# Public Good Provision and Democracy: Evidence from an Experiment with Farmer Groups in Malawi

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**Abstract**

Farmer groups are the cornerstone of many agricultural projects in the developing world. We conducted a series of public good experiments to study within group cooperation in Malawian farmer groups. In this experiment, we offer farmers the choice to either receive a lower amount over which they have private control or a higher payout that needs to be spent on a public good for the group. We measure cooperation as the degree to which farmers are willing to forego personal rewards for larger, collective rewards. We combine this experiment with survey data and qualitative interviews and shed light on the heterogeneous capacity of groups to cooperate. We find that democratically run groups, in particular those with close social ties, are more cooperative compared to groups with more leader-driven decision-making. Focus groups indicate that this democracy is deliberative in nature, characterized by open discussion, which

does not merely aggregates preferences, but also increases common knowledge and creates goodwill. A second set of public goods experiments in which we experimentally vary decision-making processes yields quantitatively similar results in arbitrary groupings of people and null results in groups with established decision-making procedures, demonstrating the stickiness of institutional rules. The results stand up using measures of collective action in the real world and have implications for the management of these projects in the developing world.

**Keywords:** Farmer Groups, Public Goods, Experiment, Malawi

**JEL Classification Numbers:** O1; Q1; H4; D7

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# 1 Introduction

Smallholder farmers in developing countries face a host of challenges, including, high transportation costs, credit constraints, incomplete input markets and low bargaining power (for some recent examples, see among others: Gine and Yang, 2009, Sexton, 2013, Courtois and Subervie, 2014, Ariga et al. 2019, Prieto et al, 2019). One strategy to increase smallholder farmer competitiveness through economies of scale is the coordination and organization of individual farmers into farmer groups. These groups can range anywhere between loosely organized informal village groups and legally constituted cooperatives, and have come to play a central role in agricultural and rural development strategies in the developing world (World Bank, 2007, Markelova et al., 2009). Farmer groups can help farmers achieve scale in credit, input purchasing, and marketing as well as increasing the efficiency of project activities by spreading the fixed costs of any project over a group. Participation in farmer groups is also advocated as a means to empowerment and strengthening of farmers' political voice. Disregarding some notable exceptions, such as by Francesconi and Wouterse (2015) and Arcand and Wagner (2016), to date, there has been little research focusing on these groups. Even among studies that use randomized control trials to evaluate the effects of projects that employ a farmer group model, examination of the farmer group formation origins, composition, and functioning has not been a focus and is generally left in the background (Burke, 2014, Duflo et al., 2014, Ashraf et al., 2009).

In this study, we aim to contribute to our understanding of farmer groups, using a combination of survey, experimental and qualitative data collected from 250 villages in central Malawi during 2014 and 2015. Our inquiry centers around within group cooperation, and in particular the ability of farmer groups to come together and invest in the common good, at the expense of individual welfare. This ability for collective action is crucial to the success of any similar development project (see also Fearon et al. 2015). In our context, working

with an international NGO aiming to encourage the uptake of new agricultural technologies and improve access to markets, examples of this need are plentiful. For instance, farmers are asked to work together on demonstration plots, volunteering their time, but sharing all output and knowledge equally. Or farmers are requested to apply for group loans for agricultural inputs, taking joint responsibility in case of default. Or farmers are asked to pitch in for the cost of a truck to pick up the produce of all. In each of these cases, farmers have limited individual incentive to invest, and incur time and monetary costs, but the overall outcome conditional on this individual investment dominates (in a way that becomes clear soon) the outcome in which no such investment takes place.

Our main tool is a series of public goods experiments. In the standard version of this experiment, participants are asked to divide a (researcher-provided) endowment between a private account and a common account. The funds in the common account are shared equally between all participants while the funds in the private account are used by the participant alone (in our experiments, however, the groups members were asked to use the funds to finance a public good of their choosing, a difference to which we return below). The experimenter multiplies the funds in the common account by a factor larger than one and less than the number of participants. By noting the amounts placed into the common account, the researcher can measure individual participants' willingness to forgo personal monetary rewards for larger, collective monetary rewards. In effect, according to standard economic theory, participants will not contribute anything to the common account, even though contributing one's full endowment maximizes the earnings of all; thus, the equilibrium outcome is non-cooperative and inefficient. However, analysis of this experiment in university laboratory settings have generally found that participants do cooperate, often contributing 50 percent of their endowment, though cooperation declines over time (see Ledyard, 1995, Chaudhuri, 2011, and Vesterlund, 2012, for an overview).

These encouraging results obtained in university laboratory settings might not readily

extend to field settings. On the one hand, increased heterogeneity of preferences might reduce cooperation (see Kolle, 2015 for evidence from the laboratory, and Archambault et al. 2016 for evidence from Kenya). On the other hand, the close social ties observed in field settings might trigger altruism (Guala et al., 2013 show such an effect in the laboratory) and the corresponding moral norms might deter free-riding (Dal Bo and Dal Bo, 2014 show such effects in the laboratory).[1] In addition, field settings might be affected by the presence of an existing social dilemma. Jang and Lynham (2015), for instance, document a spillover of sharing norms in Ugandan fisheries on behavior in an experiment in the field.[2] Related, Braaten (2014) documents that communities in rural Peru with a norm of joint-ownership contribute more to the common account in a public goods experiment compared to communities without such a norm.[3] Leadership can also play a more prominent role, as illustrated by the public goods experiments of Jack and Recalde (2015) among rural communities in Bolivia (see also Gauriot and Page, 2015). The scope for variation in field settings becomes clear when considering the results from Henrich et al. (2004), who conducted public goods experiments across many countries and cultures and document a high level of cross-group variation in cooperation.

In this study, we are able to take advantage of the rich tapestry of social relations and local political variations in rural central Malawi to further shed light on the determinants of cooperation within farmer groups. We worked together with an NGO, Clinton Development Initiative (CDI). In 2014, CDI was planning an expansion of their project into two districts in central Malawi: Dowa district, north of Lilongwe, the country's capital, in the central region of Malawi and Kasungu district, North-West of Lilongwe, bordering Zambia. Dowa is

[1] See also the work of Visser and Burns (2015) who explore the role of income inequality and social attitudes in South African fishing villages.

[2] Interestingly, the reverse is also possible, see, for instance Turiansky, 2015.

[3] Englmaier and Gebhardt (2016) show that when social dilemmas are presented in laboratory settings of the public goods experiment, results are substantially different than when social dilemmas are not made salient.

a densely populated district with lower than national poverty rate and an average climate. Kasungu has a lower population density, a large hinterland and higher than average poverty rate. The project consisted of agricultural extension and marketing activities, and was implemented through farmer groups.

Together with CDI, we randomly selected 250 villages in one sub-district within Kasungu and Dowa district each (as we note later, this is almost a census of all villages in these sub-districts). We divided this set, randomly, into 125 treatment villages and 125 control villages. The 125 treatment villages were asked to form farmer groups, and participate in the NGO's project. Throughout this process, we collect data. We interviewed communities, households and group leaders in 2014, prior to the start of the project. We conducted two public goods experiments. The first was conducted among group members only (in the treatment villages who were yet to receive the project) in 2014. In 2015, inspired by the results from the 2014 experiment, we expanded this to a (random) selection of control villages, this time introducing random variation in the experiment itself on one of the key variables (to which we will return later). Throughout the 2014-15 period, we visited selected villages for focus groups interviews. To be clear: The overall goal of our data collection, at the start of this project, was to shed light on the heterogeneity among farmers and communities which would affect project effectiveness. The focus of this paper, hence, is not on the project itself (even though we will touch on some aspects), but rather on the within group cooperation needed to successfully implement the project.

Our findings can be summarized as follows. First, considering the group formation process. Among 125 villages, 87 villages formed farmer groups. These farmer groups were asked to self-appoint leaders: a lead farmer, chair person, treasurer and secretary. We note that these leaders are, on average, more educated and wealthier than the other group members. Using household data on social relations, we note that groups choose leaders according to an intuitive set of network characteristics known to the group that correlates

with the specific leader's function. For instance, the treasurer is, on average, significantly more "trusted with a valuable object" compared to other group members.[4]

Second, looking at the degree of within group cooperation as measured by the first public goods experiment, which was, recall, conducted among group members only. On average, group members contribute 43 percent of their endowment to the common account. A plurality of group members (24 percent) contribute 25 percent of the endowment, followed by 50 percent of the endowment by 23 percent of the members, followed by 12.5 percent of the endowment by about 18 percent of the members and 100 percent of the endowment by 13 percent of the members. So what is determining this variation across groups? Throughout this first experiment, and while collecting survey data, we noted that the farmer groups are heterogeneous in terms of social relations, i.e. the social connections between the members, and political processes. In particular: Across groups, decision-making rules by which decisions about group's participation in the project were made, exist along a spectrum ranging from highly centralized (leader-driven) decision-making to highly decentralized (democratic) decision-making. When regressing the contribution to the common account against these factors (while controlling for others), we noted that the degree of democracy correlates strongly with the outcomes of the experiment. Democratic groups contribute, on average, 44 percent more to the common account than groups where decisions are made by the group's leaders.[5]

[4]This would suggest that these leaders were selected in a deliberative manner, a point explored by Grossman and Baldassarri, 2012, Grossman, 2014 and Stryjan et al. 2015 and to which we return later.

[5]This importance of local institutions did not come as a surprise to us. Following Ostrom (1990), a rich body of literature studies the role of community organizations in addressing common-pool resource problems (see also Dietz et al. (2003) for a review). Set in Malawi, Zulu (2008), for instance, investigates the poor performance of local committees responsible for managing forest resources, and **Skjazlsvold** (2010) similarly reports on failed irrigation schemes. Pagdee et al. (2006), using a meta-analysis, identify key factors for the success of community forestry: substantive community involvement, strong community social capital and the involvement of local leaders (see also Wade, 1989, Agrawal et al. 1999, Gutierrez et al. 2011 for more overviews). However, results from these studies are of limited use when considering contribution to a public good among farmer groups. First, cooperation while refraining to over-utilize a common resource versus contributing to a public good might differ, as illustrated by Stoop et al. (2012) who note a discrepancy among these two aspects among Dutch fishermen. Second, these studies are often qualitative in nature, limiting us in terms of quantitative insights.

As noted before, unlike a standard public goods experiment, where the funds in the common account are divided up and returned to the participants (equally), in our experiment group members were asked to use the funds to finance a public good of their choosing. While we note that democratic groups and leader-driven groups use funds on similar types of public goods, such as improved inputs for a joint field, or transportation, it is this aspect of our experiment that has likely contributed to these results - as the process through which the decision is reached on what the funds should be spend is different. Adding the second layer of heterogeneity into the regression analysis, we note that democratic groups achieve more cooperative outcomes primarily in the presence of strong social ties, while such social interactions lead to less cooperation in leader-driven groups.[6] These results are consistent with a large body of literature in the social sciences on the relationship between public good provision, redistribution and democracy (see, for instance, Olken, 2010; Hinnerich and Pettersson-Lidbom, 2014).[7] [8]

Third, in this context, democratic decision-making might not only have intrinsic value to the experiment participants, but might also allow the group to aggregate their preferences and, importantly, information about the various public good options. Our focus group interviews suggest that the latter channel is particularly important. The groups note that the democratic decision-making process employed is deliberative in nature. When making the decision as to what to spend the funds from the experiment on, participants discuss the pros and cons of the various options, learning about the options as well as each other's preferences, before making a decision which usually would get unanimous consent. This is

[6]We recognize that the literature on social identity, ethnicity, cooperation and public good provision is vast, and do not see our study as contributing substantially to this literature. For introductions, see Easterly and Levine, 1997, Alesina et al, 1999, Grootaert et al., 2002, and Voorhees et al. 2018.

[7]Our results differ, however, from Grossman and Baldassarri (2012), who, allowing for sanctioning in a public goods experiment, find that leadership can increase cooperation.

[8]Note that in our setting we cannot disentangle the leadership style from the decision-making rules, as leaders were self-selected. Leadership within the democratic groups is however expected to be important, as illustrated by Humphreys et al., 2006.

also consistent with the inverse-U shaped pattern between average contributions and group size in the democratic groups: while initially additional viewpoints are beneficial, at some stage, as the number of participants further increases, agreement is more difficult to reach via deliberation.[9]

Fourth, while the results of this public goods experiment are robust to a rich set of controls (and we show no statistical difference in group characteristics along observable dimensions between democratic and leader-driven groups), we further test the robustness of these results using the second public goods experiment. This experiment was designed after we had analyzed the results of the first experiment. This process allowed us to zoom in on the main deciding variable: the degree of democracy. Hence, the second experiment was set up in a similar manner as the first, but altered in one significant way that introduced random variation in the decision-making rule applied by each group during the course of the experiment. Half of the groups were randomly selected to utilize a rule in which they were asked to reach consensus through democratic deliberation while in the remaining groups decisions for the uses of the funds were made by group leaders before others were introduced to the experiment. Using this set-up, we formulate our final result. When we experimentally vary the degree of democracy in random groupings of individuals in comparable (project control) villages, we find the same qualitatively and quantitatively comparable result: democracy increases contribution to the public good. However, when we experimentally vary the degree of democracy among the (established) farmer groups we find no significant relationship between common account contributions and the degree of democracy.[10] These null results

[9]Madajewicz et al., 2017, use an experimental approach to also further distinguish between different types of democratic approaches, and find that, within the context of safe water provision in Bangladesh a regulated community approach dominates other approaches. Fung and Wright (2003) also note that this type of deliberative decision-making has benefits over a simple vote as it allows participants to consider aspects such as reasonableness, fairness, or acceptability of a given option to others. And, Olken (2010), randomized the political process through which Indonesian villages can select and invest in infrastructural public goods. He finds that a democratic process increases knowledge about the public good, changes preferences, and results in an increase in the willingness to contribute to the public good.

[10]These results contradict findings in Grieco et al. (2016): randomizing the decision-making process

among the existing groups demonstrate the stickiness of institutional decision-making rules, and note the importance of understanding existing decision-making rules and processes. For example, while one might want to randomly assign farmer groups to employ democratic or leader-driven decision-making, the imposition of such an exogenous relationship might be difficult and might not have any "bite" (this is consistent with the result of Humphreys et al., 2019 who found that exporting democratic practices to villages in the Congo had no significant effect on the functioning of a cash transfer project; See also Casey et al. 2012).

These results have implications for the functioning of community-driven development projects and programmes, i.e. that incorporate local management and input into the design and implementation, popular among NGOs and governments alike. In our context, we note that NGO-facilitator is more likely to interact with leader-driven farmer groups (a result we present in the conclusion of this paper). As these are also the least effective in harnessing their social capital, this might imply that much of the cooperative potential of local communities is untapped. To be successful, community-driven development programs need to consider their local realities (Mansuri and Rao, 2012, Wong 2012, Fung and Wright 2003, Ohja et al. 2016, Casey 2018), especially if they seek to circumvent issues around elite capture when programs are decentralized (Platteau and Gaspart, 2003).

This paper proceeds as follows. The next section provides describes the data. Section 3 presents the main body of the analysis and Section 4 concludes with a discussion.

among 10 existing community-based groups in South African townships, they find that a dictatorial regime, in which the leader selects the public good, results in a higher contribution to the public good compared to the more democratic regimes where townships vote on leaders who determine the public good. We attribute this discrepancy in results to two factors: a difference in group sizes and the specifically deliberative nature of the democracy in our setting.

# 2 Data

Our study took place in two districts in Central Malawi: Dowa and Kasungu. Districts in Malawi are further sub-divided into Extension Planning Areas, or EPAs. Together with CDI, we selected two EPAs as study sites among the EPAs in which CDI had not yet worked (prior to 2014): Chibvala EPA, in Dowa district, and Mtumthama EPA, in Kasungu district. The total number of villages in these two EPAs amounts to 360; we selected the 303 villages which had more than 50 households and randomly selected 250 from this set. Half of these 250 villages, again randomly selected, were invited to participate in CDI's project, i.e., these were the treatment villages.

Recall that the goal of the project was to disseminate information on improved agricultural practices and to improve access to markets. The project works with farmers through farmers groups, which CDI asks selected villages to form. Group sizes are limited to 20 members and CDI encourages women to sign up. Once groups are formed and registered, CDI asks the groups to select a lead farmer, a chairperson, a treasurer, and a secretary to liaise with CDI. The lead farmer plays a key role in the dissemination of agricultural information to the rest of the group, while the chair person is in charge of overall coordination and management. The treasurer keeps the funds secure, and the secretary keeps the group's records. Within this project, farmers are asked to work together on several activities. For instance, selected groups were asked to set up demonstration plots, and work on this plot together throughout the season. Other groups were asked to visit a field-day together. Selected groups were also asked to apply to a group input loan scheme. Others were asked to coordinate harvesting and transportation to take advantage of a new output marketing channel.

We collected data in 2014 and in 2015, before the project and one year into the project.[11]

[11]The data collection followed the Human Subject Protocols as outlined by the participating research institutions in 2013: The University of Illinois, Sussex University and the local partner institution, Bunda

In 2014, the data collection include a public goods experiment among all farmer groups and household surveys in all 250 project villages. In 2015, we conducted the second public goods experiment and a leader survey (with a revised sample to which we return below) and household surveys among 100 selected project villages. We return to these data sources below. We also administered a village questionnaire among a knowledgeable individual, often the village head or secretary to the village head.[12] And we conducted focus group discussions with ten randomly selected groups in 2015, following Morgan (1997) and Krueger and Casey (2015).[13]

## 2.1 Public Goods Experiments

### 2.1.1 First Experiment: Modified Public Goods Experiment

The first public goods experiment was conducted in 2014. Among the 125 treatment villages in the treatment group, 87 formed farmer groups These farmer groups are the sample for the first experiment (note that 53 villages formed more than one club, in which case one club was randomly selected to be part of the experiment).[14]

We started off the experiment by inviting all group members to a central location in the village and recorded, in private, their age, gender, education level and acreage of land owned. In total, we conducted 87 experiments with 1,084 group members (representing about 75 percent of all group members, or an average of 12.5 per group). Panel A of table

College, now Lilongwe University of Agriculture and Natural Resources. We can share ethics approval documentation upon request.

[12]This village questionnaire covered information on the village's distance from paved roads, population, access to NGO or governmental extension workers, price of daily labor during harvest, and involvement with other civic organizations.

[13]Questions included: "What are the challenges of managing a demonstration plot together?", "Who did you know before you formed the group and in what capacity?", "How does your group generally make decisions?", "Why was this decision-making process chosen?".

[14]We noted that farmer groups are more likely to be formed if the village is more distant from the market, has a smaller number of villagers and has a tradition of community organizations. Conditional on a group being formed, it appears that the educated members are more likely to join, and, if the village is close to the market, women are more likely to join than men.

1 describes the sample. On average, group members are 38 years old, received five years of education and own close to 5 acres of land. Roughly half (48 percent) of group members are female.

After collecting this information, we explained the experiment to all members present: Each group member was asked to divide 400 Malawian Kwacha (MK, equivalent to one USD at the time of the experiment and provided by us; in 50 MK denominated notes) into two shares. One share, labeled the "individual account, "would be the group member's money, i.e., the group member owns this money and decides on its use. The other share, labeled the "common account," was placed in an envelope and shared with all group members, i.e., the group members together decided on its use. The money placed in the "common account", once aggregated, was multiplied by two by the research team. We illustrated this multiplication process with actual bills. We then emphasized that the decision as to how much to place in the common account belongs to each individual and is a completely private and confidential decision. To further allow for confidentiality, we also placed an amount, unknown the farmers, into the common account ourselves. Before the group members made their decisions, but after the experiment was explained, we gave the group members the opportunity to discuss how the money in the common account could be used. We did not monitor the process by which this decision was made, and did not impose any time constraints.

We then asked the group members to disperse and make their decision, individually and in private. We recorded, in a confidential manner, each member's decision. Once each group member made their contribution decision, we collected all "common account" envelopes, added our own envelope, mixed up the envelopes, and opened them. We then counted the total amount in front of the group, added an equivalent amount and returned the full amount to the group.

Panel A of table 1 summarizes the main result of this experiment: on average, group

members contributed 43 percent of their endowment to the common account. This is similar to patterns of contributions in other studies utilizing variants of a public goods game. For example, a review by Chauduri (2011) notes that individuals on average contribute between 40 percent and 60 percent of the experiment's endowment. Figure 1 reveals the extent of variation in individual contributions to the common account. Each participant received eight 50 MK bills, which is why we divide the histogram in figure 1, into eight bins. We see here that a plurality of group members (24 percent) contribute 100 MK followed by 200 MK (23 percent), 50 MK (17.9 percent) and 400 MK (13.4 percent).

Before leaving the group, we recorded the intended use of the common account funds and organized these by intended use. Table 2 presents the results from the 81 groups who had made a decision within a reasonable time frame. 33.3 percent of groups mention they'll use the funds to finance expenditures such as transportation to field days, hosting of extension agents, communication with extension agents and purchasing stationary. Another 15 percent of groups stated that they would use the funds to set up some type of ROSCA style bank that will lend to the various club members in turn. Another 24 percent of groups mention investment in agricultural inputs that would be used to run a demonstration plot, e.g. improved seeds. Among the remaining groups 24 percent mentioned that they intend to open a bank account for undefined reasons and we were unable to categorize the use of funds in 5 percent of the cases. All uses mentioned constitute some degree of a public good. That is, no group stated that they would divvy the total up amongst themselves. In this way, our experiment differs from what is usually done in laboratory settings, where the researcher divides up the funds of the common account among the participants (see Ledyard, 1995, Chaudhuri, 2011, and Vesterlund, 2012, for an introduction and overview).[15]

[15]Foreshadowing the role of democracy in the contributions, it should be noted that the choice of the public good does not appear to depend on the decision-making process. The Pearson Chi-Square test of independence between the variables in table 2 indicates that we cannot reject the hypothesis ($p = 0.319$) that these variables are independent of one another.

For further detailed experimental instructions, refer to the online Appendix.

### 2.1.2 Second Experiment: Randomized Modified Public Goods experiment

The following year, in 2015, one year into the project. We took advantage of the project's setting to conduct the public good experiment in in 50 control villages - villages that had never been exposed to CDI's farmer group program. The public goods experiment participants in control villages consisted of the ten randomly selected individuals in our survey sample associated with the project.[16] In addition, we returned to the same (and 14 additional) farmer groups.[17]

The framing for the experiment remained roughly consistent with the experiment played in 2014: we asked each group to select a public good to invest in using proceeds from the experiment. The experiment was altered in one significant way that introduced random variation in the decision-making rule applied by each group during the course of the experiment. Half of the groups were randomly selected to utilize a rule in which they were asked to reach consensus through democratic deliberation while in the remaining groups decisions for the uses of the funds were made by group leaders before others were introduced to the experiment. Henceforward, we call the former treatment "democracy" and the latter "leader-driven." Appendix table 1 shows successful randomization along observable dimensions in this second experiment.

In both experimental treatment versions, we first informed the group leaders that during the experiment we might be presenting them with an alternative means of decision-making than the one adopted by the group itself. Specifically, we invited them to consider the experimental method of decision-making as one they could gain insights from when considering

[16]Note that while the project consistent of 125 control villages, only 50, a randomly selected subset, were visited by our research team in 2015.

[17]The 13 additional groups come from the same villages as the original 87. Recall that in 2014, we only included one group per village in our survey - but several villages had more than one group. In 2015, we allowed additional groups in the same 87 villages to participate in the experiment in order to increase our sample size to 101 groups.

the role of different modes of decision-making in influencing group outcomes.[18] In the leader-driven treatment, we informed the group leaders about the nature of the experiment and then invited them to decide how the funds in the common account will be used by the group. In the democracy treatment we informed the leaders that we would be inviting each group member to share their thoughts on how the common account should be used and that members would be invited to share their thoughts in a random order. After each member shared his or her thoughts, the leaders would be asked to facilitate a conversation in which the group would reach a consensus regarding the intended use of the common account.[19] Once a decision was made in either the leader-driven or democracy version of the experiment, the intended use of the public good would be announced to the entire group and group members would be invited to privately contribute to the common account in the same manner as in the 2014 experiment.[20]

For further detailed experimental instructions, refer to the online Appendix.

## 2.2 Household Survey

An additional source of information consists of data collected as part of a household survey. In the project control villages a survey was administered to ten randomly selected individuals from the group's village. In the project treatment villages with farmer groups, this was stratified among five randomly selected group members of a single group present in the

[18]The challenge in translating the public goods experiment for random groupings of individuals, as opposed to established farmer groups, is in framing the experience so that the concept of a public good is made salient to individuals participating in the experiment. To do this, we asked the participants to imagine themselves as members of a farmers group that collectively provided benefits to participating households. We mentioned that such a group typically adopts a leadership structure in which a chairperson helps to set the group's agenda and the treasurer manages group funds. We asked each group to select a chairperson and a treasurer who would be taken aside and be given further instructions.

[19]We also emphasized the importance of valuing each group member's opinions equally and not forcing a group in a particular direction when consulting on the final use of the common account.

[20]Between 2014 and 2015 the value of a USD increased from close to 400 MK to 500. Thus, in 2015 we distributed 500 MK instead, also in 50 MK denominated notes.

village[21], and five non-group members.

The survey modules of 2014 included information on: household composition, asset holdings, social networks and group decision-making processes. The survey modules of 2015 also included information on the knowledge and adoption of agricultural technologies (in particular, integrated soil fertility management techniques, the main set of technologies CDI focused on).[22]. In each case, we interviewed the head of the household, noting that this is not always the individual who participates in the experiment.

### 2.2.1 Social Networks

In 2014, the respondent was asked to describe the nature of their social relationships with each of the members of the farmer group.[23] Thus, if there are ten members in a group, the respondent was asked to detail their relationship with each of the other nine members (excluding him/herself). We formulated and asked the following four questions (adapted from Conley and Udry, 2010): (1) "Do you know who this person is?" (2) "Have you asked this person for advice about your farm in the past year?" (3) "Could you approach this person if you had a question about farming?" and (4) "Would you trust this person to look after a valuable item for you?"

Focusing on the farmer groups in 2014: Individual responses to each of these questions are reported in panel B of table 1. On average, the respondent knows 88 percent of other group members, seeks advice from 24 percent, can approach 80 percent of group members for farming advice, and can trust 68 percent of other members to hold valuable items (the

[21]One of these survey respondents is the chosen group's lead farmer. Recall that in which there are multiple CDI groups present in the village, we randomly choose one of them to participate in the public goods experiment and the survey.

[22]The questionnaires are available at the project's website: https://sites.google.com/site/taraaksharresearchproject/

[23]In the control villages, we documented the nature of each individual's relationship with each other experiment participant in 2015. For the purpose of this analysis, we use social network data collected at the time of the experiment itself, in particular, kinship ties and the frequency of conversation.

latter three statistics are unconditional averages).[24]

These measures provide a proxy for the nature of each individual's relationship with other group measures along multiple dimensions. But we can also construct a mirror-image of these proxies by aggregating the total number of survey respondents who responded yes to any one question towards each individual. In this way, we gain insights on the perceptions of the social qualities of each group member from those who participated in the survey. For example, we additionally construct a measure of "trustworthiness" of any individual $i$ by taking the sum $\sum_{i \neq j} \frac{g_{ji}}{N}$ where N is the number of group members responding to the survey and $g_{ji}$ is equal to 1 if individual $j$ stated that he could trust $i$ with a valuable object. We construct measures of how "well known," "approachable", and "advising" any group member $i$ is deemed to be by survey respondents using the same method.

This allows us to understand how leaders differ from non-leaders. Table 3 compares lead farmers' (LF), chair persons' (CP), treasurers' (T), and secretaries' (S) characteristics to the characteristics of non-leaders. We see that LF and CP are more likely than non-members to be male, and T are more likely to be female. LF, CP, and S have more years of education than the average club-member. LF are wealthier on average than other club members and also tend to contribute more to the common account during the experiment. At first glance, leader-reported measures of social connectedness do not seem to depend on leadership status - leaders do not report themselves to be, on average, more connected than other members. However, table 4 presents a simple logit analysis suggesting that particular measures of leader connectedness are more correlated with different leader types in an intuitive manner. This table suggests that, controlling for village fixed effects characteristics, clubs typically choose lead farmers who they go to for advice; chair persons are generally more approachable than the average club member (for advice), and treasurers are generally more likely to be trusted

[24]A note on sample size: While we have 435 (87 by 5) CDI households covered in the household survey, only the households with presence at the experiment are included in these descriptive statistics. This leaves us with a sample of 398 matched households.

with valuable objects. This suggests that clubs choose leaders according to an intuitive set of network characteristics known to the club that correlates with the specific leader's function.[25]

### 2.2.2 Group Decision-Making

In 2014, the respondent was asked to list the organizations and associations that the household participates in: i.e., to list for each member of the household the associations and organizations in which he or she participated. For each organization that the respondent (personally) belonged to, we asked a series of follow up questions about the organization (from Grootaert et al. 2002), including: "How does the group usually make decisions?".[26] Respondents could choose among the following responses: (1=) "The leader decides and informs the other group members" (2=) "The leader asks the group what they think and then decides" or (3="The group members hold a discussion and decide together", or (4=) "Other."

Focusing on the farmer groups in 2014: Panel C of table 1 shows individual responses to this question.[27] Of the 261 responses, roughly half of the respondents indicated a more leader-driven decision-making process responsible for group decisions - 51.3 percent of respondents chose option number (1) or (2). 41 percent of respondents indicated a democratic decision-making process; this is option number (3) and only 8 percent of the respondents chose "other," indicating that the first three options sufficiently outline the set of decision-making methods employed by the majority of the groups.

Note that within-group responses to this question may differ despite the fact that the

[25] A note on sample size: These tables require matching in individual names across different data sources, an exercise which yields a smaller sample.

[26] Other follow up questions include: "How often did the group meet in the past year?", "Overall, in your view, how effective is the group's leadership?","How strongly do you agree with the following statement: I am able to express my views at group meetings?", and "How strongly do you agree with the following statement: I am able to influence the views of others at group meetings."

[27] A note on sample size: a significant sub-section of the respondents were not personally involved in a CDI group (rather another member of the family was) and, among those that were involved, some stated that their group had yet to meet (and hence felt they could not respond to our questions). We remain with 261 responses that capture information regarding the decision-making processes present in our farmer groups.

question solicits information regarding a group-level process. Certainly, subjective perceptions of, and experiences with, the decision making process may differ depending on one's experience with the group. However, we are primarily interested in whether a group makes decisions in a *relatively* democratic or leader-driven manner. From the focus group discussions we learned that groups do not strategically choose decision-making methods but rather adopt whatever collective decision-making methods they are accustomed to using in their village. Half of the ten clubs interviewed stated that they have a democratic process in which they hold discussions to determine directions for collective action while the other half suggested that their leaders have the final say over the club's decisions. However, within these, there were degrees of discussion-based decision-making adopted by the democratic groups as well as various forms of member contributions in leader-driven groups. In this way, the responses can be thought of as providing information on the placement of a group along a spectrum of decision-making methods between two extremes: fully democratic and fully leader-driven. The average group-level response to this question will allow us to identify where a group lies along this spectrum.[28]

### 2.2.3 Knowledge and Adoption of Agricultural Technologies

In 2015, we also collected information on adoption and knowledge of agricultural technologies. We focused on integrated soil fertility management technologies. We asked the respondent whether or not they planned to adopt a particular technology (in the 2015-16 season), and if so, followed up with details, and if not, asked for reasons for non-adoption. We include questions on: seed treatment, seed selection, plot lay-out (inter-cropping, rotation, fallow, etc.), fertilizers (inorganic, organic and fertilizer trees), and other inputs: pesticide, herbicide, fungicide. We aggregate the responses in a total adoption score out of 13.

For the knowledge module, we build on Kondylis et al. (2017) and incorporated twenty

[28]In calculating the average, we omit responses that answered "other."

questions to assess knowledge about the techniques introduced by CDI. These covered practices for soybean, groundnut and maize. All questions had a correct response and based on CDI's advice. Responses were true/false, multiple choice or a numerical. Questions ranged from listing the general benefits of certain ISFM practices, such as the benefits of growing soy bean in crop rotation, and covering the soil with crop residues, as well as knowledge about how-to-apply ISFM practices including: how many weeks after planting should you apply urea fertilizer on maize; what chemical is best for controlling soy rust; where on the field should one plant fertilizer trees; and when mixing inoculant, how many table spoons of sugar should one add to the inoculant bag. We code the answers as correct/incorrect and compute a total knowledge score out of 20.

## 2.3 Leader Survey

In 2015, we also surveyed the leaders of the groups (the chairperson, secretary, treasurer and lead farmer) to learn more about group activities. These surveys were conducted prior to playing the 2015 round of the public goods experiment. The group's chairperson, lead farmer, secretary and treasurer were asked to congregate in a central location to provide collective responses to a series of questions about the group's interaction with CDI field officers, the decision-making process, frequency of meetings, use of funds, and description of primary activities.

The question on decision-making was phrased in a similar manner as before: How did the group usually make decisions in the last year? Respondents could choose between the following options: (1) The leaders decide and informs other group members, (2) The leaders asks group members what they think and then decides, (3) The group members hold a discussion and decide together, and (4) Others. In the analysis, since all leaders respond to this question simultaneously, we treat responses as a categorical variable of the decision-making method in the group with three categories: authoritarian (option (1)), mix (option

(2)), and consultative (option (3)).

The distribution of the responses was similar as in the members' survey. Among the more democratic groups, leaders noted to be more committed to reaching agreement through discussions while stating that when there are disagreements, the group's decision follows the majority rule after a vote. In effect, voting was often seen as a last resort, in case agreement could not be reached. This process was also confirmed in the focus group interviews.

Questions on group activities included, among others: "How often did your group meet in the last year during the planting and harvesting seasons?", "One year ago, did your group play a experiment with researchers where the group member contributed some money to a common fund in order to use the common fund towards a project of the group's choice? If so, can you tell us what the funds were used for?" Questions were also asked on the interaction between the lead farmer and CDI, such as: "Did you attend a classroom training hosted by CDI in December 2014?" Finally, we included questions on cooperation within the group, as in "Does the group have a rule in place to deal with those who could not cooperate?" and "Is cooperation easy or difficult to achieve with this activity (where "this" refers to a series of activities the group undertakes)?" The full set of questions posed to leaders is available in the online Appendix.

# 3 Analysis and Results

To set the stage for the analysis, we first use the results of the first experiment to explore individual correlates of common account contributions by regressing individual contributions against individual characteristics in Column (1) of Table 5. We find no statistically significant correlation for gender and age while educated and wealthier individuals contribute significantly more on average. In column (2) we incorporate group-level fixed effects and show that these do not change the direction of coefficients relative to column (1). However,

they are able to explain roughly 50 percent of the variation in contributions as exhibited by the jump in the adjusted $R^2$ value from 0.04 to 0.52. Indeed, a one-way ANOVA regression provides an intraclass correlation coefficient of 0.51, suggesting that half of the variation in contributions is strongly related to group-level factors.This difference is likely due to the local economic, social, and political context each group is embedded within, as well as possibly positive assortative matching.

This within group correlation is also reflected in appendix Figure 1, which shows the group-average distribution of the contributions to the common account in the first experiment. Compared to Figure 1, this shows a more balanced distribution of group-level contributions, which suggests key differences in group vs. individual contribution behavior.

## 3.1 Empirical Specification

To understand the relationship between cooperation and group characteristics, we present a basic empirical specification. In essence, we hypothesize that economic factors may influence cooperation, including, wealth (land size and asset holdings), education and age. In addition, local context might affect the value of the public good, and can be partially characterized by village-level variables. such as, village size, market access and familiarity with civic associations. For example, one may expect that villages isolated from market centers might place higher value on self-provided public goods. Similarly, direct access to NGO or government provided public goods might disincentivize group members from contributing to group-provided public goods. Finally, and the focus of our analysis, social relations and decision-making processes might influence cooperation.

We denote the farmer group $S_j$ as the unit of analysis and then regress the average contributions to the common account against the decision-making process employed by the

group alongside other covariates as follows:

$$C_j = \alpha + \beta_1 R_j + \beta_2 S_j + \beta_3 X_j + \beta_4 V_j + \epsilon_j \tag{1}$$

where each group is represented by subscript $j$. The dependent variable, $C_j$, represents the average share of the endowment contributed to the common account by group members ranging from zero to 100. Variable $R_j$ represents group $j$'s decision-making method which can be either leader driven (0) or democratic (1) - thus, $\beta_1$ can be interpreted as the effect of democratic decision-making on contributions in the public goods experiment in percent terms. $S_j$ represents the degree of social connectivity within the farmer group. We use the group mean of the "approachability" measure for this purpose, as we are primarily interested in whether group members can "approach one another for farming advice since it is this quality of social relationships which underlies CDI's farmer group model.

Vector $X_j$ includes group-level variables such as the group mean and standard deviation of age, gender, years of education, land, and asset stock for all group members and the total number of participants. In other words, we aggregate the variables in panel A of table 1 and include them in the estimation of equation (1) by taking both the per-group mean and standard deviations of these measures.[29]

$V_j$ contains village-level characteristics that may influence the value of the group's public good: the village's distance to a paved/all-weather road, the number of households in the village, the presence of NGO or governmental extension workers, the value of labor during harvest, and the number of civic associations present in the village.[30]

[29] Among these variables, information regarding asset stocks is taken from the household survey which randomly selects five households whose members belong to a CDI group - thus, aggregate levels of asset stocks are assumed to be representative of the group's membership.

[30] A number of the variables in the analysis are skewed quite far to the right. Due to the small sample in the analysis, we apply log transformations of the following variables to ensure our results are not biased by outlier observations: mean and standard deviations of land and asset stock, distance from paved road, the number of households residing in the village and the value of labor during harvest.

Recall that we use the within-group average of the decision-making variable in Table 1 as our measure of group decision-making.[31] The within-group average of the decision-making variable is 2.29 and the median of the within-group average is 2.2 (Recall that this number is between 1 and 3 where 1 is the most leader-driven process while 3 is the most democratic process). To further ease interpretation of results, for our main analysis, we created a binary measure and divided groups into two mutually exclusive groups based on whether they are above or below this median value of 2.2.[32]

## 3.2 Main Results

Table 6 presents results from estimations of equation 1 using the first experiment. Each column progressively adds additional controls. Column (1) includes the effect of democratic groups (relative to leader-driven groups) and shows that democratic groups contribute 14 percentage points more towards the common account (44 percent more than leader-driven groups). Column (2) adds group-level controls, column (3) adds village level controls, and column (4) adds a measure of social interactions. These additional controls have little effect on the coefficient of interest - indeed, adding additional controls marginally increases the coefficient associated with democratic decision-making, evidence that omitted variable bias may not be a significant problem for our analysis and is more likely to attenuate the effect of democratic decision-making than bias it upward. Furthermore, it is quite striking that the difference in the Adjusted $R^2$ is 0.18 between columns (4) and (5). Thus, once accounting for confounding factors, the decision-making variable accounts for nearly 20 percent of the variation.[33]

[31] As aggregate measures constructed using survey data are representative of the group.

[32] In total, we lose information regarding decision-making processes for 13 groups that played the public goods experiment because either we did not capture information from a household member with personal involvement in the group, the group had yet to meet, or a combination of these. Thus, the main analysis is restricted to the remaining 74 groups.

[33] The analysis presented in table 6 uses a binary measure of the group's decision-making process. We can also treat group decision-making as located along a spectrum between zero and one where fully leader

We find that the total share of contribution decreases by 1 percentage point for each additional individual in the group participating in the public goods experiment; this finding is consistent with both theory and empirical results which have found that free-riding increases as the number of participants grows. We also find that among the group-level variables, only average land size significantly influences public goods contributions. The negative correlation suggests that groups with more farming resources (land) may value group-provided public goods less than others. However, groups with greater variation in the distribution of land and education (measured using within-group standard deviations) see higher contributions, on average, than other groups. Finally, the effect of social interaction is not significantly different from zero.

To understand the current estimates as causal, one needs to confront two primary challenges: (i) reverse causality, and (ii) omitted variable bias. First, the groups may select into democratic decision-making due to extant cooperative norms in relationships among group members. In other words, democratic groups may choose to make decisions in such a manner because they are already more cooperative than other groups. However, while plausible, we believe this is not the case in our context: as noted before, we learned through focus group discussions that the primary driver behind the group's choice of decision-making process consisted of existing decision-making norms at the village level. In other words, groups adopted the same decision-making rules used in other group settings within the village. To address the second challenge, we present, in appendix table 2, the mean values of 2014 group characteristics by the decision-making method.

The last column reports p-values associated with t-tests in which the null hypothesis is

driven (equal to zero) and fully democratic (equal to one) processes occupy the two extremes. The use of a continuous measure of decision-making can provide information on the position of each group along this spectrum. The result of an estimation using this continuous measure of group decision-making are consistent with findings from estimations using the dichotomous measure but point estimates increase, suggesting that groups towards the democratic end of the spectrum engage in more cooperative behavior (Results available on request from the corresponding author).

that the sample mean is equivalent across groups that differ along the two types of decision-making. Out of 26 variables tested, only three means differed significantly from each other (at the 90 percent confidence level). First, groups using democratic decision-making methods tend to have two fewer members participate in the public goods experiment than those using centralized regimes. Second, the mean age of group members in groups using democratic methods is two years higher than the centralized regime. Third, 20 percent more of the villages in which groups employed democratic decision-making methods were not visited by government extension workers in the 12 months prior to the survey. It is noteworthy that the decision-making process is not systematically related to any of the network variables, which may proxy for pre-existing norms of cooperation.

The fact that observable characteristics do not predict villages decision-making type does not solve the second empirical challenge: that unobservable characteristics are correlated with decision-making processes at the group-level in a way that may present problems in the form of omitted variable bias. While we do not deny the possibility that such omitted variables exist, we argue that they should not pose a major threat to the identification. Our analysis is primarily driven by group-level differences in cooperation. In order for unobservable factors to influence group dynamics, they must be cultural or economic forces specific to each village that will influence a collective body of people. Given the richness of our data, we can control for many of these forces in our analysis. As the progressive inclusion of controls does little to change the estimate associated with the decision-making variable of interest, it appears unlikely that omitted variables are driving the results in the analysis.

## 3.3 Mechanisms

To gain a better understanding as to why the decision-making process appears to matter so significantly, we do a series of tests. These tests not only strengthen the causal interpretation, but also shed light on the underlying mechanisms.

Figure 2 displays a flexible polynomial relationship between average contributions and group size by the decision-making method. The left panel, which presents average contributions in leader-driven groups and the number of participants, shows what may be a slight negative relationship between the number of participants in the public goods experiment and the contributions. This is expected as larger numbers of participants increase free-riding behavior. A different dynamic emerges in the right panel of figure 2, which includes only democratic groups. The right panel presents a strong inverse-U shaped pattern between the number of participants in the experiment and average contributions. When group sizes are small, additional members increase average contributions, perhaps because of the contribution of new insights in group discussion. However, beyond a threshold of around 11 or 12 individuals, additional members decrease average contributions, perhaps because it becomes difficult for the group to identify a public good compatible with (group) preferences.

This inverse-U shape of the relationship between group size and cooperation in the democratic groups points at one of the main benefits of democracy: knowledge aggregation. As such, we would also expect that groups characterized by strong social relations can aggregate knowledge through discussion to greater effect, thereby contributing more towards the public good. Thus, the effect of social interactions can be expected to be heterogeneous across decision-making methods. This advantage of democratic decision-making, as well as this exact process, was also noted by our focus group participants.

Table 7 presents a test of this proposition. Column (1) indicates a negative effect associated with increased approachability of group members in leader-driven groups and a null effect in democratic groups - in other words we cannot reject a Wald joint hypothesis test that the sum of the coefficients in front of the interacted terms is different from zero. In leader-driven groups, a ten percent increase above the mean decreases cooperation by 8 percentage points. The negative coefficient suggests that, among the direct effects of social interactions in the public goods experiment, the negative effects of social interactions

dominate the positive effects in groups whose decisions are made by leaders. However, much of this negative effect appears to dissipate in democratic settings where the marginal effect of social interactions is positive. To check for the robustness of this result, we control for the direct effect of other measures of social interactions in column (2) and see that the coefficient on the interaction term associated with approachability is significantly positive while the direct effect is not significantly different from zero.[34]

## 3.4 Experimental Evidence

To further strengthen the causal interpretation, we returned to the project area one year later with a second public goods experiment. It should be noted that we had not planned this experiment at the start of the project in 2014; it is only after analyzing the data of the first experiment, that we realized the importance of the social-political background, and in particular the decision-making method the groups employed. Aiming to now experimentally vary this decision-making method, we followed best practice in the literature which was available through working papers at the time in the design of the experiment (Jack and Recalde, 2015, Grieco et al., 2016, and Stryjan et al. 2015).

We expanded the sample to also include random groupings of individuals in 50 villages from the project's control group. Meaning, these were villages that had never been exposed to CDI's project. For these 50 villages: Each experiment was played with ten randomly selected individuals who were also survey respondents in the larger project. Random groupings of individuals are unlikely to have an established mode of decision-making, making it easier to exogenously vary decision-making methods. For these individuals, we documented the nature of each individual's relationship with the other participants, in particular, kinship ties and the frequency of conversation.

[34]By including these additional positively correlated, but not linearly dependent, measures of social interactions we can more effectively zoom in on the relationship between cooperation and the openness to discuss important matters among your peer group in democratic groups.

Results of the experiments are reported in columns (3) through (8) in table 8. In these columns, we show that random groupings of individuals exposed to democratic decision-making increase average contributions to the common account by 10 to 14 percentage points, roughly similar to our OLS results presented in table 6. Furthermore, we (weakly) show that when the participants in the democratic decision-making rule have stronger social ties - defined by the percent of experiment participants who were related to one another or have daily conversations with one another - contributions to the common account increase. This is consistent with the results in table 7, though we suspect we are underpowered and are thus unable to demonstrate statistically significant results associated with these interactions.

We contrast these results with the experimental results from a second group. Recall that we also returned to the same (and 14 additional) farmer groups. Columns (1) and (2) in table 8 show the effect of democratic decision-making on contributions to the public good experiment in established CDI farmer groups. We cannot reject a null treatment effect when the treatment is defined as the random selection into a democratic decision-making rule in established CDI groups. This suggest that established decision-making rules in such groups are likely too sticky to be manipulated by outsiders - groups may make decisions in public goods experiments as though their own decision-making rules will prevail after funds are transferred to the groups.

## 3.5 External validity

Finally, one might wonder whether contributions in the public good experiment lead to increased capacity for collective action in reality, outside of the experiment setting. Recall that in the 2015 interviews with group leaders we gleaned information on aspects of group functioning at least one year following the start of the CDI project.

We asked leaders 1) the number of meetings they held in each season, 2) whether the group provides loans to its members, 3) the three most important group activities (outside of

the ones organized by CDI), and 4) itemized lists of group expenditures over the last year. In category 3), we isolated instances in which the groups indicated that "helping each other" was one of the most important group activities and in category 4) we divide total expenditures into farm/field-rental related expenditures and farming input expenditures — two of the more important types of farmer group expenditures given the nature of their activities.[35] This results in six measures that provide reasonable proxies for a group's capacity for collective action, and can shed some light on external validity.

Figure 3 shows a very consistent trend in which we compare the averages of all measures across decision-making categories and additionally provide the 90 percent confidence intervals for each measure. Each variable is larger among groups with democratic decision-making methods relative to leader-driven decision-making methods.

# 4 Discussion

We study the determinants of cooperative behavior in farmer groups in Malawi using data a mixture of experimental, survey and qualitative data. Our central data collection tool is a public goods experiment. In this experiment, participants are asked to divide a (researcher-provided) endowment between a private account and a common account. The funds in the private account are used by the participant alone. The funds in the common account are multiplied by two, and spent on a public good of the group's choice. It should be noted that groups in this case not only in determine the choice of the public good but are also involved in the production of the selected public good. We identify conditions that lead to cooperation and find that democracy matters.

We find that democratically-run groups contribute about 44 percent more to the public

[35]We included instances in which leaders cited "ganyu" as one of the most important activities in our "helping each other" measure. Ganyu is a form of labor-pooling during labor-intensive farming seasons in Malawi.

good (of their choice) compared with groups run in a leader-driven fashion. This result is strongly dependent on the nature of the social relationships: democratic groups exhibit greater cooperation in the presence of strong social ties. In addition, we also find a concave relationship between the number of members in the democratic group and the degree of cooperation; groups are most cooperative when they include 11 to 12 members. In contrast, increasing numbers in leader-driven groups linearly decreases the average contribution to the public good.

These results, together with insights from the focus group discussions, suggest that cooperation within farmer groups depends on the ability of group members to share information and discuss preferences in a deliberative, democratic manner. In the democratic groups members note to feel welcome to share and listen to others' thoughts in group meetings, and in addition, expect to more effectively coordinate the implementation of the selected public good.

We do not find significant effects on public goods contributions in farmer groups in which we experimentally vary the degree of democracy. However, the experimental variation of the degree of democracy in random groupings of individuals in comparable villages generates similar results and strengthens the causal interpretation. Finally, we note that democracy also correlates with an increased capacity for collective action outside of the experimental setting. This is important as although the participants of our experiment could earn a significant amount, 40 USD, sufficient to purchase inputs for a one acre farm, the usual limitations of these lab-in-the-field experiments apply (see Harrison and List, 2004; and Stoop et al. 2012 for an application).

The degree of socio-political variation within our relative small geographical area is notable. The presence of such variation combined with our results suggests that the socio-political structure is likely to meaningfully impact project outcomes and may call into question the external validity of empirical analysis â randomized controlled trials or otherwise.

This variation as been noted by others. Ostrom (2014), for instance, summarizing her research on irrigation systems in the field, notes that the esteemed localized relationships and institutions that evolve slowly over time to facilitate local collective action are highly complex and subject to nuanced conditions of local social, political and physical environments. For practitioners, especially those involved in community-driven development projects,[36] these results also suggest the importance of attending to group formation as a part of project implementation, and to carefully consider the size of groups, how groups are formed, how leaders are selected, and what, if anything, the project can do to strengthen social ties and encourage democratic practices. Our results using the second public goods experiment are particularly discouraging in this regard as they suggest that imposing a decision-making rules in established community organizations is unlikely to be effective. From a research point of view, this implies that in these types of groups, researchers need to continue to rely on observational data when studying the role of democracy.

Nevertheless, more research is needed, in particular with respect to the possible trade-offs among working with groups with existing social connections and the possibilities of social exclusion based on gender, wealth, ethnicity or other existing power dynamics in the community. We would, for instance, expect that choices regarding group formation might disadvantage sub-populations in a community such as women, widows, the socially excluded, ethnic or religious minorities, and existing groups may exclude such members. It is not obvious that in such a case either a democratic or leader-driven process is preferred. For instance, Stryjan et al. (2015) show that Ugandan community groups who select their leaders through open discussion are less inclusive than those who use secret ballots. In general, we recom-

[36]Community-driven development programs - programs that incorporate local management and input in program design and implementation - can provide benefits to organizations working in developing countries relative to centralized and top-down modes of operation. The decentralized approach to project implementation and design has several attractive features: first, working with groups rather than individuals is a cost effective means to reach more people with a fixed amount of resources; second, community involvement may improve project design and implementation in situations where participants have privileged access to information about local needs, constraints and resources.

mend a combination of methods. While we included focus group interviews in our research, the combination of rigorous quantitative and qualitative methods provides a useful pathway forward. In effect, Mansuri and Rao (2012), in an overview of community-driven development programs, stress the importance of combining qualitative information on local social and political circumstance with quantitative analysis to further illuminate the processes that lead to success in community-driven development.[37]

In addition to paying attention to cooperation with the community group, of particular interest is the relationship between the project and the community. To conclude this discussion, we hence present some preliminary evidence on this relationship from our data. In the interview with club leaders in 2015, we collected information detailing the lead farmers interactions with NGO. We summarize the nature of these interactions in three measures: 1) the number of NGO trainings they attended, 2) whether they knew the NGOS's officer by name, and 3) whether they had communicated with the NGO officer. Appendix figure 2 summarizes these measures by decision-making method utilized by each farmer group; in this case, as defined the group's leaders in the leader survey. The patterns show that leader-driven groups interact with CDI, on average, more than leaders of democratic groups. Leaders in mixed decision-making groups sometimes interact more with the officers than leader-driven group leaders and sometimes interact less, though these differences are never statistically significant.

In appendix table 3 we analyze the extent to which knowledge about and adoption of the new technologies that the NGO recommended in the project differs across the two types of groups. We construct group-level averages of the adoption and knowledge variables collected in the 2015 household survey. Recall that in 2015, we randomly selected 100 villages for resurveying: 50 project control villages and 50 project treatment villages. Of these 50

[37]A similar sentiment is prevails in the literature on management of common pool resources. See, among others, Ostrom (2014) and Agrawal and Gibson (1999).

treatment villages, 37 had farmer groups with the corresponding number of participating households described here.[38] Column 1 shows that any lead farmer who attend any the NGO's training increases their knowledge of CDI introduced technologies by one point (50 percent increase from baseline, with a total possible score of 13). However, democratic groups score one additional point higher. Column 2 switches focus to adoption plans (out of a total possible score of 6). What is striking in this column is that lead farmers who participate in CDI trainings and lead farmers who have ever spoken with CDI facilitators are not more likely to plan adoption of new technologies (among the ones we considered). However, lead farmers of democratic groups have a significantly higher adoption score. Indeed, they plan to adopt 300 percent more of the novel technologies than leader-driven groups. Recognizing the small sample, the self-selection of the leader, as well as the voluntary nature of the participation in the NGO's project, this suggests that it is possible that accountability to group members drives the lead farmers' behaviors in democratic groups in a way that does not drive behaviors in leader-driven groups. To further examine this, we explore non-leader adoption in column 3 and introduce lead farmer adoption as an explanatory variable. Strikingly, the lead farmer adoption plans have no statistically significant relationship with non-leader adoption plans in leader-driven groups; however, they are positively correlated with non-leader adoptions in democratic groups.

So, despite the fact that the gains to cooperation are larger in democratic groups, these results show that the project tends to engage more with leader-driven groups. However, despite this, democratic groups still benefit more from their few interactions with the project in terms in increasing knowledge and adoption, and are likely able to diffuse the benefits of these interactions to members of their own groups to a greater degree compared to leader-driven groups.

[38] In order to increase the precision of the novel knowledge learned and technologies introduced, we remove the 10 most correctly answered questions and the 7 most likely to be adopted technologies in the control villages when generating sums of our knowledge and adoption measures.

To conclude, this study contributes to our understanding of farmer groups in developing countries. We find that, in central Malawi, a close-knit, democratic farmer group enjoys higher cooperation and increased public good provision. Further research into the detailed workings of farmer groups and other community groups, is needed, and expected to feed into a better design of especially community-driven development programmes.

# References


Agrawal, A. and Gibson, C.C. 1999. "Enchantment and Disenchantment: the Role of Community in Natural Resource Conservation." World Development, 27(4), 629–649.

Alesina, A., Baqir, R. and Easterly, W. 1999. "Public Goods and Ethnic Divisions." Quarterly Journal of Economics, 114(4), 1243–84.

Arcand, J.L. and Wagner, N. 2016. "Does Community-Driven Development Improve Inclusiveness in Peasant Organizations? – Evidence from Senegal." World Development, 78, 105-124.

Archambault, C., Chemin, M. and de Laat, J. 2016 "Can Peers Increase the Voluntary Contributions in Community Driven Projects? Evidence from a Field Experiment." Journal of Economic Behavior and Organization 132, 62-77.

Ariga, J., Mabaya, E., Waithaka, M., Wanzala-mlobela, M., and Foundation, M. G. 2019. "Can Improved Agricultural Technologies spur a Green Revolution in Africa? A Multi-country Analysis of Seed and Fertilizer Delivery Systems." Agricultural Economics, 50, 63-74.

Ashraf, N., Giné, X., and Karlan, D. 2009. "Finding Missing Markets (and a Disturbing Epilogue): Evidence from an Export Crop Adoption and Marketing Intervention in Kenya." American Journal of Agricultural Economics, 91(4), 973–990.

Braaten, R.H. 2014. "Land Rights and Community Cooperation: Public Goods Experiments from Peru." World Development, 61, 127–141.

Burke, M. 2014. "Selling Low and Buying High: an Arbitrage Puzzle in Kenyan Villages." Working Paper.

Casey, K. 2018. "Radical Decentralization: Does Community-Driven Development Work?" Annual Review of Economics, 10, 139-163.

Casey, K., Glennerster, R. and Miguel, E. 2012. "Reshaping Institutions: Evidence on Aid Impacts using a Preanalysis Plan." Quarterly Journal of Economics, 127(4), 1755–1812.

Chaudhuri, A. 2011. "Sustaining Cooperation in Laboratory Public Goods Experiments: A Selective Survey of the Literature. Experimental Economics, 14(1), 47–83.

Conley, T.G. and Udry, C.R. 2010. "Learning about a New Technology: Pineapple in Ghana." The American Economic Review, 100(1), 35–69.

Courtois, P., and Subervie, J. 2014. "Farmer Bargaining Power and Market Information Services." American Journal of Agricultural Economics, 97(3), 953-977.

Dal Bo, E. and Dal Bo, P. 2014. "'Do the Right Thing': The Effects of Moral Suasion on Cooperation". Journal of Public Economics, 117, 28–38.

Dietz, T., Ostrom, E. and Stern, P.C. 2003. "The Struggle to Govern the Commons", Science, 302(5652), 1907–1912.

Duflo, E., Keniston, D. and Suri, T. 2014. "Diffusion of Technologies within Social Networks: Evidence from a Coffee Training Program in Rwanda." Working Paper.

Easterly, W. and Levine, R. 1997. "Africa's Growth Tragedy: Policies and Ethnic Divisions." Quarterly Journal of Economics, 112(4), 1203–50.

Englmaier, F. and Gebhardt, G. 2016. "Social Dilemmas in the Laboratory and in the Field." Journal of Economic Behavior and Organization, 128, 85–96.

Fearon, J. D., Humphreys, M. and Weinstein, J. M. 2015. "How Does Development Assistance Affect Collective Action Capacity? Results from a Field Experiment in Post-Conflict Liberia." American Political Science Review, 109(3), 450–469.

Francesconi, G.N. and Wouterse, F. 2015. "The Health of Farmer-Based Organisations in Ghana: Organisational Diagnostics and Governance Implications." The Journal of Development Studies, 51(3), 262-273.

Fung, A. and Wright, E. O. 2003. Deepening Democracy: Institutional Innovations in Empowered Participatory Governance, Vol. 4, Verso, London and New York.

Gauriot, R. and Page, L. 2015. "I Take Care of my Own: a Field Study on how Leadership Handles Conflict between Individual and Collective Incentives." American Economic Review, 105(5), 414-19.

Giné, X., and Yang, D. 2009. "Insurance, Credit, and Technology Adoption: Field Experimental Evidence from Malawi." Journal of Development Economics, 89(1), 1–11.

Grieco, D., Braga, M. and Bripi, F. 2016. "Cooperation and Leadership in a Segregated Community: Evidence from a Lab-in-the-Field Experiment in a South African Township." No. 2016/76. WIDER Working Paper.

Grootaert, C., Van Bastelaer, T., Kahkonen, S., Krishna, A., Pantoja, E., Reid, C., Salmen, L. and Shrader, E. 2002. Understanding and Measuring Social Capital: A Multidisciplinary Tool for Practitioners, Vol.1. Washington D.C.: World Bank Publications

Grossman, G. 2014. "Do Selection Rules affect Leader Responsiveness? Evidence from Rural Uganda." Quarterly Journal of Political Science, 9(1), 1-44.

Grossman, G. and Baldassarri, D. 2012. "The Impact of Elections on Cooperation: Evidence from a Lab-in-the-Field Experiment in Uganda." American Journal of Political Science, 56(4), 964–985.

Guala, F., Mittone, L. and Ploner, M. 2013". "Group Membership, Team Preferences, and Expectations." Journal of Economic Behavior and Organization, 86, 183–190.

Gutiérrez, N.L., Hilborn, R. and Defeo, O. 2011. "Leadership, Social Capital and Incentives Promote Successful Fisheries." Nature, 470(7334), 386–389.

Harrison, G.W. and List, J.A. 2004. "Field experiments." Journal of Economic Literature, 42(4), 1009–1055.

Henrich, J., Boyd, R., Bowles, S., Camerer, C.F., Fehr, E., Gintis, H. and McElreath, R. 2004. Foundations of Human Sociality. Oxford University Press.

Hinnerich, B. T. and Pettersson-Lidbom, P. 2014. "Democracy, Redistribution, and Political Participation: Evidence from Sweden 1919–1938." Econometrica, 82(3), 961-993.

Humphreys, M., Masters, W.A., and Sandbu, M.E. 2006. "The Role of Leaders in Democratic Deliberations: Results from a Field Experiment in São Tomé and Príncipe." World Politics, 58(4), 583-622.

Humphreys, M., Sanchez de la Sierra, R. and Van der Windt, P. 2019. "Exporting Democratic Practices: Evidence from a Village Governance Intervention in Eastern Congo". Journal of Development Economics, 140, 279–301.

Jack, B. K. and Recalde, M.P. 2015. "Leadership and the Voluntary Provision of Public Goods: Field Evidence from Bolivia." Journal of Public Economics, 122, 80-93.

Jang, C. and Lynham, J. 2015. "Where do Social Preferences come from?" Economics Letters, 137, 25–28.

Kölle, F. 2015. "Heterogeneity and Cooperation: The role of Capability and Valuation on Public Goods Provision." Journal of Economic Behavior and Organization, 109, 120–134.

Kondylis, F., Mueller, V. and Zhu, J. 2017. "Seeing is Believing? Evidence from an Extension Network Experiment." Journal of Development Economics, 125(C), 1-20.

Krueger, R.A. and Casey, M.A. 2015. "Focus group interviewing", in K. E. Newcomer, H. P. Hatry and J. S. Wholey (eds.), Handbook of Practical Program Evaluation. Hoboken: John Wiley and Sons.

Ledyard, J. 1995. "Public Goods Experiments" in Kagel, J. and Roth, A. (eds.). Handbook of Experimental Economics, Volume 1. Princeton University Press.

Madajewicz, M., Tompsett, A. and Habib, A. 2017 "Community Participation in Decision-making Evidence from an Experiment in Safe Drinking Water Provision in Bangladesh." Working Paper.

Mansuri, G. and Rao, V. 2013. Localizing Development: Does Participation Work? Washington D.C.: World Bank Publications.

Markelova, H., Meinzen-Dick, R., Hellin, J. and Dohrn, S. 2009. "Collective Action for Smallholder Market Access." Food policy, 34(1), 1–7.

Morgan, D.L. 1997. Focus Groups as Qualitative Research. Vol. 16, Thousand Oaks: Sage Publications.

Ojha, H.R., Ford, R., Keenan, R.J., Race, D., Vega, D.C., Baral, H. and Sapkota, P. 2016. "Delocalizing Communities: Changing Forms of Community Engagement in Natural Resources Governance." World Development, 87, 274–290.

Olken, B.A. 2010. "Direct Democracy and Local Public Goods: Evidence from a Field Experiment in Indonesia." American Political Science Review, 104(2), 243-267.

Ostrom, E. 1990. Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge: Cambridge university press.

Ostrom, E. 2014. "Do Institutions for Collective Action Evolve?" Journal of Bioeconomics, 16(1), 3–30.

Pagdee, A., Kim, Y.S. and Daugherty, P.J. 2006. "What makes Community Forest Management Successful: a Meta-Study from Community Forests throughout the World." Society and Natural Resources, 19(1), 33–52.

Platteau, J.P. and Gaspart, F. 2003. "The Risk of Resource Misappropriation in Community-Driven Development." World Development, 31(10), 1687-1703.

Prieto, S., Ricker-Gilbert, J., Bauchet, J., and Sall, M. 2019. "Incomplete Information and Product Quality in Rural Markets: Evidence from an Experimental Auction for Maize in Senegal." Economic Development and Cultural Change. Forthcoming.

Sexton, R. J. 2013. "Market Power, Misconceptions, and Modern Agricultural Markets." American Journal of Agricultural Economics, 95(2), 209–219.

Skjølsvold, T.M. 2010. "One Size Fits All? Institutional Design: Lessons from two Malawian Examples." International Journal of the Commons, 4(2), 758–771.

Stoop, J., Noussair, C.N., Van Soest, D. 2012. "From the Lab to the Field: Cooperation among Fishermen." Journal of Political Economy, 120(6), 1027-1056.

Stryjan, M., Deserranno, E., and Sulaiman, M. 2015 "Electoral Rules and Leader Selection: Experimental Evidence from Ugandan Community Groups." Working Paper.

Turiansky, A. 2015. "Collective Action in Games as in Life: Experimental Evidence from Canal Cleaning in Haiti." Mathematica Policy Research Working Paper.

Vesterlund, L. 2012. "Voluntary Giving to Public Goods: Moving beyond the Linear vcm." in Kagel, J. and Roth, A. (eds.). Handbook of Experimental Economics, Volume 2. Princeton University Press.

Visser, M. and Burns, J. 2015. "Inequality, Social Sanctions and Cooperation within South African Fishing Communities." Journal of Economic Behavior and Organization, 118, 95-109.

Voorhees, B., Read, D., and Gabora, L. 2018. "Identity, Kinship, and the Evolution of Cooperation." Current anthropology. Forthcoming.

Wade, R. 1989. Village Republics: Economic Conditions for Collective Action in South India. Bombay: Cambridge University Press.

Wong, S. 2012. "What have been the Impacts of World Bank Community-Driven Development Programs? CDD Impact Evaluation Review and Operational and Research Implications." World Bank, Washington, DC.

World Bank, 2007. World Development Report: Agriculture for Development. Washington, DC: The World Bank.

Zulu, L.C. 2008. "Community Forest Management in Southern Malawi: Solution or Part of the Problem?" Society and Natural Resources, 21(8), 687–703.

# Notes

# Tables and Figures

Table 1: Descriptive statistics 2014 data

| | N | Mean | Sd | Median | Max |
|---|---|---|---|---|---|
| **Panel A - Demographic Variables:** | | | | | |
| Share Contributed in Game (0-1) | 1,079 | 0.43 | 0.30 | 0.4 | 1.0 |
| Female | 1,059 | 0.48 | 0.50 | 0.0 | 1.0 |
| Age | 1,082 | 38.77 | 13.12 | 36.0 | 82.0 |
| Years of Education | 1,073 | 5.39 | 3.49 | 5.0 | 12.0 |
| Land Size (Acres) | 1,080 | 4.86 | 10.47 | 3.0 | 260.0 |
| **Panel B - Social Ties - % of Club Members:** | | | | | |
| Known | 398 | 0.88 | 0.15 | 0.9 | 1.0 |
| Sought Advice From | 398 | 0.24 | 0.29 | 0.1 | 1.0 |
| Could Approach for Advice | 398 | 0.80 | 0.24 | 0.9 | 1.0 |
| Could Trust with Valuables | 398 | 0.68 | 0.32 | 0.8 | 1.0 |
| **Panel C - Club's Decision-Making Process:** | | | | | |
| The leader decides and informs the group | 261 | 0.17 | 0.38 | 0.0 | 1.0 |
| The leader decides after consulting the group | 261 | 0.34 | 0.47 | 0.0 | 1.0 |
| The group decides through consultation | 261 | 0.41 | 0.49 | 0.0 | 1.0 |
| Other (unexplained) | 261 | 0.08 | 0.27 | 0.0 | 1.0 |

The data in this table refer to the 2014 round of data collection. The discrepancy in the number of observations results from the following: contributions to the common account and demographic variables (with the exception of asset value) are sourced from data collected during the public goods experiment. All other data are sourced from the household survey. Answers for data in Panel C are limited to a further subset with knowledge of their group?s decision-making process.

Table 2: Use of funds in common account in 2014 experiment

| Fund Purpose (Categorized) | Total |
|---|---|
| Investments | 23.5% |
| Expenses | 33.3% |
| Savings and Lending | 14.8% |
| Bank Account (Unknown Purpose) | 23.5% |
| Undefined | 4.9% |
| **Total** | 100.0% |
| **N** | 81 |

Table 3: Comparing characteristics of leaders and non-leaders in 2014

| | LF | | CP | | T | | S | |
|---|---|---|---|---|---|---|---|---|
| Variables | N | Mean | N | Mean | N | Mean | N | Mean |
| **Data Collected During Game** | | | | | | | | |
| Contribution (0-400) | 48 | 225.00** | 49 | 200.00 | 56 | 177.68 | 55 | 187.27 |
| Female | 53 | 0.25*** | 50 | 0.26*** | 58 | 0.66** | 53 | 0.51 |
| Age | 48 | 37.60 | 49 | 42.12* | 56 | 41.36* | 55 | 34.49** |
| Years of Education | 43 | 7.65*** | 43 | 6.33** | 46 | 4.96 | 45 | 8.40*** |
| Land Size (Acres) | 48 | 7.31** | 48 | 5.44 | 56 | 4.42 | 55 | 4.21 |
| **Household Survey Variables** | | | | | | | | |
| % of Group Members Known | 48 | 88.70 | 24 | 85.97 | 25 | 84.62 | 20 | 96.37*** |
| % of Group Members Could Approach for Advice | 48 | 93.32 | 24 | 88.99 | 25 | 87.44 | 20 | 93.62 |
| % of Group Members Ask Advice | 48 | 26.35 | 24 | 18.10 | 25 | 29.09 | 20 | 36.09* |
| % of Group Members Trust with Valuable Object | 48 | 69.98 | 24 | 64.90* | 25 | 75.76 | 20 | 80.90 |

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$: Ttests of differences in means between club-leader and non-leaders.

Table 4: Comparing characteristics of leaders and non-leaders in 2014

| | LF | CP | T | S |
|---|---|---|---|---|
| N who know leader | -0.40 | -0.47* | 0.067 | -0.17 |
| | (0.28) | (0.27) | (0.22) | (0.22) |
| N who sought leader for advice | 0.82*** | 0.33** | 0.10 | 0.36* |
| | (0.22) | (0.17) | (0.18) | (0.19) |
| N who could approach leader | 0.23 | 0.53* | -0.23 | -0.047 |
| | (0.34) | (0.29) | (0.26) | (0.29) |
| N who trust leader with object | 0.030 | 0.024 | 0.24* | 0.14 |
| | (0.22) | (0.15) | (0.15) | (0.17) |
| Village FE | Yes | Yes | Yes | Yes |
| Pseudo R-squared | 0.089 | 0.051 | 0.022 | 0.032 |
| N | 632 | 729 | 837 | 786 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Correlates of Individual Common Account Contributions in the First Public Goods Experiment

| Dependent Variable: | Percent Contributed | |
|---|---|---|
| | (1) | (2) |
| Female | -0.001 | -0.018 |
| | (0.019) | (0.014) |
| Age | 0.000 | -0.000 |
| | (0.001) | (0.001) |
| Years of Education | 0.011*** | 0.005** |
| | (0.003) | (0.002) |
| Log: Land Size (Acres) | 0.071*** | 0.016 |
| | (0.016) | (0.012) |
| Club FE | No | Yes |
| Adjusted $R^2$ | 0.04 | 0.51 |
| Observations | 1045 | 1045 |

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. Robust standard errors in parentheses. Dependent variable equals the percent of the endowment (0-1) contributed by each individual. Results estimated using OLS estimator with club fixed effects included in column 2. The sample for this table includes all 87 villages for which we have data regarding the 2014 public goods experiment. The adjusted $R^2$ value shows that close to 50% of the variation is explained by club fixed effects.

Table 6: Decision-Making Method and Cooperation in Public Goods Game

| Dependent Variable: | Percent Contributed | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| **Main effects:** | | | | | |
| Democratic (Dichotomous) | 0.14*** | 0.16*** | 0.17*** | 0.19*** | |
| | (0.05) | (0.05) | (0.05) | (0.05) | |
| Club Mean: Percent Approachable (0-1) | | | | -0.35 | -0.34 |
| | | | | (0.29) | (0.32) |
| **Club Variables:** | | | | | |
| N game players | | -0.01** | -0.01** | -0.01** | -0.01* |
| | | (0.00) | (0.00) | (0.00) | (0.01) |
| Club Mean: Female (0-1) | | 0.09 | 0.11 | 0.10 | 0.13 |
| | | (0.15) | (0.15) | (0.15) | (0.16) |
| Club Mean: Years of Education | | 0.02 | 0.01 | 0.00 | -0.00 |
| | | (0.02) | (0.02) | (0.02) | (0.02) |
| Log: Avg. Land Owned | | -0.17 | -0.26** | -0.34** | -0.16 |
| | | (0.12) | (0.13) | (0.13) | (0.14) |
| Club Sd: Female (0-1) | | 0.36 | 0.39 | 0.36 | 0.28 |
| | | (0.36) | (0.37) | (0.37) | (0.40) |
| Club Sd: Years of Education | | 0.05 | 0.07** | 0.08** | 0.05 |
| | | (0.03) | (0.03) | (0.03) | (0.03) |
| Log: Sd. Land Owned | | 0.14* | 0.16** | 0.21** | 0.10 |
| | | (0.07) | (0.07) | (0.08) | (0.08) |
| **Village Variables:** | | | | | |
| Log: Distance to paved road (km) | | | 0.07** | 0.07** | 0.07* |
| | | | (0.03) | (0.03) | (0.03) |
| N organisations from village questionnaire | | | 0.06** | 0.06** | 0.06** |
| | | | (0.02) | (0.02) | (0.03) |
| Constant | 0.32*** | -0.01 | -0.51 | -0.37 | -0.67 |
| | (0.04) | (0.43) | (0.49) | (0.52) | (0.57) |
| Adjusted $R^2$ | 0.10 | 0.19 | 0.29 | 0.30 | 0.12 |
| Observations | 74 | 71 | 71 | 71 | 71 |

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$. Standard errors in parentheses. Dependent variable equals the average share of the game endowment contributed by club (0-1) in the 2014 public goods game. All columns estimated using OLS. Additional controls were included but not reported in the following manner: columns 1-4: within-club heterogeneity in reporting decision-making methods (Mean Standard Error); columns 2-5: mean and standard deviation of asset index (reducing the sample to 71); columns 3-5: village population (log), whether the village received visits from extension agents (NGO and Gov), price of daily labour during harvest (log), distance from major trading areas (log km); columns 4-5: within-club heterogeneity in social connectivity (SD).

Table 7: Heterogeneous Effects of Social Networks

| Dependent Variable: | Percent Contributed | |
|---|---|---|
| | (1) | (2) |
| **Decision-Making:** | | |
| Democratic (Dichotomous) | 0.19*** | 0.20*** |
| | (0.05) | (0.06) |
| **Approach:** | | |
| Club Mean: Percent Approachable (0-1) | -0.77** | -0.19 |
| | (0.37) | (0.56) |
| Democratic (Dichotomous) | 0.56* | 0.99** |
| × Club Mean: Percent Approachable (0-1) | (0.32) | (0.40) |
| Social Interaction Variables | No | Yes |
| Club Variables | Yes | Yes |
| Village Variables | Yes | Yes |
| Adjusted $R^2$ | 0.33 | 0.31 |
| Observations | 71 | 71 |

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. Standard errors in parentheses. Dependent variable equals the average share (0-1) of the experiment endowment contributed by group in the 2014 public goods experiment. Estimated using OLS. Group-and-village-level controls are same as in table 6. Column 2 includes controls for all other social interaction variables (group mean and club standard deviation) associated with trust, advice, and known. Interacted social interaction variables are de-meaned.

Table 8: Correlates of Average Common Account Contributions in the Second Public Goods

| Dependent Variable: | Percent Contributed | |
|---|---|---|
| | (1) | (2) |
| **Randomized Decision-making Rule:** | | |
| Deliberative Democracy | -0.017 | -0.025 |
| | (0.05) | (0.05) |
| Constant | 0.73*** | 2.22*** |
| | (0.03) | (0.60) |
| Controls | No | Yes |
| R-squared | 0.00 | 0.12 |
| N | 101 | 101 |

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$. Standard errors in parentheses. Dependent variable equals the average share (0-1) of the experiment endowment contributed by group in the 2015 public goods experiment. Estimated using OLS. Columns (1) and (2) contain only the experiments conducted in farmer groups, while Columns (3) to (8) refer to the random groupings. Controls include all the variables listed in Appendix Table 1.

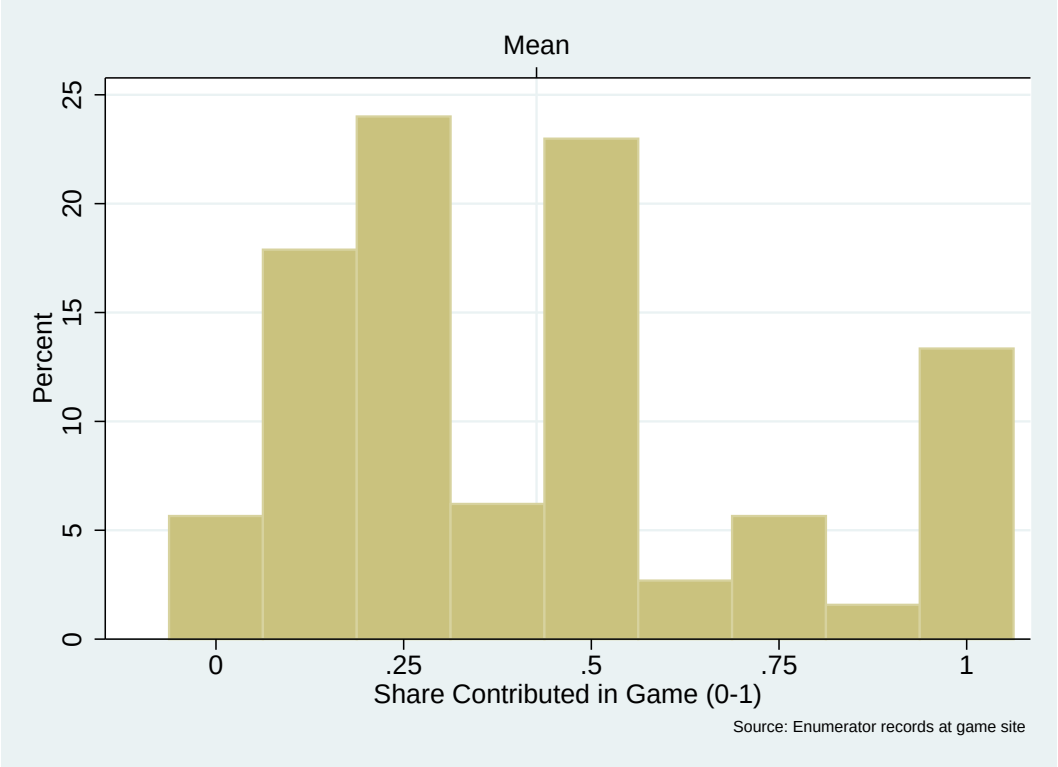



Figure 1: Histogram of Individual Contributions to Public Goods

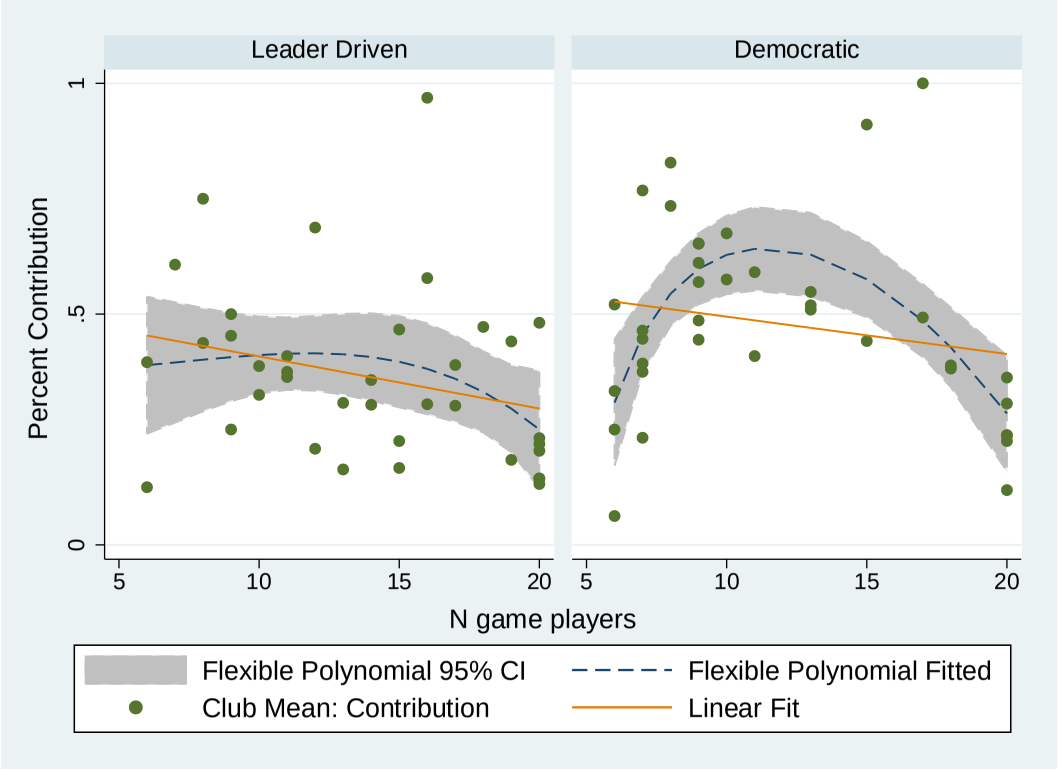
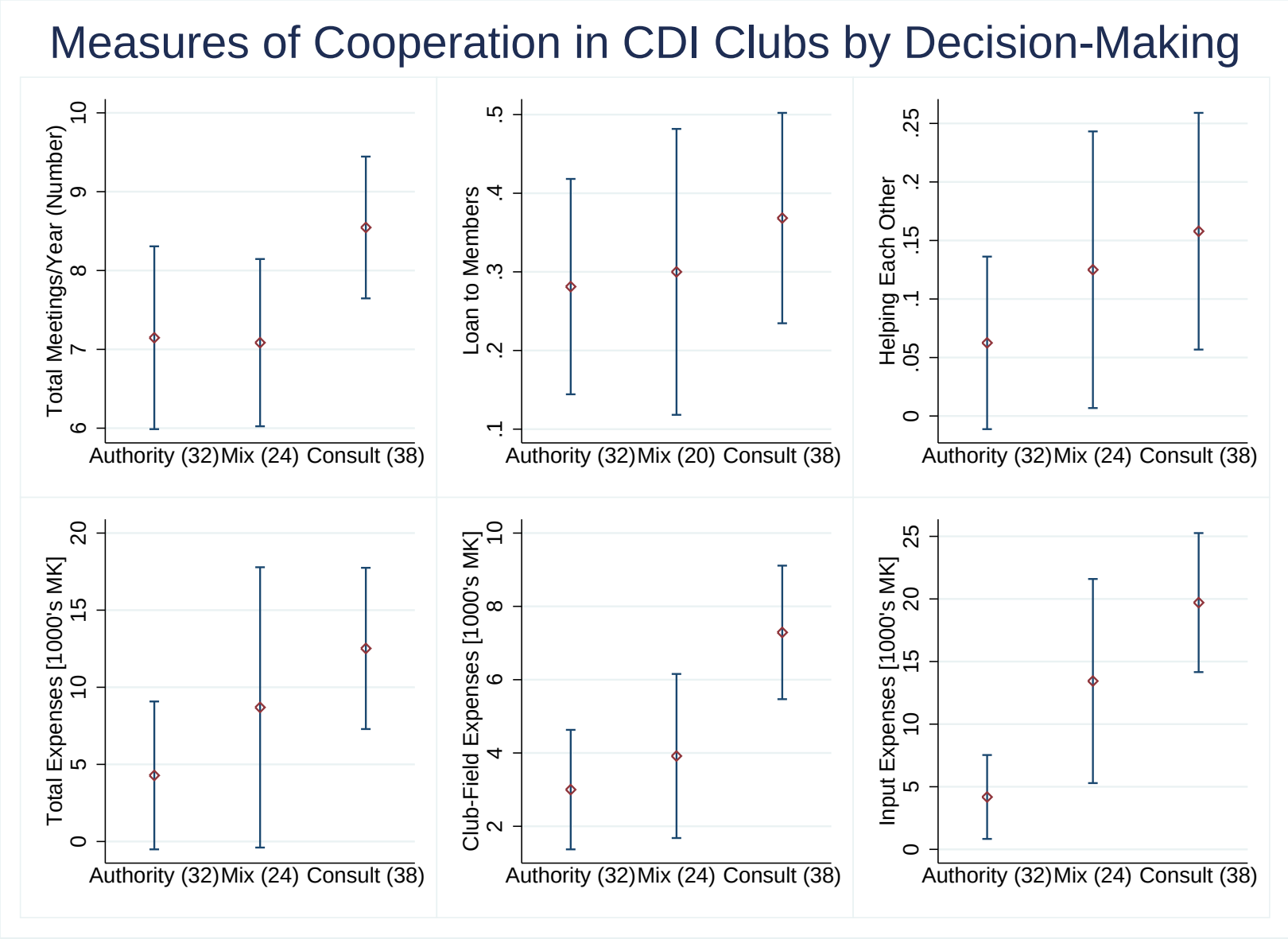



Figure 2: Average group-level contribution to the common account by group size and decision-making method.




We use decision-making categories solicited in the leader survey of 2015. ?Authority? refers to answer (1), ?Mix? to answer (2) and ?Consult? to answer (3) in this survey. Of the 101 groups we surveyed, 7 groups noted a decision-making process that did not match the options provided. We have omitted these seven groups from the data that construct this figure.

Figure 3: Measures of Collective Action by Group Decision-Making

# ONLINE APPENDIX

## A Game Details

### A.1 2014 Game Instructions

Before the game starts:

- Arrange to meet all the CDI club members in one central village location, secluded from the rest of the village as to avoid bystanders
- Place 400 KW in brown envelopes in notes of 50 KW (these cannot be see through), meaning 400 K per envelope, one envelop per club member.
- Place a table or mat in the center area. and arrange seating in a circle.

Once all the members are present, ask every individual to introduce themselves to the group by name. Note down who is present and who is not present on the next page. **A minimum of 6 members should be present to play the game**.

Read from the following script: Good morning, I am [your name] and I came to this village to learn more about group today. Ask whether anyone would like to say a prayer, if appropriate, and continue: We would like to do a group activity with you. This activity will take about 30 minutes. But before we get started, I'll go around the group and will ask you some information about yourself.

Go around the group and fill in the notation sheet - all columns except for the two last columns. Use the Club Game Matching Number Table to select the column that matches the number of club members present and complete the 'Match Number' - second column. These numbers have been drawn randomly such that the 'Number assigned for the game' is not the same as 'Match number'. While this information is not secret, keep the conversation

with each member at a quiet volume. Keep track of spouses within the group as per notation sheet. Continue with the script: In this activity you will each receive 400 Kwacha in this white envelop (Hold up a white envelop). Once you receive the 400 Kwacha, we will ask you to make an important decision. You will each divide up the 400 Kwacha in two parts: one part, you will put in your pocket. This part will be yours to keep and you and your family can decide what to do with it. The other part, you will put back into the envelope. You will then place the envelope back onto the table (point to the table). Once we have all made our decision, I will open these envelopes and tell you the total amount that is in the envelopes. I will then multiply this amount by 2, and place back double onto the table. So if the total amount is 500 Kwacha, I will add 500 Kwacha and place a total of 1000 Kwacha on the table. Then, you - as a group - will have to decide what to do with this money. You can decide to spend it on something for the group, or return it to the members. That decision is up to you - as a group - together.

Emphasize the following. The decision you make will be a secret decision. This is your decision and yours only. So I will ask you to go to different corners of the square and divide the money you have in secret, without anyone seeing you. You can decide to put as much or as little as you want into the envelop, so it can be 0 or 400 KW. There is no right or wrong decision. It is just a personal decision. I will also play. (Hold up your own envelop). I will come around the square and record your decision. But it will be only me knowing your decision; I will not share this information with anyone in the village. So your decision is secret. No-one else will know what you decided.

Ask whether there are any question. If not, proceed and hand out the envelopes to everyone.

Continue the script: Before you make a decision, I would like you to discuss for 5 minutes with the group what you would like to do with the group money, once you receive it. Allow the group members to discuss in your absence for 5 minutes.

Return to the group and tell the members to disperse and make their decision. After a few minutes, go around and speak to each member. It is very important that no-one else can hear you, so go further from the others if need be. Ask the individual how much they kept to themselves and note down their contribution to the pot on the next page. Then ask them whether they happen to know their match and how much acreage the match has. Note down this stated acreage on the next page. Do not pressurize people to make a decision quickly. Give them sufficient time. When everyone is done, ask them to place their envelope on the table. Mix the envelopes carefully. Then open the envelopes, and take out the funds. Do this quickly and try not to show too much how much is in each envelop. Count the total and announce the total. Then match the total and place the full amount on the table.

Ask: whom should I give this to? [Write down that person's ID]

Ask: So what does your group plan to do with this money? [Write down the answer on the next page]

Notes: Sometimes group members might ask what they can do with the money they have: emphasize that this is up to them. They should treat this money as regular normal income.

Sometimes group members might want to know the exact amount they will get before they can discuss what to do. Tell them that you don't know this either, this will depend on what each person will put in, and they should try to discuss nevertheless.

| Number assigned for the game | Match number | Name | Present? (Yes/No) | Household ID | Age (years) | Education (years completed) | Land (acre owned) | Spouse number | Reported match acreage | Contribute |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | | |
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How does the group intent to use the funds from the common pot? _____

## A.2 2015 Game Instructions

### A.2.1 Discussion Treatment

Village Number: |____|____|____|
Decision Type: |2 = Group Decides|
Pre-Game Conversation Type: |____|

# GROUP GAME - INSTRUCTIONS

## 1 Before the Meeting Starts

- Write down the village number code in the space at the top of each sheet. Consult the randomization list and make sure you are using the correct document for the "Decision Type" (1 = leader decides, 2 = group decides). The "Pre-Game Conversation Type" will be either 1 = Control, 2 = Ability, or 3 = Values. Write down the "Pre-Game Conversation Type" at the top of every sheet. Only follow the instructions for the pre-game conversation relevant for your particular case according to the randomization list. As an aid, go through the remaining pages of this document and circle the sections you will read based on the randomization codes. Double check to make sure you are using the correct document and instructions according to the randomization list.
- Place 500 KW in 20 envelopes in notes of 50 KW, meaning 500 K per envelope. There should be at least one envelope per club member.
- If there is a CDI club in your village:
  - Consult the club listing for your village and write down the names, leadership roles and gender of each of the club members on the form titled "Game Data" attached to this document. Write down the HH ID of the households that were included in the survey in baseline.
  - First arrange to meet the CDI club leaders (chairperson, secretary, lead farmer, and treasurer) in one central village location, secluded from the rest of the village as to avoid bystanders. Arrange to have the rest of the CDI club members arrive 45 minutes later. If the entire club arrives at the same time, then take the leaders aside first to fill out the leader questionnaire and describe the activity as mentioned in section 2
- If there is NOT a CDI club in your village:
  - Arrange to meet all of the individuals in the sample in a village and write down their names, gender, and household IDs on the form titled "Game Data" attached to this document. Once everyone is present, read the following prompt:

    > We would like to invite you to participate in an activity where you will have the opportunity to provide a useful good to your households. In order for this activity to work, we would like for you to imagine that you are members of a farmers group. You can imagine that your group gets together twice a month or so to discuss various farming techniques and items of group interest using an agenda created by the group chairperson. You can also imagine that your group has a treasurer who keeps group contributions in a common fund. The group sometimes uses the funds to provide various services or items of value to club members. Each club is unique and can make different decisions regarding how to use the funds. Each club member can choose how much to contribute to the club's well-being. In the following activity you will be making hypothetical decisions associated with how the group funds will be used. You will have actual funds available to you when thinking of the decision at hand, so your decision can be acted upon if the group desires to.
  - Ask if there are any questions. If necessary, state that this is only a hypothetical exercise and that we will provide the group with funds, do not specify how at this time, to use in deciding how to spend money as a group. After addressing any questions, ask the group to choose one person to act as a temporary chairperson and one person to act as a temporary treasurer. Once these individuals are identified, specify who is the chairperson and who is the treasurer on the form titled "Game Data" in the relevant column and proceed by telling these individuals (temporary chair person and treasurer) that you have specific instructions just for then. Tell the remaining club members that you will spend

15 minutes or so explaining instructions to the chosen leaders and that you appreciate their patience very much as they wait. Take the leaders aside and proceed to section 2.

## 2 Once the Leaders are present

- Skip the sections of the exercise that are only relevant for CDI clubs only (e.g. how many group activities do you attend, etc.). As an aid, these bullets are labeled [**CDI CLUBS ONLY**]
- [**CDI CLUBS ONLY**]: Ask the leaders for their names and note whether they are present or not in the form titled "Game Data." Indicate what kind of leader they are in the "Leader" Column next to the name column (Chairperson - CP; Secretary - S; Lead Farmer - LF; Treasurer - T). Ask questions G1 to G5 on the "Game Data" form and document responses on the form.
- [**CDI CLUBS ONLY**]: (20 minutes) Say "Before I explain the nature of our activities today, I'd like to get some more information about your club. This should take about twenty minutes." Find the document titled **"Group Leaders"** attached to this document. Follow the instructions and proceed to collect relevant information.
- Once documentation is complete, read the following script:

  Good day, I am [your name] and I came to this village to learn more about the group today. I wanted to talk to you before talking to the group as a whole in order to describe some of the activities we'll be doing together today. Shortly, we will distribute some funds to each of the group members and you will all try to decide how much of these funds to give to the common funds that belong to the group. We will double whatever amount the group gives for the use of the funds that you decide on. **Before asking the group to contribute, we will ask the entire group to participate in discussions that will help describe some of the workings of the group. We will also ask the group to decide on how the funds will be used through a group discussion.** I understand that your group may make decisions in a different manner than through group discussion. If it does, then I'd like to invite you to think of this as an experiment of how decisions might be made by groups in a different way. This is what we are studying by conducting this activity, and the research group looks forward to sharing the results of this study in the future.

  During the group discussions I will ask each group member to offer their opinion on a question that I will pose to them. After each person has spoken, I will ask you to lead the group to arrive to a consensus with respect to the topic of conversation. I will share the topics of conversation once everyone is present. As you try to lead the group to a consensus regarding the decision that the group can make together, please remember that everyone's opinion should be valued equally. If disagreements arise, you can try your best to help the group find a way to overcome these disagreements, but you should try not to tell the group what to do. This is certainly not an easy task, but I only ask that you try your best to facilitate the group decision in this manner. Do you know which of you would take the lead in this manner? [allow the leaders to respond and note who would lead the discussion... this should be the chairperson] Do you have any questions for me?

- Who is leading the discussion (Name/"Game Data" ID): _____

## 3 Once everyone is present

- Once all members are present, ask every individual to introduce themselves to the group by name. Note down who is present and who is not present on the form at the back of this document. **A minimum of 6 members should be present to play the game.**

Village Number: |____|____|____|
Decision Type: |2 = Group Decides|
Pre-Game Conversation Type: |____|

- Read the following script

  > Good day, I am [your name] and I came to this village to learn more about the group today. Before we start, would anyone like to say a prayer?

- After the prayer, say the following.

  > Thank you. We would like to do a group activity with you. This activity will take about 60 minutes, but before we begin I would like to go around the group and ask you some information about yourself.

- Go around the group and fill in the "Game Data" form questions G10 through G13 for all members - all shaded columns in the middle of the table. While this information is not secret, keep the conversation with each member at a quiet volume. Keep track of spouses within the group as per question G9 on the "Game Data" form.

- At this time, you may also randomly select "Match numbers" only for individuals who are present during the game as indicated by G6. This is a task done by enumerators without discussing with game participants.

- Read the following script

  > I will ask the group to participate in two different activities. In the first activity, we will discuss and agree upon the 5 most important abilities that would be good for group members to have when trying to cooperate as a group. To help you think of this list, we thought we'd describe some of the things that we've seen farmer clubs do. Clubs can manage demonstration plots in villages in order to learn about new farming techniques, have fundraisers to help group members in need, use club funds to finance a village savings group, help each other with high labor tasks on each others plots, bargain for higher prices with buyers as a group, and many other things. We are interested in hearing your thoughts on the 5 most important abilities that a club would need to have among its members (not every person has to possess all of the abilities) to successfully carry out group activities. I will first call on each of you to share your thought on ONE such important ability. After everyone has spoken, the club leaders will help you chose the five most important abilities from the list that you have created.

- Tear a sheet of paper in equal pieces according to the number of people present. Write down numbers 1, 2, 3... on each sheet so that you have one number for each participant PRESENT in the discussion. For example, if there are 12 individuals present, tear a sheet of paper into 12 equal parts and write numbers 1, 2, 3... 10, 11, 12 on each of these 12 pieces. You may need to skip numbers associated with individuals who are not present as per their identifier in the "Game Data" Form. Put all of the pieces in a hat, bowl, cup, or other container. Pull a number out of the container and refer to the form titled "Game Data" to find the name of the individual associated with this number. Leave the piece of paper with this number outside of the container. Ask this person with all other club members present "What are a few (no more than 3) abilities you think would lead to group success?" After the person lists ONE ability, record their response on the sheet titled "Randomly-sorted Ability Response." Repeat the activity (draw a new number) until everyone has spoken once. Then, read the following script:

  > These are all excellent ideas! I would now like to ask the group leaders to help you take 5 minutes to choose the 5 most important abilities out of the abilities you've already chosen. Everyone is free to discuss their thoughts and all opinions should be equally considered. Please be considerate of others and do not take too much time to share your thoughts.

- Start a timer for 5 minutes. Once the timer says that there is only one minute left, tell the group that they will have to decide on their list in the next minute. If the group is able to come up with a list of 5 qualities, please note their decisions in the form at the back of this document. If they are unable to come to a decision in this time, give them 2 more minutes to discuss their list and take note of their decisions in the same form. If after the group is still unable to make a decision on the list, read the following:

  > It's very useful to hear your thoughts on qualities that are important and that lead to cooperation in these groups. Even though the time was short to come to agreement on the 5 most important

qualities, hopefully the discussion itself has been useful to you as you think about how your group can improve in the future.

- **If Pre-Game Conversation = 1, move to section 4.** Otherwise, read the following according to the Pre-Game Conversation Type:

  **Pre-Game Conversation 2 - ABILITY** Now that you have a list of the 5 most important abilities for group discussion [List the 5 abilities], turn to the person you are sitting next to (small groups no larger than 3 people) and decide who among you is particularly strong in each of these abilities. If possible, think of examples of how each person's abilities can be used to the benefit of the group. This conversation is important to the activity, so I appreciate your cooperation!

  **Pre-Game Conversation 3 - VALUES** Now that you have a list of the 5 most important abilities for group discussion [List the 5 abilities], turn to the person you are sitting next to (small groups no larger than 3 people) and share a story of how your group managed to come to an agreement after an initial moment of disagreement between group members. Did these abilities help lead to agreement or were other factors at play? If your group has not yet had disagreement, then share how you might overcome disagreement if it were to arise. This conversation is important to the activity, so I appreciate your cooperation!

- Spend 2-3 minutes having these small-group discussions. The idea is for everyone to have a brief conversation according to the prompt, the content of these conversations should not be recorded and need not be monitored by the enumerator.

## 4 Choosing and Contributing to Public Goods

- Read the following script

  In the following activity, you will each receive 500 Kwacha in this envelope (hold up an envelope). Once you receive the 500 Kwacha, we will ask you to make an important decision. You will each divide up the 500 Kwacha in two parts: one part, you will put in your pocket. This part will be yours to keep and you and your family can decide what to do with it. The other part, you will put back into the envelope. You will then place the envelope back onto the table (point to the table). Once we have all made our decision, I will open these envelopes and tell you the total amount that is in the envelopes. I will then multiply this amount by 2, and place back double onto the table. So if the total amount is 500 Kwacha, I will add 500 Kwacha and place a total of 1000 Kwacha on the table. **You will all decide together what the group will do with this total amount. You will make this decision before you decide how much to put in the envelope.** Do you have any questions?

  In the same manner as before, I would like you to decide what the best use of the funds will be. I will first call on each of you to share your thought on one way in which the funds can be used. After everyone has spoken, the club leaders will help you discuss the options that have been presented and come to a decision on how the funds will be used. Your group is free to use the funds in any way you choose.

- Return the pieces of paper with the numbers on them to the container. Repeat the same activity as earlier but with a different question. Specifically, take a number out of the container (and leave it out of the container) and refer to the "Game Data" form to find the name of the individual associated with the number. Ask this individual "Please briefly describe your opinion on how the money should be spent by the group." Record responses in the form titled "Randomly-Sorted Decision Response." After the person finishes their thought, repeat the activity (draw a new number), until everyone has spoken once. Then, read the following script:

  Again, these are excellent thoughts. I would now like to ask you to spend 5 minutes to discuss the various options with the help of your group leaders. By the end of five minutes you should have a decision on how to spend the group's money. After this, each of you will decide how much of the 500 Kwacha to leave in the envelope and how much to put in your pockets.

- Start a timer for 5 minutes and remain listening to the group's conversation, but do not say anything! Once the timer says that there are only 2 minutes left, tell the group that they will have to decide on their list in the next two minutes. If the group has completed their decision, please note their decision in the form titled "Decision for Use of Common Funds" at the back of this document. Also note how long it took (in minutes) for the group to make their decision. If they are unable to come to a decision in this time, give them 2 more minutes to discuss their list and take note of their decisions in the same form. Note why it took long for the group to come up with their decision. In either case, read the following:

  It's very useful to hear your thoughts on how to use the funds. You are free to think further about how to use the funds after you receive the common pot at the end of this activity if you need more time.

## 5 Return to Group

- Read the following prompt:

  You have decided to use the funds for [read the decision that was arrived at and that you documented in question 2]. Now that we know how the funds will be used I would like to ask you to make your decisions on how much to put in the envelope. [Emphasize the following] **I want you to know that the decision you make will be a secret decision. This is your decision and yours only. So when it is time to decide how much money to put in the envelope, I will ask you to go to different corners of the square and divide the money you have in secret, without anyone seeing you.** You can decide to put as much or as little as you want into the envelope, so it can be 0 or 500 KW or anything in between. I will come around the circle and record your decision. But it will be only me knowing your decision; I will not share this information with anyone in the village. Your decision is secret. No-one else will know what you decided.

- Ask whether there are any questions. If not, proceed and hand out the envelopes to everyone. Tell the members to disperse and make their decision. Make sure they are not in earshot of one another.

- After a few minutes, go around and speak to each member. It is very important that no-one else can hear you, so go further from the others if need be. Ask the individual questions G14-G18 on the "Game Data" form and fill in G9-G12 if not yet filled in. Ask them whether they happen to know their match and how much acreage the match has. Note down this stated acreage on the next page. Ask the individuals how much they kept to themselves and note down their contribution to the pot on "Game Data" form. After they share their contribution amount, ask them for the envelope and move on to the next person. Once information has been collected for the entire group, come back to the area where the group is gathered.

- Mix the envelopes carefully. Then open the envelopes and take out the funds. Do this quickly and try not to show too much how much is in each envelope. Count the total in a public fashion and announce the total (e.g. count outloud for each 50 KW bill). Then match the total and place the full amount on a table.

- If the treasurer of the group is present, tell the group that you will hand the funds to the treasurer. If the treasurer is not present, ask "Who shall I give this amount to?"

- Write down that person's ID number as listed on the "Game Data" Form. _____

**THE FOLLOWING INSTRUCTIONS (IN THIS BOX) ARE ONLY FOR THE CASE WHERE THE GROUP PLAYING THE GAME IS <u>NOT</u> A CDI CLUB**

- At the end of the activity, you may read the following:

  Since those of you who have participated in an activity may not actually be members of a farmer club, we would like to give you the following option. Please decide whether you would like to use the funds in the way that was decided during the activity, or whether you would like for us to return the funds in equal shares to each of you.

- Allow the group some time to decide whether they would like to receive the funds as a group or whether they would like to receive the funds in equal shares. I they would like to receive the funds in equal shares, divide the funds in as equal shares as possible. Otherwise, if the group decides to use the funds in the matter they decided originally, hand the funds to the treasurer. If there are funds left over that can not be be divided equally, mark this amount (it should be less than 50KW × The number of people playing the game) separately. Take note of the decision and the remaining money on the following lines.

- **Decision**. Circle one of the following: Group Use of Funds / Divide in Equal Shares

- **Remaining Amount**. _____

## 6 Notes

- Sometimes group members or leaders might ask what they can do with the money they have: emphasize that this is up to them. They should treat this money as regular normal income.
- Sometimes group members might want to know the exact amount they will get before they can discuss what to do. Tell them that you don't know this either, this will depend on what each person will put in, and they should try to discuss nevertheless.
- Sometimes group members will say that the decision-making process is not the same one they employ in their group meetings. Tell them that you understand this and apologize if it creates difficulties but that it is part of an experiment to study ways in which groups can make decisions together. Hopefully the group can discuss the outcomes of their experience with each other after the activity and compare it with how they usually make decisions.

### A.2.2 Leader Treatment

Village Number: |____|____|____|
Decision Type: |1 = Leader Decides|
Pre-Game Conversation Type: |____|

# GROUP GAME - INSTRUCTIONS

## 1 Before the Meeting Starts

- Write down the village number code in the space at the top of each sheet. Consult the randomization list and make sure you are using the correct document for the "Decision Type" (1 = leader decides, 2 = group decides). The "Pre-Game Conversation Type" will be either 1 = Control, 2 = Ability, or 3 = Values. Write down the "Pre-Game Conversation Type" at the top of every sheet. Only follow the instructions for the pre-game conversation relevant for your particular case according to the randomization list. As an aid, go through the remaining pages of this document and circle the sections you will read based on the randomization codes. Double check to make sure you are using the correct document and instructions according to the randomization list.
- Place 500 KW in 20 envelopes in notes of 50 KW, meaning 500 K per envelope. There should be at least one envelope per club member.
- If there is a CDI club in your village:
  - Consult the club listing for your village and write down the names, leadership roles and gender of each of the club members on the form titled "Game Data" attached to this document. Write down the HH ID of the households that were included in the survey in baseline.
  - First arrange to meet the CDI club leaders (chairperson, secretary, lead farmer, and treasurer) in one central village location, secluded from the rest of the village as to avoid bystanders. Arrange to have the rest of the CDI club members arrive 45 minutes later. If the entire club arrives at the same time, then take the leaders aside first to fill out the leader questionnaire and describe the activity as mentioned in section 2
- If there is NOT a CDI club in your village:
  - Arrange to meet all of the individuals in the sample in a village and write down their names, gender, and household IDs on the form titled "Game Data" attached to this document. Once everyone is present, read the following prompt:

    > We would like to invite you to participate in an activity where you will have the opportunity to provide a useful good to your households. In order for this activity to work, we would like for you to imagine that you are members of a farmers group. You can imagine that your group gets together twice a month or so to discuss various farming techniques and items of group interest using an agenda created by the group chairperson. You can also imagine that your group has a treasurer who keeps group contributions in a common fund. The group sometimes uses the funds to provide various services or items of value to club members. Each club is unique and can make different decisions regarding how to use the funds. Each club member can choose how much to contribute to the club's well-being. In the following activity you will be making hypothetical decisions associated with how the group funds will be used. You will have actual funds available to you when thinking of the decision at hand, so your decision can be acted upon if the group desires to.
  - Ask if there are any questions. If necessary, state that this is only a hypothetical exercise and that we will provide the group with funds, do not specify how at this time, to use in deciding how to spend money as a group. After addressing any questions, ask the group to choose one person to act as a temporary chairperson and one person to act as a temporary treasurer. Once these individuals are identified, specify who is the chairperson and who is the treasurer on the form titled "Game Data" in the relevant column and proceed by telling these individuals (temporary chair person and treasurer) that you have specific instructions just for then. Tell the remaining club members that you will spend

15 minutes or so explaining instructions to the chosen leaders and that you appreciate their patience very much as they wait. Take the leaders aside and proceed to section 2.

## 2 Once the Leaders are present

- Skip the sections of the exercise that are only relevant for CDI clubs only (e.g. how many group activities do you attend, etc.). As an aid, these bullets are labeled [**CDI CLUBS ONLY**]
- [**CDI CLUBS ONLY**]: Ask the leaders for their names and note whether they are present or not in the form titled "Game Data." Indicate what kind of leader they are in the "Leader" Column next to the name column (Chairperson - CP; Secretary - S; Lead Farmer - LF; Treasurer - T). Ask questions G1 to G5 on the "Game Data" form and document responses on the form.
- Once documentation is complete, read the following script:

  Good day, I am [your name] and I came to this village to learn more about the group today. I wanted to talk to you before talking to the group as a whole in order to describe some of the activities we'll be doing together today. Shortly, we will distribute some funds to each of the group members and you will all try to decide how much of these funds to give to the common funds that belong to the group. **Before asking the group to contribute, we will ask the leaders of the group, you, to decide how the funds will be used.** We will double whatever amount the group gives for the use of the funds that you decide on. I understand that your group may make decisions in a different manner than by having the leaders determine the outcome. If it does, then I'd like to invite you to think of this as an experiment of how decisions might be made by groups in a different way. This is what we are studying by conducting this activity, and the research group looks forward to sharing the results of this study in the future.

- [**CDI CLUBS ONLY**]: (20 minutes) Say "First, I'd like to get some more information about your club. This should take about twenty minutes." Find the document titled **"Group Leaders"** attached to this document. Follow the instructions and proceed to collect relevant information.
- The following script initiates the first decision that the leaders will have to make. Read the following:

  Before doing this activity, however, we would like you to spend 5 minutes listing 5 important attributes that would be good for group members and groups to have when trying to cooperate. To help you think of this list, we thought we'd describe some of the things that we've seen farmer clubs do. Clubs can manage demonstration plots in villages in order to learn about new farming techniques, have fundraisers to help group members in need, use club funds to finance a village savings group, help each other with high labor tasks on each others plots, bargain for higher prices with buyers as a group, and many other things. We are interested in hearing your thoughts on the top 5 most important attributes that a group and group members would need to have in order for the club to be successful in some of these activities. Again, you have five minutes to come up with this list; please write down your decision on this sheet of paper.

- Hand the leaders the attached sheet titled "5 Attributes of Successful Groups" and ask them to write their decisions on this sheet. Mention that this sheet will be handed back to the enumerators.
- Start a timer and allow the leaders 5 minutes to come up with this kind of list. Make sure that they decide on 5 (and only 5) of the most important abilities. It is important that they not mention more than 5, but that if they come up with more than 5 abilities, they decide which are the top 5 most important combined abilities for group success.
- If the leaders have not completed the activity after 5 minutes, ask "Do you need 1 more minute to complete the activity?" If yes, grant them one more minute to fill as many slots on the sheet as they can. After the extra minute is up, ask them to hand in the sheet even if it is incomplete.

- If the **Pre-Game Conversation = 1** then proceed to section 4. If the **Pre-Game Conversation = 2 OR 3**, proceed to section 3 by saying "Thank you for your effort in coming up with this list. Let us return to the group where we will share this list with the rest of the group members."

## 3 Everyone is present

- NOTE: IF **PRE-GAME CONVERSATION = 1**, then you should skip this section entirely and go straight to section 4. Do not gather the group together until AFTER section 4.
- Now that the first activity with the club leaders is complete, invite everyone to gather together and sit in a circle.
- Once all members are present, ask every individual to introduce themselves to the group by name. Note down who is present and who is not present on question G6 on form titled "Game Data" attached to this. Make sure the sex (G8) of each group member is correctly recorded. If an individual is being represented by a spouse or other family member during the activity, please note this in question G9 in the form titled "Game Data."
- **A minimum of 6 members should be present to play the game.** If this is the case, read the following script:

  > Good day, I am [your name] and I came to this village to learn more about the group today. Before we start, would anyone like to say a prayer?

- After the prayer is said, say the following:

  > Thank you. We would like to do a group activity with you. This activity will take about 45 minutes, but before we begin I would like go around the group and ask you some information about yourself.

- Go around the group and fill in the "Game Data" form questions G10 through G13 for all members - all shaded columns in the middle of the table. While this information is not secret, keep the conversation with each member at a quiet volume. Keep track of spouses within the group as per question G9 on the "Game Data" form.
- At this time, you may also randomly select "Match numbers" only for individuals who are present during the game as indicated by G6. This is a task done by enumerators without discussing with game participants.
- Read the following according to the Pre-Game Conversation Type:

  > I would now like to explain a few instructions on the side to the leaders you identified earlier. While the rest of you wait, I would like you to do the following activity:

  **Pre-Game Conversation 2 - ABILITY** Your group leaders have identified the following 5 abilities as important abilities that lead to success in group activities [List the 5 abilities the leaders came up with]. Turn to the person you are sitting next to (small groups no larger than 3 people) and decide who among you is particularly strong in each of these abilities. If possible, think of examples of how each person's abilities can be used to the benefit of the group. This conversation is important to the activity, so I appreciate your cooperation!

  **Pre-Game Conversation 3 - VALUES** Your group leaders have identified the following 5 abilities as important abilities that lead to success in group activities [List the 5 abilities the leaders came up with]. Turn to the person you are sitting next to (small groups no larger than 3 people) and share a story of how your group managed to come to an agreement after an initial moment of disagreement between group members. Did these abilities help lead to agreement or were other factors at play? If your group has not yet had disagreement, then share how you might overcome disagreement if it were to arise. This conversation is important to the activity, so I appreciate your cooperation!

Village Number: |____|____|____|
Decision Type: |1 = Leader Decides|
Pre-Game Conversation Type: |____|

## 4 Talking to Leaders

- Take the leaders identified earlier aside and read the following script:

  > The activity that follows will help us understand how different decision-making processes can lead to different outcomes in group cooperation. Earlier, I told the group that you will make the decisions on how to use the funds. I understand that your group may make decisions in a different manner than the one I described. If it does, then I'd like to invite you to think of this as an experiment of how decisions might be made by groups in a different way. This is what we are studying by conducting this activity, and the research group looks forward to sharing the results of this study in the future. In your particular case, I would like you to follow the following procedure for making a decision.
  >
  > Before the group members decides how much to contribute, I would like you to decide what the best use of the funds will be. Please take the next 5 minutes to decide what your group will use the funds to do. Please keep this conversation among yourselves, do not talk to other group members when making this decision. When I return, I would like you to tell me your decision. Then, we will reunite with the rest of the group and you will tell them your decision. After that, the group members (yourselves included) will decide how much to put in the envelope. Do you have any questions?

- Allow 5 minutes for the leaders to make their decisions. Start a timer (perhaps on your phone) for five minutes. *[These two sentences only for **Pre-game Conversation = 2 OR 3**: While you wait, feel free to listen in on the conversations the rest of the group members are having in pairs or groups of three. If groups are not talking, approach them and ask them if they have discussed the pre-game conversation at length or whether they would like to hear the instructions again.]* When the leaders are ready, note the decision that is made on the form at the end of this document titled "Decision for Use of Common Funds." Note how many minutes it took for the leaders to come up with this decision. If the leaders spend more than 5 minutes, ask them why the decision is taking longer than 5 minutes and note the reason down in the available slot in the same form. If needed, urge them to finalize the decision since the group is waiting for a response. Remember, do not allow the leaders to discuss this decision with the rest of the group.

## 5 Return to Group

**If Pre-Game Conversation = 1, then this is the first time you are with all of the club members. Do the tasks outlined in this box. Otherwise, skip this box.**

- Now that the first activity with the club leaders is complete, invite everyone to gather together and sit in a circle.
- Once all members are present, ask every individual to introduce themselves to the group by name. Note down who is present and who is not present on question G6 on form titled "Game Data" attached to this. Make sure the sex (G8) of each group member is correctly recorded. If an individual is being represented by a spouse or other family member during the activity, please note this in question G9 in the form titled "Game Data."
- **A minimum of 6 members should be present to play the game.** If this is the case, read the following script:

  > Good day, I am [your name] and I came to this village to learn more about the group today. Before we start, would anyone like to say a prayer?

- After the prayer is said, say the following:

Village Number: |____|____|____|
Decision Type: |1 = Leader Decides|
Pre-Game Conversation Type: |____|

Thank you. We would like to do a group activity with you. This activity will take about 45 minutes, but before we begin I would like to go around the group and ask you some information about yourself.

- Go around the group and fill in the "Game Data" form questions G10 through G13 for all members - all shaded columns in the middle of the table. While this information is not secret, keep the conversation with each member at a quiet volume. Keep track of spouses within the group as per question G9 on the "Game Data" form.
- At this time, you may also randomly select "Match numbers" only for individuals who are present during the game as indicated by G6. This is a task done by enumerators without discussing with game participants.

- Read the following script

  In the following activity, you will each receive 500 Kwacha in this envelope (hold up an envelope). Once you receive the 500 Kwacha, we will ask you to make an important decision. You will each divide up the 500 Kwacha in two parts: one part, you will put in your pocket. This part will be yours to keep and you and your family can decide what to do with it. The other part, you will put back into the envelope. You will then place the envelope back onto the table (point to the table). Once we have all made our decision, I will open these envelopes and tell you the total amount that is in the envelopes. I will then multiply this amount by 2, and place back double onto the table. So if the total amount is 500 Kwacha, I will add 500 Kwacha and place a total of 1000 Kwacha on the table. **The leaders you identified earlier will decide what to do with this total amount and inform you of their decision before you decide how much to put in the envelope.** Do you have any questions?

- After any questions are addressed, read the following prompt:

  The leaders of your group have decided to use the funds in the following manner [read the decision that was arrived at and that you documented in the "Decision for Use of Common Funds" form]. Now that we know how the funds will be used I would like to ask you to make your decisions on how much to put in the envelope. [Emphasize the following] **I want you to know that the decision you make will be a secret decision. This is your decision and yours only. So when it is time to decide how much money to put in the envelope, I will ask you to go to different corners of the square and divide the money you have in secret, without anyone seeing you.** You can decide to put as much or as little as you want into the envelope, so it can be 0 or 500 KW or anything in between. I will come around the circle and record your decision. But it will be only me knowing your decision; I will not share this information with anyone in the village. Your decision is secret. No-one else will know what you decided.

- Ask whether there are any questions. If not, proceed and hand out the envelopes to everyone. Tell the members to disperse and make their decision. Make sure they are not in earshot of one another.
- After a few minutes, go around and speak to each member. It is very important that no-one else can hear you, so go further from the others if need be. Ask the individual questions G14-G18 on the "Game Data" form and fill in G9-G12 if not yet filled in. Ask them whether they happen to know their match and how much acreage the match has. Note down this stated acreage on the next page. Ask the individuals how much they kept to themselves and note down their contribution to the pot on the "Game Data" form. After they share their contribution amount, ask them for the envelope and move on to the next person. Once information has been collected for the entire group, come back to the area where the group is gathered.
- Mix the envelopes carefully. Then open the envelopes and take out the funds. Do this quickly and try not

to show too much how much is in each envelope. Count the total in a public fashion and announce the total (e.g. count outloud for each 50 KW bill). Then match the total and place the full amount on a table.

- If the treasurer of the group is present, tell the group that you will hand the funds to the treasurer. If the treasurer is not present, ask "Who shall I give this amount to?"
- Write down that person's ID number as listed on the "Game Data" Form. _____

**THE FOLLOWING INSTRUCTIONS (IN THIS BOX) ARE ONLY FOR THE CASE WHERE THE GROUP PLAYING THE GAME IS NOT A CDI CLUB**

- At the end of the activity, you may read the following:

  Since those of you who have participated in an activity may not actually be members of a farmer club, we would like to give you the following option. Please decide whether you would like to use the funds in the way that was decided during the activity, or whether you would like for us to return the funds in equal shares to each of you.

- Allow the group some time to decide whether they would like to receive the funds as a group or whether they would like to receive the funds in equal shares. I they would like to receive the funds in equal shares, divide the funds in as equal shares as possible. Otherwise, if the group decides to use the funds in the matter they decided originally, hand the funds to the treasurer. If there are funds left over that can not be be divided equally, mark this amount (it should be less than 50KW × The number of people playing the game) separately. Take note of the decision and the remaining money on the following lines.

- **Decision**. Circle one of the following: Group Use of Funds / Divide in Equal Shares

- **Remaining Amount**. _____

## 6 Notes

- Sometimes group members or leaders might ask what they can do with the money they have: emphasize that this is up to them. They should treat this money as regular normal income.
- Sometimes group members might want to know the exact amount they will get before they can discuss what to do. Tell them that you don't know this either, this will depend on what each person will put in, and they should try to discuss nevertheless.
- Sometimes group members will say that the decision-making process is not the same one they employ in their group meetings. Tell them that you understand this and apologize if it creates difficulties but that it is part of an experiment to study ways in which groups can make decisions together. Hopefully the group can discuss the outcomes of their experience with each other after the activity and compare it with how they usually make decisions.

# GAME DATA

Village: |___|___|___|
Decision Type: _____
Pre-Game Conversation Type: _____

| ENUMERATOR | | ENUMERATOR GETS INFORMATION DURING CONVERSATION WITH GROUP LEADERS | | | | | | | ENUMERATOR NOTES RESPONSES DURING GROUP INTRODUCTIONS | | | | ENUMERATOR GETS INFORMATION AFTER INTRODUCTIONS | | | | ENUMERATOR GETS INFORMATION MEMBERS AFTER CONTRIBUTION IS MADE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number assigned for the game | Match number | Name | G1 Leader Role? (CP, S, LF, T) | [LEADERS ONLY] G2 were you a leader last year? | G3. | G3a. If G3 = "NOT IN VILLAGE", Village Name? | G4 | G5 | G6. Present? (Yes/No) | G7. Household ID (if in sample) | G8 Sex (M/F) | G9 Represented by Family Member (Y/N) | G10. Age (years) | G11. Education (years completed) | G12. Land (acre owned) | G13.Does your dwelling have iron sheets? | G14 | G15 | G16 | G17 | G18 | Reported Match Acreage | Contribute |
| 1 | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | | | | | |

**[G2-G5] CDI CLUBS ONLY**

G3 [ASK THE LEADERS] Are there any individuals in the group who do not live in the village? If yes, who? [MARK THE BOXES OF INDIVIDUALS WHO DO NOT LIVE IN THE VILLAGE. CODE: 0 = IN VILLAGE 1 = NOT IN VILLAGE]
G4 [ASK THE LEADERS] Are there any individuals in the group who do not attend meetings regularly? If yes, who? [MARK THE BOXES OF INDIVIDUALS WHO DO NOT ATTEND REGULARLY. CODE: 0 = REGULAR; 1 = NOT REGULAR]
G5 [ASK THE LEADERS] Are there any individuals who have joined the group in the last year? If yes, who? [MARK THE BOXES OF INDIVIDUALS WHO ARE NEW TO THE GROUP. CODE: 0 = OLD MEMBER; 1 = NEW MEMBER]
[READ THE FOLLOWING STATEMENT BEFORE ASKING THE FOLLOWING QUESTIONS]

**NOTE TO ENUMERATOR: If not with a CDI club, change wording of G14, G16, and G17 to refer to the activity they just participated in.**
**In other words, G14 would be "The club will effectively use the group funds contributed today." G16 would be "I was able to express opinions in the meeting today" And so on.**

In the next set of statements I want you to respond with one of 5 options: 1 = Strongly Agree; 2 = Somewhat Agree; 3 = Neither Agree nor Disagree; 4 = Somewhat Disagree; 5 = Strongly Disagree. Are these instructions clear?
G14. The club was very effective in its use of group funds in the last year
G15 I often take risks in important decisions affecting my household
G16 I am able to express my opinions in group meetings
G17 Others listen to my opinions and take them seriously in group meetings
G18 The leadership of this group is very effective

Match Number: Use a random number generator to match each individual with another individual who is PRESENT during the game.
[Reported Match Acreage] Ask the individual to state the acreage of the random match within the group and record the response. Code for "I don't know" = -99.
Contribute: Ask the individual to state how much they are contributing to the group. In other words, how much of the money in the envelope are you leaving in the envelope?

### A.2.3 2015 Leader Interview

## GROUP LEADERS

Village: |___|___|___|
Decision Type: _____
Pre-Game Conversation: _____

**Note to enumerator: Chairperson, Treasurer, Lead Farmer, Secretary should be present if they are available. All questions should be addressed to all the leaders, but only one response should be recorded. If there is initial disagreement among the leaders on a particular response, wait until they are able to remember the accurate response. If the disagreement persists, skip the question and move to the next question. Pay attention to who is more influential in providing responses. Note the respondent code in the column to the right of the response code. Any box in GRAY should be filled by the enumerator.**

| **Respondent Code: CP - Chair person, LF - Lead Farmer, T - Treasurer, S - Secretary, E - Shared response among some leaders, D - Persistent Disagreement** | | | **Respondent Code** |
|---|---|---|---|
| **I would like to ask you a few questions about your group.** | | | |
| L1 How often did your group meet last year before the planting season? | | 1 = 2-3 Times a Week<br>2 = Weekly<br>3 = 2 times a month<br>4 = Monthly<br>5 = Rarely | |
| L2 How often did your group in the last year during the planting and harvesting seasons? | | same code as L1 | |
| L3 How often did your group meet in the last year after the harvesting season? | | same code as L1 | |
| L4 Did the group have a common fund to hold member contributions prior to today? | | YES/NO | |
| L5 If yes, what was the amount in the common fund yesterday? | | Malawi Kwacha | |
| L6 One year ago, did your group play a game with researchers where the group members contributed some money to a common fund in order to use the common fund towards a project of the group's choice? | | YES/NO | |
| L7 If yes to L6, how were the funds used? _____ (If they have not been used yet, specify "NOT YET USED") | | | |
| L8 List three of the top expenses the group had in the last year: | | | |
| 1 _____ | | Malawi Kwacha | |
| 2 _____ | | Malawi Kwacha | |
| 3 _____ | | Malawi Kwacha | |
| L9 How many different ethnic groups are represented in this group? | | Number | |
| L10 Which ethnic groups are represented by the club? | | | |
| Group 1 _____ Number of Group Members _____ | | | |
| Group 2 _____ Number of Group Members _____ | | | |
| Group 3 _____ Number of Group Members _____ | | | |
| Group 4 _____ Number of Group Members _____ | | | |
| L11 How did the group usually make decisions in the last year? | | | |
| 1 The leaders decide and informs other group members | | | |
| 2 The leaders asks group members what they think and then decides | | | |
| 3 The group members hold a discussion and decide together | | | |
| 4 Other _____ | | | |
| L12 Does the group use group funds to provide loans to group members? | | YES/NO | |

**I would like to ask you how your group would respond to the following difficult situation**

PROMPT: Imagine that all the members of your group are soybean farmers. Your group is trying to get a high price for the soya they have harvested. One buyer offers a price that is 200 Kwacha per 50kg bag if all of the farmers sell their soya one month after harvest. In order to acquire this price, the entire group needs to wait to sell their soya. Two farmers do not wait and sell their soya for 130 Kwacha per 50kg bag. As a result, the original buyer refuses to purchase the soya for 200 Kwacha per 50kg bag.

**NOTE TO ENUMERATORS: Notice that in the questions below, we importantly do not use the word "punishment" until L15**

| | | | |
|---|---|---|---|
| L13 Does the group have a rule in place to deal with those who could not cooperate? | | YES/NO | |
| L14 Who makes the decision on how to react to this kind of behavior? | | | |
| 1 The group has a set of rules in a constitution that describes the proper response - there is no discussion. | | | |
| 2 The leaders of the group decide what the response should be without discussion. | | | |
| 3 The leaders of the group first discuss with group members, and then decide themselves what the response | | | |
| 4 The group discusses and decides together the best way to respond | | | |
| 5 Other (specify) _____ | | | |

Village: |___|___|___|
Decision Type: _____
Pre-Game Conversation: _____

| | | | | |
|---|---|---|---|---|
| L15 | How likely is it that the members who did not cooperate would be punished (for example be fined, kicked out of the group, or other form of punishment)? | | 1 = Very Likely<br>2 = Somewhat Likely<br>**3 = Neither**<br>**4 = Somewhat Unlikely**<br>**5 = Very Unlikely** | |

**Ask: who among you is the lead farmer of the group? I would like to ask you a few questions about your relationship with CDI**
**Note to enumerators: Even though respondent code should be "LF," it may not be (LF may not be present, another leader has more interaction with CDI…)**
**If respondent code was not LF, note below L20 why it was not "LF."**

| | | | | |
|---|---|---|---|---|
| L16 | How many CDI trainings have you attended in the last year? | | Number | |
| L16a | Did you attend a Sensitization Meeting hosted by CDI in September 2014? | | YES/NO | |
| L16b | Did you attend a classroom training hosted by CDI in December 2014? | | YES/NO | |
| L16c | Did you attend a training on a demonstration plot held by CDI? | | YES/NO | |
| L16d | Did you attend a farmer field day held in either Kapinya or Galeka village? | | YES/NO | |
| L17 | Do you know the CDI extension officer by name? If NO, go to (L18) | | YES/NO | |
| L17a | If yes to L17: What is his/her name? | _____ | Name | |
| L18 | How often did you speak to the CDI extension officer in the last year? | | 1 = Daily<br>2 = 2-3 Times a Week<br>**3 = Weekly**<br>**4 = Monthly**<br>**5 = Rarely**<br>**6 = Never** | |
| L19 | How many times did you work with the CDI extension officer on any demonstration plot in the past year? | | Number | |
| L20 | Not including the answers to the previous question, how many times did you work with the CDI extension officer on any plot (yours or a group member's) in the past year? | | Number | |

If Respondent Code NOT "LF" in L16-L20, why not:_____

**I would now like to ask you about other activities you do with your group**

L21 Other than working on demonstration plots, please list the top 3 activities in terms of time spent that group members do **together**: L21a

**Note to enumerator: First, complete the table on the left. After this table is completed, ask the participants to rank according to the table on the right (L21a).**

| Ask the leaders to list the activities first, and then proceed to ask the next two questions. | | How often does the group meet for this activity? | Is cooperation easy or difficult to achieve with this activity? | Rank the activities according to the level of cooperation they require. |
|---|---|---|---|---|
| Unit/ Code | Activity | 1 = 2-3 Times a Week, **2 = Weekly, 3 = 2 times a month, 4 = Monthly, 5 = Rarely** | [1 - Very Easy, 2 - Somewhat Easy, 3 - Neither, 4 - Somewhat Difficult, 5 - Very Difficult] | (1 - Most cooperation required, 5 - Least Cooperation Required) |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |

# B Appendix Tables and Figures

Table A1: Balance test associated with public goods experiment in 2015

| | No Club | | | | | | CDI Club | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | Mean | Sd | Leader | Dem. | P | N | Leader | Dem. | P |
| Average Contribution (0-1) | 50 | 0.57 | 0.21 | 0.52 | 0.62 | 0.09* | 101 | 0.73 | 0.72 | 0.73 |
| **Game-player characteristics** | | | | | | | | | | |
| Sex (1-M; 2-F) | 50 | 1.53 | 0.21 | 1.52 | 1.53 | 0.87 | 101 | 1.47 | 1.48 | 0.61 |
| Age (Years) | 50 | 41.91 | 6.18 | 42.84 | 41.05 | 0.31 | 101 | 40.68 | 39.63 | 0.29 |
| Land (Acres) | 50 | 4.82 | 2.09 | 4.65 | 4.97 | 0.60 | 101 | 4.88 | 5.21 | 0.28 |
| Education (Years) | 50 | 3.42 | 1.72 | 3.50 | 3.35 | 0.77 | 101 | 4.20 | 4.10 | 0.82 |
| Dwelling with Iron Sheets (1-Y; 2-N) | 50 | 1.72 | 0.23 | 1.76 | 1.68 | 0.26 | 101 | 1.79 | 1.79 | 0.96 |
| SD: Sex (1-M; 2-F) | 50 | 0.47 | 0.07 | 0.46 | 0.48 | 0.33 | 101 | 0.49 | 0.48 | 0.32 |
| SD: Age (Years) | 50 | 13.77 | 3.41 | 14.15 | 13.42 | 0.45 | 101 | 13.02 | 13.04 | 0.97 |
| SD: Land (Acres) | 50 | 3.75 | 2.80 | 4.00 | 3.52 | 0.55 | 101 | 3.13 | 3.14 | 0.92 |
| SD: Education (Years) | 50 | 2.12 | 1.69 | 2.42 | 1.84 | 0.23 | 101 | 2.61 | 3.30 | 0.27 |
| SD: Dwelling with Iron Sheets (1-Y; 2-N) | 50 | 0.38 | 0.18 | 0.35 | 0.40 | 0.32 | 101 | 0.35 | 0.37 | 0.58 |
| **Relationships among game-players** | | | | | | | | | | |
| % Family Members (0-1) | 49 | 0.00 | 0.17 | 0.01 | -0.01 | 0.61 | 56 | -0.01 | -0.02 | 0.78 |
| % Daily Conversation (0-1) | 49 | 0.01 | 0.17 | 0.02 | -0.01 | 0.47 | 56 | 0.01 | -0.02 | 0.60 |
| SD: % Family Members (0-1) | 49 | 0.46 | 0.04 | 0.46 | 0.46 | 0.88 | 56 | 0.44 | 0.45 | 0.61 |
| SD: % Daily Conversation (0-1) | 49 | 0.47 | 0.05 | 0.48 | 0.46 | 0.19 | 56 | 0.46 | 0.46 | 0.74 |

Table A2: Comparing Democratic and Leader Driven Club Characteristics

| | Leader | | Democratic | | |
|---|---|---|---|---|---|
| | N | Mean | N | Mean | P-Value |
| **Panel A - Club Variables:** | | | | | |
| N Club Members | 37 | 17.70 | 37 | 17.08 | 0.428 |
| N game players | 37 | 13.95 | 37 | 11.81 | 0.060* |
| Club Mean: Female (0-1) | 37 | 0.47 | 37 | 0.50 | 0.528 |
| Club Sd: Female (0-1) | 37 | 0.49 | 37 | 0.48 | 0.540 |
| Club Mean: Age | 37 | 37.61 | 37 | 39.84 | 0.056* |
| Club Mean: Years of Education | 37 | 5.24 | 37 | 5.58 | 0.371 |
| Club Mean: Land (acres owned) | 37 | 4.07 | 37 | 4.75 | 0.183 |
| Club Mean: Asset Value (1000s MK) | 34 | 127.23 | 37 | 222.09 | 0.160 |
| Club Sd: Age | 37 | 12.52 | 37 | 12.24 | 0.679 |
| Club Sd: Years of Education | 37 | 3.13 | 37 | 3.15 | 0.903 |
| Club Sd: Land (acres owned) | 37 | 3.00 | 37 | 3.62 | 0.479 |
| Club Sd: Asset Value (1000s MK) | 34 | 160.68 | 37 | 316.49 | 0.218 |
| **Panel B - Network Variables:** | | | | | |
| Club Mean: Percent Known (0-1) | 34 | 0.90 | 37 | 0.88 | 0.227 |
| Club Mean: Percent Approachable (0-1) | 34 | 0.81 | 37 | 0.82 | 0.598 |
| Club Mean: Percent Sought Advice (0-1) | 34 | 0.23 | 37 | 0.25 | 0.595 |
| Club Mean: Percent Trusted (0-1) | 34 | 0.67 | 37 | 0.73 | 0.200 |
| Club Sd: Percent Known (0-1) | 34 | 0.08 | 37 | 0.11 | 0.142 |
| Club Sd: Percent Approachable (0-1) | 34 | 0.19 | 37 | 0.14 | 0.119 |
| Club Sd: Percent Sought Advice (0-1) | 34 | 0.21 | 37 | 0.26 | 0.116 |
| Club Sd: Percent Trusted (0-1) | 34 | 0.27 | 37 | 0.23 | 0.179 |
| **Panel C - Village Characteristics:** | | | | | |
| Distance to Paved Road (km) | 37 | 1.84 | 37 | 1.82 | 0.973 |
| N of HH in Village | 37 | 65.03 | 37 | 72.52 | 0.588 |
| N organisations from village questionnaire | 37 | 1.89 | 37 | 2.05 | 0.583 |
| No Visits by Gov. Extension (year) | 37 | 0.16 | 37 | 0.38 | 0.037** |
| No Visits by NGO Extension (year) | 37 | 0.27 | 37 | 0.30 | 0.800 |
| Price of Labour During Harvest (100 MK/Day) | 37 | 10.53 | 37 | 11.49 | 0.727 |

P-value associated with null hypothesis in a binary means tests with unequal variance. We limit the sample to those villages for which we were able to construct decision-making statistics.

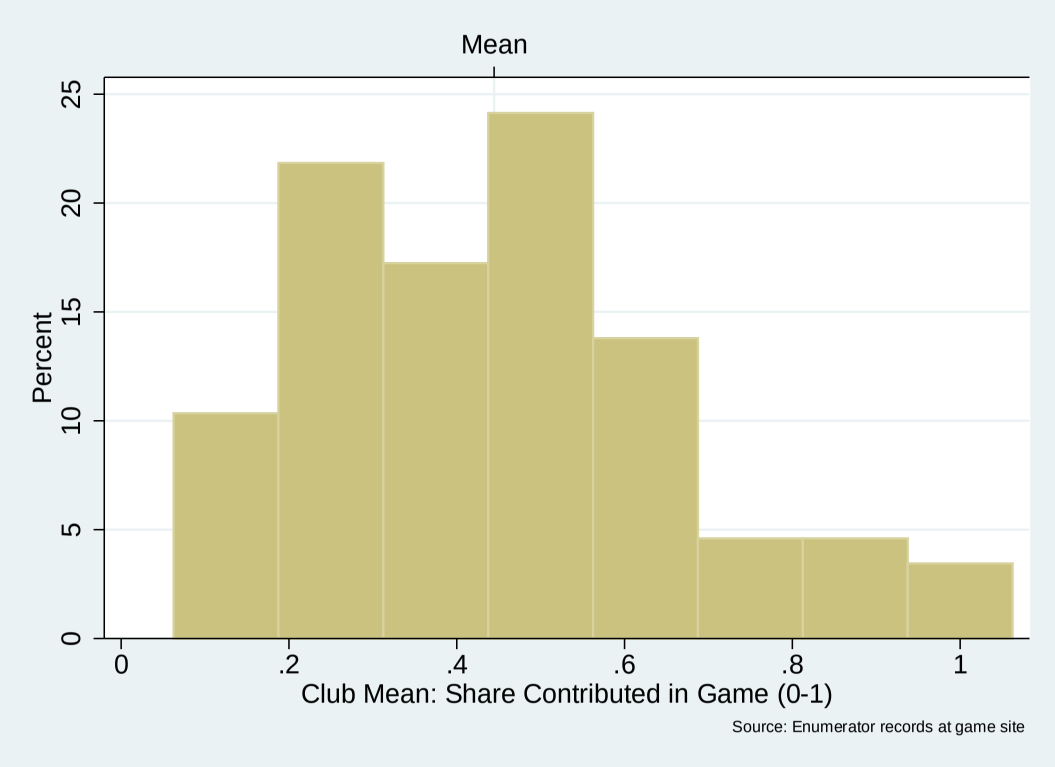
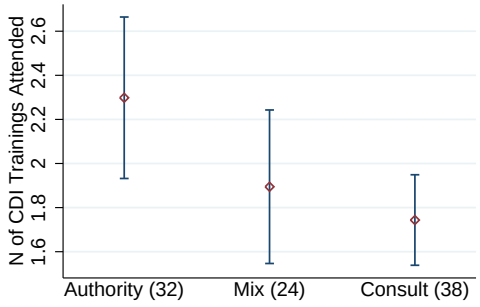
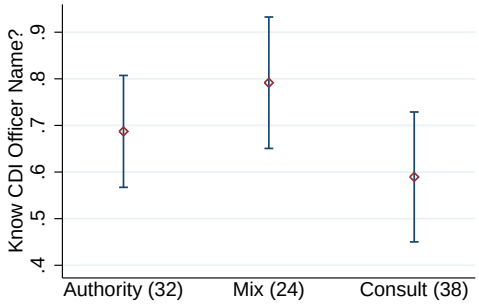
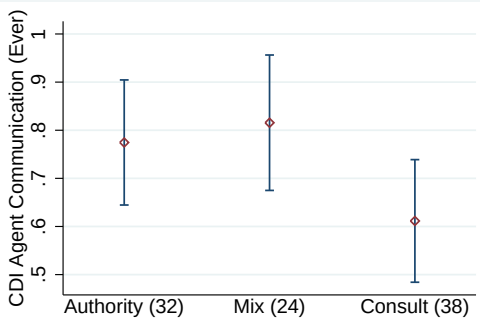



Figure A1: Average group level contribution to the common account in the 2014 experiment.

Figure A2: Measures of CDI interaction by decision-making




Notes: We use decision-making pro