</td>
<td>0.143</td>
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<tr>
<td></td>
<td>(0.08)</td>
<td>(0.08)</td>
<td>(0.11)</td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>DG Co-Member/Villager</td>
<td>0.004</td>
<td>0.004</td>
<td>0.172</td>
<td>0.193</td>
<td>-0.125</td>
<td>-0.103</td>
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<tr>
<td></td>
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<td>(0.08)</td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Male</td>
<td>1.172***</td>
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<td>0.533</td>
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<tr>
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<td>(0.33)</td>
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<td>(0.50)</td>
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<td>(0.54)</td>
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</tr>
<tr>
<td>Age (units of 10)</td>
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<td>0.242</td>
<td></td>
<td>-0.012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td></td>
<td>(0.20)</td>
<td></td>
<td>(0.21)</td>
<td></td>
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<tr>
<td>Church attendance</td>
<td>0.144</td>
<td></td>
<td>-0.326</td>
<td></td>
<td>0.238</td>
<td></td>
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<tr>
<td></td>
<td>(0.28)</td>
<td></td>
<td>(0.48)</td>
<td></td>
<td>(0.42)</td>
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<tr>
<td>Education (Std.)</td>
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<td></td>
<td>0.551*</td>
<td></td>
<td>0.350</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td></td>
<td>(0.24)</td>
<td></td>
<td>(0.23)</td>
<td></td>
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<tr>
<td>Wealth (Std.)</td>
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<td></td>
<td>-0.404</td>
<td></td>
<td>-0.041</td>
<td></td>
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<tr>
<td></td>
<td>(0.16)</td>
<td></td>
<td>(0.25)</td>
<td></td>
<td>(0.23)</td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>1.552***</td>
<td>0.443</td>
<td>0.996</td>
<td>0.435</td>
<td>1.125</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
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<td>(1.07)</td>
<td>(0.65)</td>
<td>(1.81)</td>
<td>(0.77)</td>
<td>(1.60)</td>
</tr>
<tr>
<td>$\sqrt{\psi}$</td>
<td>-0.221</td>
<td>-0.237</td>
<td>0.018</td>
<td>-0.038</td>
<td>-0.341</td>
<td>-0.583</td>
</tr>
<tr>
<td></td>
<td>(0.29)</td>
<td>(0.31)</td>
<td>(0.33)</td>
<td>(0.35)</td>
<td>(0.60)</td>
<td>(0.87)</td>
</tr>
<tr>
<td>Log Likelihood</td>
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<td>-177</td>
<td>-91</td>
<td>-87</td>
<td>-76</td>
<td>-74</td>
</tr>
<tr>
<td>N</td>
<td>370</td>
<td>367</td>
<td>218</td>
<td>217</td>
<td>199</td>
<td>199</td>
</tr>
</tbody>
</table>

Table 5: DV: Attended general assembly vs Did not attend the general assembly. Multilevel logistic regressions (varying intercept models) modeling individuals nested within producer organizations. $\sqrt{\psi}$ refers to variability between producer organizations. Note: given the small N, * corresponds to $p < 0.1$ level of significance, etc.
Appendix III: Script of the Dictator Game

Introduction to the Activity

Thank you all for participating to this activity. My name is [interviewer 1] and this is my colleague [interviewer 2]. In this activity we will be playing with real money. You should know that whatever money you win in this and the next activities will be yours to keep and take home. This money is for your individual use, goes to your private pocket, and you can spend it as you want. You will receive the money from this activity, as well as your compensation, at the end of the day. The money comes from two American Universities, Princeton and Columbia. You should understand that this money does not come from our own (private) pocket. It is money given to the research team by the University to use for research.

Before we begin, I want to tell you the rules that we must follow. I am about to explain the first activity and it is important that you listen as carefully as possible, because only people who understand the activity will actually be able to participate. We will run through some examples here while we are all together. While in the group, you cannot ask questions or talk. This is very important. Please be sure that you obey this rule, because it is possible for one person to spoil the activity for everyone. If one person talks about the activity while sitting in the group or with other people later, this person will not be allowed to participate to the activity today. Do not worry if you do not completely understand the activity as we go through the examples here in the group. Each of you will have a chance to ask questions in private to be sure that you understand.

Finally, you will be playing in groups of two individuals, but you would not be told the name of the person and you would not be able to see the person you are playing with. Similarly, we would not reveal your name to the person you are playing with or anybody else. Only us, the research team, will know about your decisions, and we’ll register them using an identification code, and not your name.

Game Description and Instructions

This first activity involves pairs of individuals. Each pair will be given a total of ten 100 USH coins, totaling 1,000 USH. The First participant, the Decider, has to decide how to allocate the money between her/himself and the Second participant, the Receiver. The Decider will take home whatever he has decided to allocate to himself, and the Receiver will take home whatever he has been allocated by the Decider.

All the people in this room have been chosen to participate as Deciders. As a Decider, you have to decide how to split the 1,000 USH between you and a Receiver. Here are 4 examples of how you could split the money:

Demonstrate on “Generic” Board

- if you give 1,000 USH (10 coins) to the Receiver, the Receiver will receive 1,000 USH and you will walk away with nothing at the end of the day.
• if you give the Receiver 200USH (2 coins), s/he will receive 200 USH and you will walk away with 800USH (8 coins).
• if you give the Receiver 700 USH (7 coins), s/he will receive 700 USH and you will walk away with 300 USH, (3 coins).
• if you give the Receiver 0 coins, s/he will receive nothing and you will walk away with 1,000 USH (10 coins).

We will ask you to make a decision two times for two different individuals. In the first case you’ll be asked to be the Decider and allocate money between you and a Stranger. You will use this board [pull out stranger board and set up 10 coins.] After you make your decision, a stranger will receive a box with the money. The Receiver will not be told your name or given any information about you. This stranger is a person who you do not. We have chosen this person in the following way: from the list of all the people in your sub-county, we have randomly selected a few people. The person that will be receiving is one of them. We will show you the picture of some of them, to make sure that you have never met any of them.

The second time, you will be playing again as a Decider, but this time the Receiver will be a member of your PO. You will use this board [pull out PO-member board and set up 10 coins.] After you make your decision, a member of your PO will receive a box with the money. The Receiver will not be told your name or given any information about you. He will be told only that the money comes from a co-PO member. This person might be here today or he might not be here. The only thing you know is that he is a member of your PO.

You will meet with the interviewers one-on-one. After you have decided how to allocate the money in each situation, we will determine which activity you will be paid for. You will have to pick between two cards. One card has the symbol of the Stranger on it, while the other has the symbol of the co-PO member on it [show cards]. You will pick one of the cards, and you will take home the money you have made in the activity that you have randomly selected. Be careful, since you do not know in advance for which activity you are going to be paid for, you have always to decide as if you were dividing real money.

Before making your decision, the interviewer will explain the activity again, and let you ask any question you might have. While waiting during the one-on-one meetings with interviewers, no one should talk about the activity or their decisions. If you have a question, please ask the interviewer, not another participant. Also, you are not allowed to speak about the activity with anybody during the day. You can talk about it only on your way home, after all the activities are over.

Now we are going to call each of you one-by-one to meet with an interviewer.

One-on-one Meeting

Each booth should be set up before the participant comes for their one-on-one interview. The boards with the two symbols should be placed in front of the participant with ten 100USH coins on each board on the “Personal Pocket” side. Record the participant’s ID number in the “ID number” Column. If you are in-
terviewer 2, first describe the co-PO member, and second, the stranger. Report the results in the appropriate column of the Recording sheet.

You have been selected to be a Decider. You have been given a total of ten 100USH coins, totaling 1,000USH, and have to decide how to allocate the money between you and the Receiver. You will make both decisions when I have finished explaining the activity.

Here you are dividing the money between yourself and a Stranger [Point to the corresponding board]. The Stranger is someone from your sub-county who has been selected at random from a complete list of all the members of the sub-county. Here some pictures of people in your sub-county who have been selected to participate with us. The person you are giving to is one of them. This person will NOT be told your name or given any information about you.

Here you are dividing the money between yourself and a member of your PO [Point to the corresponding board]. This person will NOT be told your name or given any information about you. He will not be told only that the money comes from a co-PO member. This person might be here today or not. The only thing you know is that he is a member of your PO.

In both cases, you will take home whatever you have decided to allocate to yourself, while the Receiver will take home whatever you have decided to give him/her. You do not have to give any money to anyone if you do not want to. Remember that you are dividing real money, and you will be paid for one of these decisions.

Let’s start with an example. If you decide to give a person 300USH (3 coins), then you will have 700USH (7 coins) for yourself.

Do you have any question for me?

Let me now ask you a question: If you give 600USH (6 coins) to a person, how much do you keep for yourself?

If the participant responds correctly, go ahead with the Game! If not, give the answer, and ask another question:

If you give 200 USH (2 coins), how much are you keeping for yourself?

If the participant responds correctly, go ahead with the Game! If not, give the answer, explain, but put an ‘*’ next to the participant’s decision.

You now have a few minutes to make their decisions for all three situations. When you are finished, please let me know.

Record the number of coins the participant has given to the Stranger in the “Offer - Stranger” Column, and the number of coins the participant has given to the co-PO member in the “Offer - co-PO” Column.

Show the participant the 2 payment option cards.

Now we will decide which situation you will be paid for. I will shuffle these two cards, and you will pick one. The card you pick will indicate which decision you will be paid for.

it Shuffle cards, have participant pick one. Record under the “Pick” Column if the card is a Stranger, or a PO Member.

Refer to the appropriate board and point out how much the participant kept in the selected activity.
Write the number under the “PAYMENT” column.

In the situation for the card you picked, you kept [number from PAYMENT column], so that is how much you have made from this activity. At the end of the day you will be given [number] USH in addition to the participation fee.

Relocate the 20 coins back to the starting positions.

Thank you. You can now go. Please, call person [ID number]. (alternatively, call the person yourself)

Repeat with everyone in the group.
Appendix IV: Script of the Public Goods Game

[Each variant (Baseline, Communication and Sanctioning) had its own script. The script changes after the second round of contributions.]

Game introduction and instructions:
(Interviewer 1 begins instructions, interviewer 2 records everyone’s ID numbers on the record.)

Hello my name is [interviewer 1] and my colleague’s name is [interviewer 2]. Please take a seat at one of the stations. We would like to thank you all for being cooperative and for participating in the various activities.

For this activity, there must be absolute silence. You are not allowed to talk to each other. While in the group, you cannot ask questions or talk. This is very important. Please be sure that you obey this rule, because it is possible for one person to spoil the activity for everyone. If one person talks about the activity while sitting in the group or with other people later, we will not be able to continue the activity. Do not worry if you do not completely understand everything as we go through the examples here in the group. We will take questions when we are finished explaining.

This activity will have a few rounds of decisions. However, only one round will count for payment, which will be chosen randomly once the activity is completed. For the round that is chosen, the money will be yours to take home and use as you please. Since we do not know which round will count, you should decide in each round as if you were deciding on real money.

In front of you there is a board. One side represents your Personal Pocket, the other side represents a Group Pot. There are now 1,000USH in your personal pocket. In this activity, you will have to decide how many Shillings you would like to keep for yourself in your personal pocket, and how many you would like to contribute to the group pot.

You must understand something very important about the group pot. The group pot will include only the contributions from all the people participating in this activity. Once everyone has decided how much to give to the group pot, I will add up the total amount and the research team will double the amount. The group pot will then have twice the amount of money people contributed to it. I will then redistribute the total earnings equally among all twelve of the people participating in the activity. Each person’s payoff will be rounded up to the nearest 50USH.

Everyone’s donations and decisions will be anonymous, and the screens are here to ensure that. No one will know another’s contributions. Do not look at other people’s boards. Only the interviewer will know how much each person has donated and the interviewer will never tell anyone else. The number of coins contributed by each person will be reported once all the contributions have been made, but I will not say who donated each number of coins. Names or ID numbers of the people here will not be used throughout the activity.

Let’s go over a few examples.

Interviewer 1 explains and demonstrates the coins. Interviewer 2 writes results on the large sheet of paper. Participants should be able to see all three examples at one time by the end of the explanations.

Interviewer 1: One way the activity might turn out is that six participants decide to give nothing and the
other six decide to give 200 USH to the group pot. Demonstrate by moving two coins from Personal Pocket to Group Pot.

*Interviewer 2 writes on large sheet of paper and explain each number:*

“0,0,0,0,0,200,200,200,200,200,200”, total (1200), average (100), doubling (2400), and Payback (200).

<table>
<thead>
<tr>
<th>0, 0, 0, 0, 0, 200, 200, 200, 200, 200, 200</th>
<th>Average 100</th>
<th>Total 1200</th>
<th>Double 2400</th>
<th>Payback 200 USH</th>
</tr>
</thead>
</table>

*Interviewer 1: *In this case, the results will look like this. We will have a total 1,200 USH in the group pot. The average donation is 100 USH. The research team double the total contribution, so the group pot now has 2,400 USH which will be divided equally amongst all the participants. In this case, everyone will get 200 USH.

The participants that donated 0 to the group pot will get 1000 shillings from their personal pocket and 200 from the group pot, making 1,200 USH. The participants that donated 200 USH will get 800 USH from their personal pocket and 200 USH from the group pot making 1,000 USH.

*Interviewer 2: As interviewer 1 explains the individual payoffs, demonstrate on board like the following:*

<table>
<thead>
<tr>
<th>0, 0, 0, 0, 0, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000</th>
<th>Average 1000</th>
<th>Total 12000</th>
<th>Double 24000</th>
<th>Payback 2000 USH</th>
</tr>
</thead>
</table>

Let’s try another example.

In this case, everyone gives all 1000 shillings to the group pot.

*Interviewer 2 write and explain each number: “1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000,” total (12000), average (1000), doubling (24000), payoff (2000)*

*Interviewer 1 explain: *The total contribution was 12,000 USH. In this case, the average contribution was 1,000 USH. Now the research team will double this amount. The group pot now has 24,000 USH. Everyone will get 2,000 USH. Since everyone donated everything, everyone has 0 in their private pocket, and everyone gets 2,000 USH from the group pot. Everyone has made 2,000 USH.

Let’s try a final example, in this case 7 people don’t give anything to the group pot, 4 people give 100 USH, and 1 person gives 800 USH. The results will look like this:

*Interviewer 2 write: “0, 0, 0, 0, 0, 0, 100, 100, 100, 100, 100, 800,” total (1200), average (100), doubling (2400), payoff (200). Also write out the three different contributions and their total pay off during explanation.*

*Interviewer 1: *The total donation is 1200 USH. The average donation is 100 USH, The research team will then double this number so that the group pot has twice the money, or 2400 USH. The payoff is 200 shillings for each person.

The participants that donated nothing will get 1000 USH from their personal pocket, as well as 200 USH from the group pot. This makes 1,200 USH. While the participants that donated 100 will get 900 from their
personal pocket, as well as 200 from the group pot. This makes 1100 USH. The participants that donated 800 USH will have 200 USH from their personal pocket, as well as 200 USH from the group. This makes 400 USH.

Here are some things to remember:

People that donate coins will make less than people who do not donate or donate fewer coins. In the first case, 6 people donated 200 USH and 6 people donated 0. The people that donated 200 made 1000 USH, but the people that donated 0 made 1,200 USH.

The group as a whole gets the most money if everyone puts in all 1000 USH. Remember the second example. Everyone donated everything, and everyone made 2,000 USH.

Also keep in mind that if you put a lot and everyone else puts in little or nothing, you can end up with less than the 1000 USH you started out with. Remember the third example. Some made 1,200 USH, while the person who donated the most made only 400 USH.

Before we begin the activity, does anyone have any questions?

[Interviewers should answer questions, but they should stick to the script as much as possible. Also, they do not have to invite too many questions. They have to keep it short!]

Rounds 1 and 2

Interviewer 1: Now please use the screen we have provided and decide how much you would like to contribute to the group pot. We will go around and record your decisions. Place the amount of coins you would like to contribute to the group pot on the right side of the board, with the picture of the group of people. Remember you do not have to contribute if you do not want to. The coins in the group pot will benefit everyone in the room.

Interviewer 2 goes around and records decision on data sheet. Individual contributions are recorded next to the ID of the contributor. Calculate average, total, double, payoff.

Interviewer 2 writes the results of the donations on the large sheet of paper at the front of the room by writing all contribution amounts in increasing order.

Interviewer 1: Thank you. Please move all your coins back to your personal pocket. Here are the results of all the donations in the room.

Explain each number. Just to clarify, let’s go over how much two participants are going to get.

Pick the third and eight donated amount and go over their payments:
The person that donated X will have Y in his personal pocket, and will get Z from the group pot, totaling Y+Z. The person that donated A to the pot will have B in his personal pocket, and get C from the group pot, making B+C.

[Repeat for round 2]

Interviewer 1: Now we will repeat the activity again.

Interviewer 2 walks around to make sure the setup has been followed.
(…) 

[After round 2]

**Game Variant 1: Baseline**

*Repeat for additional 4 rounds*

**Game Variant 2: Communication**

We will now repeat the activity. However, before we begin, you will have the opportunity to actually talk to one another. I’ll ask you to take down your screens and you will have 2 minutes to speak, about whatever you would like. You can talk about what happened in the previous round, what you are going to do in the next round, or any other issue you would like to bring up. Remember, no one has to disclose the contributions from the previous round if they do not want to, and no one can demand from any other participant to disclose his/her contribution in previous and past rounds. You are given the possibility to speak, but you are not required to do so.

After these 2 minutes of communication, you will be asked to make a decision about how much to allocate to the community pot once again. Then each of you will make the decision privately. Now, please take down the screens in front of you. I will be watching the time. You may begin speaking.

*Participants will communicate for two minutes. Interviewer 1 should watch the time; Interviewer 2 should record the content of the conversation.*

2 minutes have finished. You must now decide how much to allocate to the public pot once again. Please lift up your screens again, and decide how many shillings you would like to put in the group pot.

*Wait for the participants to finish, record their response on the Round 3 response sheet. Repeat for 3 more rounds. There should be four sessions of communication and six rounds total.*

**Game Variant 3: Sanctioning**

**Monitor Election:**

*Interviewer 1:* We will now repeat the activity again, but a little differently than the previous round. In this round one of the participants will become a “monitor”. The monitor will be elected by all of the participants in this activity.

The monitor will not be participating in this activity like everyone else. He will not donate anything to the group pot, and he will not receive any payment from the group pot. He will be given 1000 USH and he can spend 100USH to take away 300USH from the private pocket of contributors he is dissatisfied with. He may do this to as many participants as he would like but he may only use 100USH for each participant. The monitor does not have to reduce from anyone and may keep all 1000 USH.
The monitor will not know the names of the contributors, only how much they donated. He will see the same results as everyone else. The monitor will only choose who to reduce money from by writing an “X” under the number indicating the size of the contribution. Now, we will elect the monitor.

Each of you has a piece of paper and a pen at your stations. Please write the ID number of the person that you would like to elect to be your monitor. An interviewer will walk around to collect your ballots and will tally the results. Please take a moment to look around at the ID tags on the other participants, so you know who you can vote for.

[Interviewer 2 collects ballots, and tallies results, and tells interviewer 1]

Interviewer 1 to elected monitor: You have been elected by the group as the monitor. Please step to the front of the room, and stand beside the large paper. Starting from the next round of activity, you will be able to reduce 300 USH from any contributor, by giving up 100 USH. If you would like to reduce, you will give 100 USH to [interviewer 2], walk up to the board, and mark an X beneath the contributions you would like to reduce shillings from. So if you would like to reduce 300 USH from a person who contributed (point to the second from the left), place an X below it. If you would like to reduce 300 USH from a person who contributed (point to second from the right), place an X beneath it. Give one coin for each X to [interviewer 2].

Rounds 3-6

Interviewer 1: Now please use the screen we have provided and decide how much you would like to contribute to the group pot. We will go around and record your decisions. Place the amount of coins you would like to contribute to the group pot on the symbol. Remember you do not have to contribute if you do not want to, and the coins in the group pot will benefit everyone in the room.

Interviewer 2 goes around and record decision on data sheet. Individual contributions are recorded next to the ID of the contributor. Calculate average, total, double, payoff.

Interviewer 1 writes the results of the donations on the large sheet of paper at the front of the room by writing all contribution amounts in increasing order.

Interviewer 1: Please move all your coins back to your personal pocket. This is the result of all the donations in the room.

Let’s go over how much two participants are going to get.

Pick the third and eight donated amount and go over their payments:
The person that donated X will have Y in his personal pocket, and will get Z from the group pot, totaling Y+Z. The person that donated A to the pot will have B in his personal pocket, and get C from the group pot, making B+C. Now, the monitor can decide if he would like to reduce 300 USH from a contributor.

Interviewer 1 to monitor: Would you like to reduce the 300 USH from any contributor? If yes, please mark an X by the ones you want to reduce from and give 100 USH to [interviewer 2] for each X you mark. If not, let us know now.
Explain results to the room The Xs mean that 300 USH have been reduced from the person that donated the amount indicated to the group pot. So for example, one person that donated X has just had 300 USH reduced from their payoff. Instead of earning X, they will now earn Y.

Announce repetition Now, we will repeat the activity again. After you’ve made a decision the elected monitor will again be given the possibility to take some money away from you. Please move your coins back to their original position so that there are ten coins in your private pot.

(...)

[This process should be repeated for a total of 4 rounds.]

Payoff (end of 6 rounds) for all Variants of the Game

The cards are numbered from one to six. We will ask one of you to pick a card. The number that will be picked will determine which round you will be paid for at the end of the day. For example, if you pick card number one you will be paid for round 1 (point to round 1 results). If you pick card number three you will be paid for round 3 (point to round 3 results). Remember, you will get both what you kept in your private pocket, and the payoff from the group pot.

Interviewer 1 asks the front right participant: Please pick a card from this shuffled deck.

Interviewer 2 records accordingly.

Thank you for your time. You may now leave.