A Theory of Leadership Selection in Small Groups - With Evidence from Ugandan Farmer Associations

Guy Grossman[1] and W. Walker Hanlon[2]

[1]PhD Candidate, Department of Political Science, Columbia University.

[2]PhD Candidate, Department of Economics, Columbia University.

December 6, 2010

Abstract

Small groups, such as farmer associations, micro-lending groups, or civic organizations, play an important role in economic, political and social life in all manner of countries and circumstances. This paper studies factors that affect the ability and effort exerted by leaders of these groups, and hence the effectiveness of the groups in providing public goods to their members. We argue that small groups differ from larger political units in a number of important ways, and offer a model adapted to the small group setting. The model suggests that, under certain conditions, groups face a tension when choosing the level of effort to demand from their leaders. If groups demand too little effort, they obtain high ability leaders, but these leaders exert little effort. Increasing effort demands increases the effort exerted by leaders, but may cause high ability members to self-select out of the candidate pool. The overall result is an inverted U-shaped relationship between groups' effort demands and the value of the public good that their leaders produce. Whether this trade-off exists depends crucially on the level of private income opportunities available to group members outside of the group. These predictions are tested using data gathered for the purpose from a sample of Ugandan farmer associations. The data support the predictions of the model and suggest that variation in the value of the group public good produced by the leader can have a meaningful impact on group member's welfare.

1 Introduction

Recently, there has been growing interest in the factors affecting the quality of elected leaders. This literature has focused mainly on two issues. First, how the costs and benefits of holding office affect the set of available candidates through individual candidacy decisions (Besley, 2004; Caselli & Morelli, 2004; Messner & Polborn, 2004)[1]. Second, how the rewards from office affect the amount of effort exerted by politicians once elected (Gagliarducci *et al.* , 2010; Ferraz & Finan, 2010). The ultimate concern of these studies is the positive relation between the quality of the political class and the quality of public goods and public policies. Thus far the theoretical and empirical work have focused on leadership quality in the context of large political units, such as national parliaments or local governments. However, issues affecting leadership quality and its relation to public goods production are also relevant for a large class of situations in which a relatively small number of citizens organize into groups, organizations, and communities in order to deliver a local public good. We refer to this class of organizations as "small groups".

Small groups come in many varieties, from farmer cooperatives in Uganda and micro-credit groups in Bangladesh to parent teacher associations in Oklahoma, artisan cooperatives in New York, or the Chambers of Commerce found in towns throughout the world. The importance of these groups, especially in developing countries, has increased in recent years as larger political units have sought to democratize, decentralize and liberalize their economies[2]. As these few examples suggest, small groups are present in many facets of economic and social life, and in countries of all income levels. The ubiquity and growing importance of small groups calls for a better understanding of the factors that determine their effectiveness.

In the theoretical portion of this project we define small groups and introduce a model adapted to their political features. The model suggests that the issues of candidacy self-selection and leader effort, identified in studies of larger political units, are particularly important in the small groups setting. In particular, we find that groups face a trade off between leader effort and leader ability. However, we show that these effects only exist when group members have sufficient opportunties for generating private income outside of the group. In contrast, if there are few of these opportunities, then high ability member will prefer to become a candidate and will exert a high level of effort if elected. These predictions are then tested using data gathered for the purpose from Ugandan farmer associations. The richness of this data set allows us to test existing predictions regarding candidacy self-selection and leader effort, as well as the new predictions of the model. Our empirical findings suggest that the candidacy self-selection and leader effort issues identified by the existing literature are also present in small groups, but only under certain conditions. Thus, one of the contributions of this work is that it is able to demonstrate a wider applicability of existing political selection models, but also to show that existing results must be modified in order to better fit the small group setting.

The starting point of this study is that small groups differ from larger political units in a num-

---

[1] A related strand of literature considers these issues when citizens are heterogeneous with respect to public spirit, honesty, or political skills. See, for example, Bernheim & Kartik (2010) and Mattozzi & Merlo (2008).

[2] For example, in Senegal 10% of sampled villages reported to have, at least, one self-help group in 1982; by 2002 this figure was 65%. In Burkina Faso the figures were 22% for 1982 and 91% in 2002 (Bernard *et al.* , 2008).

ber of important ways. First, unlike large political units (regions, nations, etc.) where each citizen knows only a few of her fellows, in small groups members generally know each other well. This means that incomplete information plays a smaller role in determining outcomes in small group settings. It also means that small groups have an advantage over large political units in offering high-powered incentive schemes that condition remuneration on effort[3]. A second feature of small groups is that they are often formed with a specific purpose in mind. Farmer associations, for example, are made up of producers who become members in order to secure higher prices for their outputs, lower prices for their inputs, and better access to technology. Thus, the goals of members of small groups are often much more closely aligned than in large groups[4]. A third feature of small groups is that participating in them, even as the leader, is generally a part-time affair. Rarely do small groups have the resources to employ full time or professional leaders, as is common in larger political units. A fourth feature of small groups is that the leader receives significant benefits from the public good that she produces, which has an important effect on members' incentives to seek leadership positions[5]. In contrast, in larger political units, the value that leaders derive from the public good they produce is often small relative to the amount of effort they exert or the overall value of the public good. A fifth feature of small groups is that their set of options for incentivizing and monitoring leaders is often constrained by institutional factors outside of their control. These constraints are likely to be more important for small groups, since they are often subject to regulations imposed by larger political or economical units[6].

We offer a model built on the citizen-candidate framework pioneered by Osborne & Slivinski (1996) and Besley & Coate (1997), but designed to reflect the features of small groups described above. There is perfect information in the model, leaders' remuneration depends on their effort, group members' preferences are perfectly aligned, the group leader divides her effort between public goods production and generating private income, and she receive significant benefits from the public good that she produces[7]. In this setting, the process of electing the best leader from the available candidate pool is straightforward, so that the importance of individual candidacy decisions is magnified. This contrasts with the case of larger political units, where outcomes are largely driven by the process through which the candidate pools is translated into office holders (see, e.g., Besley (2006)).

The theory investigates how variation in the amount of effort that groups demand from their leader affects the value of the public good produced by the leader, where public goods production depends on both the leader's effort and ability. When groups' demand little effort from their leaders, the model suggests that high ability individuals are more willing to be candidates, but

---

[3]See Besley (2004, 197-198) which provides a thoughtful discussion on the problems that large political units face in trying to devise high-powered incentives for politicians.

[4]Note that the assumption that society is comprised of citizens that have competing interests, together with incomplete information about candidates who cannot credibly commit to voters, forms the basis of the canonical citizen-candidate model. See, among others, Besley & Coate (1997).

[5]In contrast, the benefits of holding office in larger groups often comes through private, rather than public, goods.

[6]For example, academic departments' ability to tailor remuneration and effort demands to incentivize faculty to propose themselves as Chairs, is usually constrained by their university's administration.

[7]The assumption of complete information sets our model apart from a large pool of models that deal with similar issues in the context of large political units. Important contributions to this literature include Barro (1973), Ferejohn (1986) and Persson *et al.* (1997). For a recent survey of the literature, see Besley (2005).

3

that once elected, they devote less effort to public goods production than group members would like, resulting in a low public good value. As group effort demands increase, elected leaders exert more effort – since rewards from office are conditional on satisfying their group's effort demands – and the value of the public good rises. Following Besley (2006), we refer to this as the "discipline effect". However, increasing effort demands also reduces group members' incentives to become candidates, which may cause some members to self-select out of the candidacy pool. We refer to this as the "self-selection effect". High ability members are particularly likely to self-select out of the candidate pool, since they face higher opportunity costs on their time. Thus, increasing effort demands beyond a certain point may ultimately reduce the value of the public good produced, if it drives better members out of the candidate pool. The tension between the discipline and self-selection effects is the key feature of the model.

The theory offers two new results. First, we show that when the discipline and the self-selection effects both operate, there is a trade-off between leader ability and the amount of effort they exert. This trade-off generates a rough inverted U-shaped relationship between the amount of effort demanded by the group and the value of the public good that is ultimately produced. This implies that there exists a welfare-maximizing level of effort demand for each group. Allowing group effort demands and leader's ability to be continuous variables is crucial to obtaining this result[8].

Second, we demonstrate the central role that private income opportunities – income generated outside the group's activities – play in determining the quality of leadership. Previous studies, including Caselli & Morelli (2004) and Messner & Polborn (2004), have assumed that high ability citizens, by definition, face a higher opportunity cost of being the leader. However, this need not hold when leaders benefit from the public good that they produce. We show that high-ability members have a greater opportunity cost of holding public office only when private income opportunities are sufficiently high relative to the potential value of the group public good[9]. Thus, the trade-off between leader effort and ability exists *only when there are sufficient private income opportunities*. In cases where there are relatively few private income opportunities, the model predicts that high ability members will choose to become candidates, and once elected, will work hard to produce the public good, from which they benefit directly.

To test these results, we use original data collected through an extensive survey of associations of coffee farmers in Uganda. These associations, recently established through a USAID funded intervention, provide a good context for testing the model because we are able to look across a large number of groups, all with relatively similar structures, and all formed around the same time for the same purpose. However, while the surveyed associations have similar governance structures, we observe a significant amount of variation across associations in the availability of private in-

---

[8]In contrast, Gagliarducci *et al.* (2010) predict that when incumbents are allowed to split their time between private and public activities, citizens will be forced to elect either high ability leaders who do not exert any effort towards generating group goods, *or* low ability leaders who do. Unlike our model, which makes clear welfare predictions, Gagliarducci *et al.* (2010) cannot assess which of those two corner solutions is preferable.

[9]It is important to consider the level of private income opportunities in relation to the potential value of the public good. This is because the value of the public good may also vary across contexts. For example, if the public good is generated by overcoming information asymmetries, then the potential value of the public good will be lower the more information is readily available.

come opportunities and in the amount of effort that each group demands from its leaders. This variation results from a number of factors, including the identity of the facilitator who helped the farmers set up their associations, local economic conditions, and variation in the cohesiveness of different localities, as manifested in the strength of their social networks. Exploiting variations in group effort demands, and in local private income opportunities, allows us to assess the capacity of the model to explain the determinants of leader quality in small groups.

The Ugandan farmer associations that we study fit the features of small groups, described in the theoretical portion of the model, well. The associations are made up of farmers from several nearby villages. All group members share a common main goal, obtaining higher prices for their outputs, with secondary goals including obtaining lower input prices and learning about better farming practices. The group leaders spend only part of their time working for the group, with the rest devoted to farming their land or working at other jobs. When leaders negotiate higher prices for their crops, they benefit directly and significantly from the group public good through the higher price that they receive for their own crops. Finally, the groups we study are constrained in their ability to incentivize their leaders due to factors such as the institutional structures introduced when the groups were initially organized. Our data collection effort involved conducting extensive surveys of over 3,000 members and leaders drawn from a sample of 50 farmer associations. These data allow us to construct a broader set of variables than were available in previous studies, including information on the value of the public good, members' ability, leaders' effort, groups' effort demands, private income opportunities, and changes in the welfare of group members since joining their group.

To summarize the empirical results, we find support for both the discipline and self-selection effects, as well as the trade-off between them represented by the inverted U-shaped relationship between group effort demands and the value of the public good. Furthermore, our results suggest that the level of private income opportunities plays an important role in determining whether these effects coexist. Finally, we find evidence that a higher quality leaders produce a higher public good value, and that the value of the public good is associated with positive welfare effects.

Our results generally support the predictions of previous models that stipulate the existence of a self-selection effect (Caselli & Morelli (2004), Messner & Polborn (2004)), but with some nuance. Using evidence from Italian municipalities,Gagliarducci & Nannicini (2010) find evidence that increasing politician pay leads to higher ability citizens joining the candidate pool. Ferraz & Finan (2010) find similar effects in Brazilian municipalities, but of very modest size. Using data on MPs in Finland, Kotakorpi & Poutvaara (2010) find evidence of the self-selection effect for women, but not for men. They speculate, but do not test, that this difference may be due to differences in the private income opportunities available to women relative to men. In similar work, Gehlbach *et al.* (2010), study the decision of businessmen to become candidates in Russia and find that businessmen are less likely to become candidates in regions with greater media freedom and government transparency reduce the private benefits of holding office.

This paper makes two advances over existing tests of the self-selection effect. First, our theory suggests that the self-selection effect exists only under certain conditions: when group effort demands are binding and private income opportunities are high. We take these conditions into

account when testing for the existence of the self-selection effect. Second, we have individual-level data on the entire pool of potential candidates. This allows us to look at individual choices when assessing the self-selection effect, and control for individual characteristics. Existing studies observe only those individuals who choose to become candidates and thus can consider only changes in the candidate pool as a whole. As predicted by the model, the empirical findis suggest that high-ability member are less likely to become the leader when effort demands are high and there are sufficient private income opportunities.

We also explore the relationship between the costs and rewards of office and the effort exerted by incumbents. In a recent paper, Ferraz & Finan (2010) find that an increase in leader remuneration leads to an increase in the effort of legislators in Brazilian municipalities, as reflected in the number of legislative bills submitted and approved. One of the key testable predictions of our model is the discipline effect, in which an increase in the amount of effort that groups demand from their leaders will cause leaders to exert more effort. These are complementary approaches because both remuneration and effort demands affect the costs and benefits of holding office and the returns to exerting effort, albeit in different ways[10]. The data allow us to measure both effort and group effort demands, and hence, to explicitly test the discipline effect. The results suggest that an increase in group effort demands is associated with an increase in the effort exerted by the leader, consistent with the theoretical predictions. Thus, these findings regarding the role of group effort demands are similar to the results of Ferraz & Finan (2010) regrading remuneration.

The existing literature also makes claims concerning the relation between incumbents' effort and ability when incumbents are allowed to divide their time between public and private activities. For example, Gagliarducci *et al.* (2010) predict that under those conditions, there will be a negative correlation between leader ability and effort. Their empirical exercise provides support for this prediction, by showing that individuals with higher income before being elected are less active as legislators. Our model provides a more nuanced prediction according to which we can only be sure to observe a negative correlation between leader ability and effort when private income opportunities are sufficiently high. The empirical results suggest that, when private income opportunities are low, the correlation between leader effort and ability is positive. This correlation becomes negative as private income opportunities increase, as predicted by the model.

This research is related to two other sets of existing literature. First, our findings lend support to the growing literature on the impact of leaders' characteristics on welfare outcomes[11]. Second, the paper is related to the study of farmer organizations as engines of growth. This literature suggests that farmer associations can play an important role in generating development and reducing poverty[12], yet the success of interventions of this type have been mixed[13]. The impact of leadership has been identified as one factor that could be important in determining the success of these

---

[10]Remuneration affects the returns to exerting effort by changing the benefits of winning reelection. Effort demands affect these benefits in slightly different way: by tying rewards and costs to meeting effort requirements.

[11]See, among others, Chattopadhyay & Duflo (2004) which studies the effect of political reservations for women on the type of public goods provided by Indian Village Councils, and the study by Jones & Olken (2005) on the effect of leaders' quality on growth.

[12]In the context of the developing world, see, among others, Narayan-Parker (2002) and (Bosc *et al.* , 2002). In the context of the developed world see Staatz (1987), Sykuta & Cook (2001), and Sexton (1990).

[13]See, e.g., (Hellin *et al.* , 2009) and (Biénabe & Denis, 2005).

programs[14]. We contribute to this literature by showing how the governance structure of these associations, and the economic environment in which they are embedded, can affect the quality of leadership that they obtain and, thus, their effectiveness.

In the next section of the paper we present the theoretical model and derive several testable predictions. Section 3 describes the Ugandan farmer associations that are used to test the model, while Section 4 describes the data collection procedure. Section 5 presents a brief study of associations from two districts, Iganga and Masaka. The empirical analysis is contained in Section 6, while Section 7 concludes.

2   Theory

The model introduced in this section builds on literature investigating factors that determine the quality of leaders obtained through democratic political institutions utilizing a citizen-candidate framework. An important starting point is Caselli & Morelli (2004), who suggested that high quality citizens (more able or honest) may opt out of becoming a candidate if the rewards of the leadership position do not provide sufficient incentives, leaving voters with only low quality candidates. This occurs because high quality citizens have more rewarding options outside politics and so face a higher opportunity cost on their time. Messner & Polborn (2004) extend Caselli & Morelli (2004) to allow leaders to benefit from the public good that they produce. Internalizing the value of the public good has the effect of increasing the attractiveness of holding public office for high-ability types. Gagliarducci *et al.* (2010) extend the basic model in a different direction, by allowing candidates to split their time between public tasks and generating private income. This may result in higher quality citizens becoming candidates, but this also generates a moral hazard problem. This is because, once elected, leaders will prefer, under some conditions, to devote more time to generating private income.

We follow the existing literature by taking the rules of the game, i.e., the costs (and rewards) of holding office, as given, and considering how variation in these costs affects the quality of the elected leader. Variation in the costs and rewards of holding office drive many of the predictions of Caselli & Morelli (2004), who note that in their model, "bad politicians win because the rewards from office are too low to induce potentially good politicians to run"[15]. This approach also appears to be a reasonably good representation of reality in the farmer associations we investigate, a point that we discuss in detail in Section 3.

There are two main differences between our model and previous theories. First, we incorporate a number of the features found in previous studies in the same theoretical framework.

---

[14]See Biénabe & Denis (2005) and Bingen *et al.* (2003). Other factors that have been identified include (i) the legal and policy environment (Hussi *et al.* , 1993), (ii) project-design components (Bingen *et al.* , 2003) and (Shepherd, 2007), (iii) the nature of the links between producers and buyers (Shepherd, 2007), (iv) group-specific factors, such as size, membership homogeneity, internal cohesion and trust (Stringfellow *et al.* , 1997) and (Agrawal & Goyal, 2001), and (v) market conditions (Hellin *et al.* , 2009) and (Berdegué, 2001) .

[15]Caselli & Morelli (2004) suggest one reason why rewards may not adjust to incentivize high quality citizens to become leaders: that bad incumbent politicians can exert negative externalities on good politicians, for example, by reducing the ego-rents associated with holding office.

In particular, our theory includes both the discipline and self-selection effects in a framework in which group members' abilities are drawn from a continuous distribution. This allows us to make welfare statements regarding the trade-off between these two effects. Second, we present a theory that has been adapted to the small-group setting[16]. The characteristics of small groups that we have described lead us to specify a model in which, 1) there is perfect information, 2) leaders are rewarded or sanctions depending on the amount of effort they exert, 3) group members' preferences are perfectly aligned, 4) leaders divide their time between producing a group public good and earning private income, 5) leaders benefit significantly from the public good that they produce, and 6) groups are constrained in their ability to adjust the rewards of holding office to achieve the optimal level of public goods production.

2.1 Model setup

The model considers a group of N members which is formed in order to produce a group public good. The members elect a leader who is responsible for producing the group public good. The value of the public good produced depends on the effort exerted by the leader and the leader's ability. The utility of a member i who does not become a candidate (nor the leader) is given by Equation 1, where we suppose that the leader is some individual l. The term $I(A_i, 1)$ represents member's private income from outside sources, which depends on the member's ability, $A_i \in (0, \bar{A})$, which is drawn from a continuous distribution, and her non-leisure effort time, normalized to 1. Thus the share of effort a member devotes to generating the public good will be zero for all members except the leader[17]. The second term represents the value that a member receives from the public good, which depends on the *leader's* ability A_l and the amount of effort the leader devotes to generating the public good, e_l. The parameter $\alpha \in (0, 1)$ determines the value of private income opportunities relative to the potential value of the public good. In practice, this relative value may depend on both the availability of private income opportunities, or on factors affecting the potential value of the public good, though we focus primarily on how α is affected by the availability of private income opportunities.

$$U_i = I(A_i, 1)\alpha + P(A_l, e_l)(1 - \alpha) \tag{1}$$

The utility for an individual who becomes a candidate but is not elected the leader is just as above, plus some additional cost of candiacy $\phi > 0$, which may be monetary or social, though we expect monetary costs to be low in small groups.

The leader's utility is given by Equation 2. The leader's value from the public good depends

---

[16]Note that small groups are not defined with respect to some particular size. In effect, the size of a "small group" is context-specific. Groups with many members may display these characteristics, though as group size grows it seems increasingly unlikely that most or all of these characteristics will be sustained. Moreover, not every group with few members will satisfy these criteria. Notwithstanding these caveats, we argue that these features are present in a great many groups with few members.

[17]This follows directly from the fact that only leaders produce the public good. Of course, we do not believe that public goods can be produced without any effort by group members. It would be easy to add in a fixed amount of effort that all group members devote to public goods production without changing any of the predictions of the model.

8

on her ability and the amount of effort she devotes to producing the public good, $e_i \in [0,1]$, where $1 - e_i$ is the amount of effort the leader devotes to generating private income. The leader also faces the potential of sanctions if she exerts less effort than the group demands, or rewards if she exerts more. This is represented by the $C(\bar{e} - e_i)$ term, where $C(\bar{e} - e_i)$ is an increasing and convex function and $\bar{e}$ represents the level of the group's effort demands[18]. To be elected, the leader must have also paid candidacy cost ϕ.

$$U_l = I(A_i, 1 - e_i)\alpha + P(A_i, e_i)(1 - \alpha) - C(\bar{e} - e_i) - \phi \tag{2}$$

The functions $I(A_i, 1 - e_i)$ and $P(A_i, e_i)$ are increasing in their arguments and concave in the $1 - e_i$ and e_i terms, respectively. Also, $P(0,0) = 0$, i.e., a public good is not produced if there is no leader. We also assume that Inada conditions hold in both private income generation and public goods consumption as $1 - e_i \to 0$ and $e_i \to 0$, respectively, and that there is a complementarity between ability and effort in either task:

$$\frac{\partial^2 I(A_i, 1 - e_i)}{\partial A_i \partial (1 - e_i)} > 0 \qquad \frac{\partial^2 P(A_i, e_i)}{\partial A_i \partial e_i} > 0$$

Two parameters play key roles in the model. The first is $\bar{e}$, which represents the level of effort demanded by the group from their leader. Higher $\bar{e}$ values indicate that the group demands more effort from the leader, and is more willing *and able* to sanction the leader in order to obtain effort. This influences both the amount of effort that the leader devotes to public goods production, and group members' candidacy choices. The other important parameter is α, which represents the value of private income opportunities relative to the public good. We will refer to this parameter as the level of "private income opportunities". A higher α means that members derive greater value from the private income opportunities, which will affect the leader's division of effort, and each members' candidacy choice.

The model has three stages. In the first stage, members decide whether to offer themselves as a candidate for the leadership position. Members base this decision on a comparison of payoffs from being the leader to their payoffs from being a regular group member. Next, members vote in order to choose a leader out of the pool of available candidates. In the last stage, the elected leader decides how much effort to devote to producing the public good, knowing that devoting effort to producing the public good reduces the amount of effort that can be put towards generating private income. Once the leader's effort is chosen, the public good is produced, member's payoffs are realized, and the game ends. There is perfect information in all stages of the model. So, at every stage, all members know the level of private income opportunities α, group effort demands $\bar{e}$, and the ability of all other group members.

To solve the model, we work backwards, starting with determining the effort that each member

---

[18]The fact that remuneration is based on effort rather than outcomes is important. This type of remuneration scheme will be preferred in cases in which factors outside of the leader's control generate significant variability in the value of the public good ultimately produced. This scenario seems to be a good fit for the types of situations we are interested in, including the farmer associations we study, where overall market conditions and other factors can significantly influence the ability of leaders to raise prices through collective selling.

would give if they are the leader. These expected effort levels are used by members to determine who to elect in the second stage, given each potential set of candidates. Moving back another step, the expected election outcomes are used in individual's candidacy choices.

2.2 Leader effort

If member i is the leader, they will decide how to allocate effort between public goods production and generating private income by solving the following problem.

$$\max_{e_i} I(A_i, 1 - e_i)\alpha + P(A_i, e_i)(1 - \alpha) - C(\bar{e} - e_i) - \phi \tag{3}$$

The optimal effort level, denoted e_i^*, is the solution to the first order condition[19].

$$\frac{dI(A_i, 1 - e_i)\alpha}{de_i} + \frac{dP(A_i, e_i)(1 - \alpha)}{de_i} - \frac{dC(\bar{e} - e_i)}{de_i} = 0 \tag{4}$$

2.3 Election

Given a set of candidates, group members will choose the leader based on the value of the public good that they are expected to produce. Recall that in our small group setting, individuals know the ability of all other group members. Using this information, they are able to calculate the effort that each candidate would exert if elected, e_i^*, and the value of the public good that they would produce. Members will then rank their candidates according to $P(A_i, e_i^*)$ and choose accordingly.

Each member has one vote and will always either vote for the candidate delivering the highest public good value or themselves (if the rewards from holding office are great). The candidate delivering the highest public good value will be elected[20].

2.4 Candidacy choice

Each member's candidacy choice will depend on a comparison between her expected utility from being the leader and her utility from not being the leader. The key trade-off is that, as the leader, the member benefits from the public good they produce, but producing the public good requires substituting effort away from generating private income.

Candidacy choice is a game played simultaneously by all group members. We will look for Nash Equilibrium solutions to this game in pure strategies. Each group member will choose between two strategies: Candidate and Not Candidate. We will see that, under most circumstances,

---

[19] An interior solution is ensured by our functional form assumptions.

[20] There is the possibility that, if the rewards from holding office represented by the $C(\bar{e} - e_i)$ function are very large, then all members may choose to run and vote for themselves. In this case there will be a tie vote, and we assume that the members must vote again for a different candidate, at which point the best available candidate will be elected.

multiple equilibria exist. This occurs because better quality leaders (those delivering higher public good values) may choose Candidate if they believe that lower quality members will choose Not Candidate, in which case it is optimal for low quality members to choose Not Candidate. On the other hand, lower quality members may choose Candidate if they believe that higher quality members will choose Not Candidate. This will occur if higher quality members prefer to free ride on a lower quality leader rather than to run themselves. A supportable equilibrium in which a member i chooses Candidacy must satisfy the following three conditions.

Condition 1 *There is at most one member who chooses candidacy in each equilibrium.*

This condition must hold because no member i would choose candidacy given that another member j, with $P(A_j, e_j^*) > P(A_i, e_i^*)$, also chooses candidacy. This is because member i would never be elected under these conditions, but would still have to pay the cost of candidacy.

Condition 2 *Member i has a positive payoff from choosing Candidate relative to a situation in which no leader is chosen, i.e., $CP_i > 0$ where,*

$$CP_i = I(A_i, 1 - e_i^*)\alpha + P(A_i, e_i^*)(1 - \alpha) - C(\bar{e} - e_i^*) - \phi - I(A_i, 1)\alpha \qquad (5)$$

This must hold because member i will never choose Candidate if she would be better off with no public good.

Condition 3 *No other member j, who would deliver a higher public good value than i ($P(A_j, e_j^*) > P(A_i, e_i^*)$), has a positive payoff from choosing Candidate given that member i chooses Candidate. I.e, $CP_j - P(A_i, e_i^*) < 0$ where CP_j is as in Equation 5.*

This must hold because, in an equilibrium in which i chooses Candidate, it cannot pay for a better member j to choose Candidate. The set of equilibria in the candidacy game is composed of all equilibria for which Conditions 1–3 hold. If Condition 2 fails for all i, then every member chooses Not Candidate in equilbrium and no public good is produced. Otherwise, there will be one or more equilibrium in which only one individual runs and is elected.

2.5 Trade-offs and key assumptions

Understanding the effect of ability on members' candidacy choices and effort decisions is key to understanding the model. First, we need to know whether high or low ability members make better leaders. We will henceforth refer to more effective leaders as having an "advantage in public goods production". Note that models which do not allow leaders to divide their time between private and public tasks implicitly assume that higher ability members produce a higher value public good[21]. However, when the leader can substitute effort away from public good production,

---

[21]See Caselli & Morelli (2004), and Messner & Polborn (2004).

a higher ability leader may substitute a sufficient amount of effort away from her public tasks such that she delivers a lower public good value than a lower ability member would.

Second, we need to know whether high or low ability members have stronger incentives to be a candidate for the leadership position. We refer to this property as having "greater candidacy incentives". Candidacy incentives are driven by a trade-off, faced by leaders, between having less time to spend producing private income, and producing and benefiting from a higher value public good. Low ability members will have greater candidacy incentives if the benefits of being the leader fall, for higher ability members, because the higher public good value they produce does not compensate them for the foregone private income. We will show that this is more likely to occur when there are more private income opportunities available[22]. Conversely, the more a leader benefits from the public good she produces, the larger are the incentives for high ability members to be a candidate, compared to low ability members. These concepts are defined more formally below.

Def. 1 *High ability members have an* **advantage in public goods production** *relative to low ability members when $dP(A_i, e_i)/dA_i > 0$. Low ability members have a relative advantage in public goods production when $dP(A_i, e_i)/dA_i < 0$.*

Def. 2 *High ability members have* **greater candidacy incentives** *relative to low ability members when $dCP_i/dA_i > 0$. Low ability members have relatively greater candidacy incentives when $dCP_i/dA_i < 0$.*

Putting these together we obtain four possible scenarios, which are described in Table 1 below. The primary focus of this study will be Region B in the table, where high ability leaders have an advantage in public goods production, but low ability members have greater incentives to be a candidate. This corresponds to a case in which higher ability individuals will not substitute too much effort away from public goods production as leaders, but the higher opportunity cost on their time makes them less inclined to become candidates. This is the scenario considered by the previous literature in this area, and it is also the one suggested by our empirical results. Under these conditions, groups face a trade-off between leader effort and ability.

Region A, where high ability individual have an advantage in both candidacy and public goods production, will also play a role in this study. In this case, groups do not face a trade-off between incentivizing effort and obtaining high ability leaders. We will see that groups will be in Region A when there are few private income opportunities available. We will largely ignore Regions C and D, since our data suggest that there is a positive relationship between ability and public goods production. However, this may be an area for further study in contexts where higher ability leaders face much stronger incentives to substitute effort away from public goods production. Further discussion of these points can be found in Appendix B.

In order to focus on situations in which high ability members have an advantage in public goods production, we will make Assumption 1. This assumption restricts the set of potential

---

[22]Recall that in Caselli & Morelli (2004), the benefit that leaders derive from the public good they produce is constantly set to zero, so low ability candidates will always have greater candidacy incentives.

		Advantage in public goods production			
		High ability		**Low ability**	
Greater candidacy incentives	High ability	**A:**	- High ability are better leaders - High ability more likely to be candidates	**C:**	- Low ability are better leaders - High ability more likely to be candidates
	Low ability	**B:**	- High ability are better leaders - Low ability more likely to be candidates	**D:**	- Low ability are better leaders - Low ability more likely to be candidates

Table 1: Four potential scenarios

functional forms such that higher ability members will always deliver a higher value public good if elected.

Assumption 1 *High ability members have an advantage in public goods production.*

$$\frac{dP(A_i, e_i^*)}{dA_i} > 0$$

Some of our results will be derived by assuming that low ability individuals have an advantage in candidacy, guaranteeing that we are working in Region B. When deriving these results we will call on Assumption 2, which stipulates that members' incentives for being the leader are decreasing in ability.

Assumption 2 *High ability members have less incentive to be the leader than low ability members, i.e.,*

$$\frac{dCP_i}{dA_i} < 0$$

This will hold whenever the opportunity costs paid by high ability members for being the leader outweigh the benefits from the increased value of the public good that they produce. We will show that in order for Assumption 2 to hold, there must be sufficient private income opportunities.

2.6 Predictions

In this section we derive some predictions of the model which will later be taken to the data. We first consider how the leader's effort is affected by the parameters of the model, then consider how the parameters work through member's candidacy decision to affect the ability of the elected leader. Lastly, we consider how the sum of these effects determines the value of the public good produced and group member's welfare.

2.6.1 Discipline effect

We begin by showing the discipline effect, i.e., that holding the identity of the leader constant, an increase in the group's effort demands increases the leader's optimal effort level and therefore the value of the public good. It can also be shown that an increase in private income opportunities reduces the leader's optimal effort level.

Proposition 1 *Holding the identity of the leader constant, the amount of effort allocated to producing the public good is increasing in the amount of effort demanded by the group, $\bar{e}$, and decreasing in the level of private income opportunities, α.*

The proof of this proposition, available in Appendix A, simply applies the implicit function theorem to Equation 4.

2.6.2 Self-selection effect

Here we present results that describe how high private income opportunities and high effort demands can work together to cause high ability individuals to self-select out of candidacy. In particular, we show that equilibria in which high ability individuals choose candidacy sequentially disappear as effort demands increase, when there are sufficient private income opportunities. The argument is divided into three propositions.

Proposition 2 *Given that the equilibrium in which individual i chooses Candidacy initially exists, an increase in effort demands will reduce CP_i and may cause this equilibrium to disappear by causing Condition 2 to fail.*

The intuition is that an increase in effort demands increases the leader's expected sanctions (or decreases the expected rewards), thus reducing the attractiveness of holding office. A formal proof is available in Appendix A.

Next, we show that the equilibrium in which individual i chooses candidacy will disappear earlier, the higher is A_i.

Proposition 3 *When low ability ability members have greater candidacy incentives (Assumption 2 holds), the higher is A_i, the lower the value of $\bar{e}$ at which the equilibrium in which i chooses Candidate disappears.*

The intuition is that, under Assumption 2, a higher ability leader will always have lower candidacy incentives, and so will be the first to drop out as $\bar{e}$ increases. A formal proof is available in Appendix A.

Given the results above, it is important to know the parameter values under which low ability members have greater candidacy incentives (Assumption 2 holds). Then we will know the conditions under which we expect an increase in effort demands to eliminate equilibria in which higher

ability members choose candidacy first. The following proposition shows that Assumption 2 is more likely to hold when there are more private income opportunities.

Proposition 4 *Low ability individuals are more likely to have greater candidacy incentives (Assumption 2 is more likely to hold) when there are more private income opportunities.*

$$\frac{dCP_i}{dA_i d\alpha} < 0$$

An increase in private income opportunities decreases the candidacy incentives of high ability individuals more because it increases the private income gains that they forgo if they become the leader. A formal proof is available in Appendix A. Putting Propositions 3 - 4 together, we obtain Corollary 1.

Corollary 1 *When there are high private income opportunities, low ability members are more likely to have greater candidacy incentives. When that occurs, equilibria in which high ability members choose candidacy will disappear at lower levels of effort demand.*

Corollary 1 is our main empirical result related to the self-selection effect. It shows that private income opportunities and effort demands can work together to drive high ability individuals out of the candidate pool. It is this three-way relationship that we will take to the data in Section 6.

Finaly, we derive one more result showing that, when there are sufficient private income opportunities, higher ability leaders exert less effort. This implies a negative correlation between leader ability and leader effort when private income opportunities are high.

Proposition 5 *When private income opportunities are sufficiently high, high ability leaders choose to exert less effort, all else equal. I.e.,*

$$\frac{de_i^*}{dA_i} < 0 \quad \text{for sufficiently high} \quad \alpha$$

The intuition here is that the complementarity between effort and ability causes high ability individuals to concentrate more of their effort on tasks where the returns are higher. Thus, as private income opportunities grow, high ability leaders will substitute effort away from public good production more rapidly. A proof is available in Appendix A.

2.6.3 Combined effects

This section explores how changes in effort demands affect the public good output when both the discipline and self-selection effects are operating. We use simulation results because, with a finite number of group members, the relationship between effort demands and private income opportunities will not be smooth, a feature that makes deriving analytical results extremely difficult. The

simulation results are generated by assuming an initial distribution of abilities from which the ability of N group members are drawn at random. We then use the model to derive the candidate pool, identify the leader, and calculate the public good value obtained by each group. Repeating this procedure many times for each set of parameter values, we can begin to discern how changes in parameter values affect the outcomes of the model. Simulations are run on groups with 10 members who's abilities are drawn form a uniform [0,1] distribution. Results are obtained by repeating the exercise 100 times for each set of parameter values[23].When there are multiple equilibrium, we focus on the equilibrium delivering the highest possible public good value[24].

We select particular functional forms and parameter values that are consistent with the model's assumptions and that allow us to display a range of possible scenarios[25]. For example, functional forms and parameter values were chosen such that at low values of $\bar{e}$ and α the incentives for individuals to be the leader are high and the candidate pool is large, and at high values of $\bar{e}$ and α there are few incentives for individuals to be the leader and the candidate pool is small. This ensures that the simulations cover the range of interesting scenarios.

Figure 1 shows the average levels of leader effort (left) and ability (right) as a function of effort demands for various levels of private income opportunities. The left panel demonstrates the discipline effect: increase in effort demands increases the amount of effort exerted by the group leader. The right panel demonstrates the self-selection effect: as effort demands increase, the expected ability of the leader decreases. This effect binds earlier when there are more private income opportunities (higher α). Note that, in the left-hand panel, the slope of the relationship between effort and effort demands rises at the point at which higher ability members begin to self-select out of the candidacy pool. At this point effort demands increase effort both through changing the leader's incentives and through changing the ability of the leader. Additional results, available in Appendix C, suggest that increasing $\bar{e}$ also reduces the ability rank (relative to other group members) of the leader.
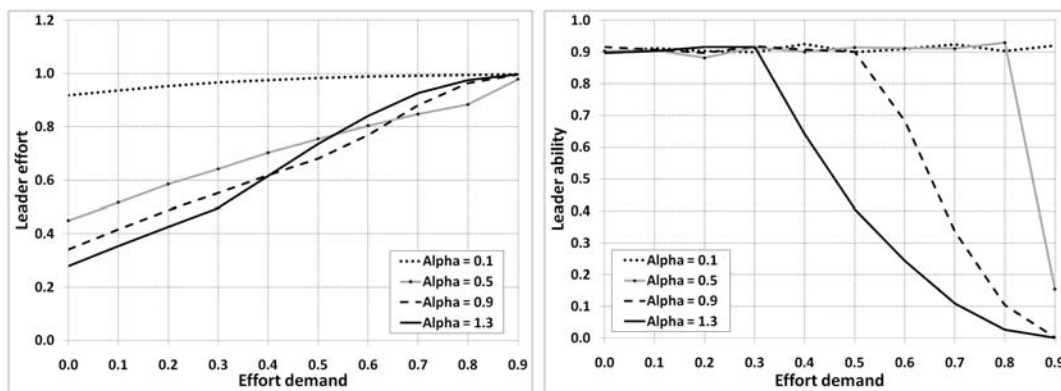

Figure 1: Simulated Leader Effort and Ability

---

[23]Running 100 simulations for each set of parameter values is sufficient to deliver reasonable smooth results.

[24]Other papers in this literature also focus on the best equilibrium. See, e.g., Bernheim & Kartik (2010). Results obtained if we look at averages over all possible equilibria, available in Appendix C, are similar.

[25]The details of the functional forms and parameter values used are presented in Appendix C.

Figure 2 shows the result of these combined effects on the value of the public good. There is a clear inverted U-shaped relationship present for higher levels of private income opportunities. In these cases, the discipline effect dominates at lower effort demand levels and the self-selection effect dominates at higher levels. The higher are private income opportunities, the earlier this inflection point is reached. However, at low levels of private income opportunities, the self-selection effect disappears, and thus, there is no inverted U-shape. In this case, high ability members prefer to run and they exert a high level of effort once elected.
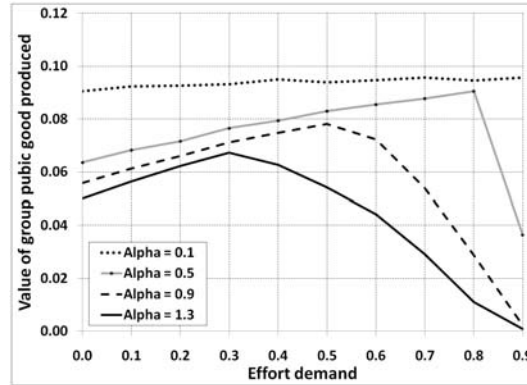

Figure 2: Simulated Public Good Values

In this section we have established the existence of the discipline effect and self-selection effects under certain conditions. When both of these effects are operating, there is an inverted U-shaped relationship between group effort demands and the value of the public good produced. Furthermore, when private income opportunities are sufficiently high, the model predicts a negative correlation between leader effort and ability. The next step is to compare these predictions to real-world data from one set of small groups.

3   Empirical Setting

Farmer associations are small self-governed organizations that exist to provide members, who join voluntarily, with a group public good. The preferences of members of farmer groups with respect to their group's services – the most important of which is securing higher outputs prices through collective marketing – are closely aligned[26]. Also, members of farmer associations, which cover relatively small geographical units, tend to have a high level of information about other members. These factors are consistent with the small group features described in the theory.

3.1   Farmer associations

Farmer associations raison d'étre is to improve the performance of their members' farms as economic units engaged in market transactions. Because of the high costs of transportation and of

---

[26]Other services that farmer groups may provide include securing lower input prices and training in agriculture.

market information, dispersed small-holder farmers have little options but to sell to local middle-men who are able to exploit asymmetries in information and in bargaining powers. By contrast, organized farmers who sell their cash crops via their association (in bulk), can obtain higher prices by increasing their bargaining powers and by reducing buyers' transaction costs (Staatz, 1987). Members of farmer groups collectively own the organization and have the right to control its decision-making process. Nonetheless, in order to ensure the production of services – which are, by nature, collective goods – members select leaders and use centralized governance structures.

3.2   APEP: The development project

All the farmer associations we surveyed were created as part of one of Uganda's largest recent development projects: the Agriculture Productivity Enhancement Project (APEP)[27]. APEP's stated goal was to support subsistence farmers' transition into commercial farming. Between 2004 and 2008 it helped organize over 60,000 small-holder farmers into more than 2,500 village-level farmer groups, which were further organized into more than 200 farmer associations across Uganda. Serving, on average, 200 members from ten neighboring village-level groups, farmer associations (known as Depot Committees, or DCs) were designed to exploit economies of scale and to bargain for better prices based on quality and volume.

In addition to the development project's scope and size, there were several other good reasons for studying the APEP groups. First, focusing on APEP groups allowed us to control for national factors, such as the political and legal environments. Secondly, influenced by project field-trainers who facilitated the process of group formation, APEP groups share a similar governance structure. Each farmer association has an executive committee – comprised of a manager, a chairperson, a secretary and a treasurer – which is responsible for making the key decisions at the association level. Operationally, the DC manager is the principal leader of the association, and we will hence-forth refer to him as the 'leader'. The leader's most important responsibilities include organizing the collection of crops from members, searching for buyers and negotiating the price paid for these crops. Additionally, leaders are involved in coordinating training activities and facilitating the diffusion of information to group members, negotiating input prices (in those groups that purchased inputs collectively), and maintaining records of the group's economic activities.

Under the DC executives there is an additional governance body, the DC council, which is comprised of one or two elected representatives from each of the village-level groups. These representatives form the pool of potential candidates from which the DC leader is elected. The council's main responsibilities are monitoring the DC executives as well as helping to implement their decisions at the village level.

APEP facilitators played a key role in shaping the governance structure of the farmer associations, influencing both effort demand $\bar{e}$ and remuneration[28]. Between 12 to 24 months after creating village-level farmer groups (known as Producer Organizations, or POs), APEP facilita-

---

[27]APEP was funded by USAID, and implemented by Chemonics International, an International Development consulting firm based in Washington D.C. A follow-up project (LEAD), is currently being undertaken by a new contractor: Associates in Rural Development (ARD).

[28]The information here is based on the authors' interviews with APEP's staff as well as with DC and PO leaders.

tors encouraged neighboring POs to form a single association with a federal structure. Representatives from each of the neighboring POs were invited to participate in a three day workshop, designed specifically to help the representatives agree on the structure and rules that govern their newly established cooperative. While all of the associations adopted governance structures that are generally similar, we observe a significant amount of variation in the amount of effort demanded from group leaders, and the monitoring structures created to incentivize leaders to meet these requirements. This variation had several potential sources, including the identity of the facilitator assigned to each group, the information the group member had about each other prior to group formation, group members' previous experience in participating in other small groups, etc[29]. Once established, groups, by and large, retained these institutions, usually enshrined in constitutions. For example, the vast majority of the constitutions we examined had both quorum and super-majority rules for making constitutional amendments.

Though there are clearly some endogenous factors affecting $\bar{e}$, the group governance institutions that were established at their inception constrain their ability to adjust $\bar{e}$ from one election cycle to the next. An example of the resilience of governance institutions in the groups, is leaders' compensation. When established, APEP facilitators strongly encouraged new groups to keep monetary remuneration to leaders as low as possible[30]. Our data confirms that 4-5 years after their creation, only one association paid its manager any salary[31].

4   Data and sampling scheme

This section briefly describes the data used in this paper and how it was collected[32]. To reduce crop-related variability, we limited the target population to only those associations that marketed the same crop: in our case coffee[33]. Our sample was then selected using a stratified, random, multistage cluster design. We sampled 50 associations out of 5 district-areas (strata)[34]. A map of these strata is available in Appendix D.

Within each association, several different types of data were collected. At the association level,

---

[29]Groups that were created by the same facilitators share more similar structures and rules that groups created by different facilitators.

[30]The idea was to postpone paying salaries to group leaders, until after members build trust with the system of governance. The reason for this was APEP's fear that if members were asked to contribute towards the salaries of group leaders, farmers would be reluctant to join. This fear harks back to the exploitation that small-farmers have endured, in many post-colonial East African countries, by state-controlled cooperatives, until their collapse in the mid-1990s. See, e.g., Bates (1981) and Ponte (2002). For an account of the history of Ugandan farmer cooperatives, see Young *et al.* (1981) and Kyamulesire (1988).

[31]In about 50% of associations, leaders reported receiving small payments in kind, usually in the form of inputs.

[32]A more thorough technical appendix can be obtained by request.

[33]Coffee was, by far, the most common cash crop marketed by the APEP groups. Limiting the sample to coffee has reduced the universe of farmer cooperatives in about half: from 213 to 105.

[34]Strata were defined by meaningful district-areas: neighboring districts that were covered by the same project field trainers and trading partners, and that share a dominant ethnicity and/or were historically part of the same district. In Uganda, districts are the most important administrative unit. Districts consist of 2-4 counties, each county has 3-6 sub-counties, each sub-county consists of 3-6 parishes, and each parish has about 5-15 villages. Between 200 and 800 households live in each village. It is rare to find more than 1-2 associations operating within a parish.

data was collected using a questionnaire completed in an interview with all DC executives. Data on the DCs' economic activities were also collected from the associations' books and records. For each association, we sampled six producer organizations (or POs), for a total of 287 village-level POs[35]. An interview with the leaders of the sampled producer organizations allowed us to collect additional data at that level. We also collected individual-level data. From each sampled PO, we further sampled, in average, six members for a total of 36 members per association[36]. Sampled members were surveyed in person by trained interviewers in the respondents' local language, for a total of 1,781 surveys. We refer to this data source as the "members' survey".

The set of representatives to the association from the village-level groups (POs) forms the complete pool of potential candidates for the association leadership position. A significant effort was made to survey each of those *potential* candidates. In each sampled farmer cooperative we surveyed (i) the four DC executives, (ii) the chairmen of all village-level POs, whether or not their group was sampled, and (iii) one or two representatives from each village-level PO, irrespective of whether their PO was sampled. Thus, we have individual-level data on the complete set of potential candidates for the senior management position, for a total of 1,316 interviews. These "representatives' surveys" only partially overlap with the members' surveys, as they were tailored to capture the representatives' roles and responsibilities within the DC structure. We visited each association up to four times to reduce attrition, which was brought down to less than ten percent. Table 2 briefly summarizes the sample design and data sources.

	Sampling Unit	Data Source	Number
1	Farmer Associations (DCs)	DC Questionnaires	50
2	Village-level groups (POs)	Group Questionnaires	287
3	Ordinary members	Individual-level Surveys	1,781
4	Representatives	Individual-level Surveys	1,316

Table 2: Data Sources

Quantitative data for the empirical analysis was collected between July and September 2009 by a team of 60 local interviewers. Though the quantitative analysis uses data collected via the individual-level surveys and group questionnaires, the construction of those instruments and the meanings we derived from them, relied heavily on more than a year of field work, in which we held dozens of open-ended interviews and meetings with regular group members, group leaders, APEP-staff and Chemonics staff in both Uganda and Washington DC.

4.1 Measurement of key variables

In this subsection we will walk through the information and procedures employed to construct each of the variables used in the subsequent analysis. One advantage of the farmer associations we study is that one of the key variables in the model, the value of the public good, is relatively straightforward to measure. Since farmer associations' central activity is collective marketing, it is

---

[35]In few cases, when a farmer association had fewer than seven POs, we selected all its village-level groups.

[36]The number of sampled members from each of the six *sampled* village-level groups was proportional to the size of the PO. This assured that the sample is self-weighted.

reasonable to relate the value of the public goods directly to the marketing decisions of members. A high value public good exists when members sell a large fraction of their crops via their farmer association[37]. In the analysis, we use two self-reported measures of member's marketing decision, derived from the members' survey, to proxy the value the public good: 1) an indicator variable capturing whether a member sold his crops via the association at least once in the past season, and 2) the share of a member's total seasonal coffee yield that was sold via the farmer group in the past season[38].

Measuring the remaining key variables in the model is a more complex task. For some of the variables, e.g. members' ability, a number of questions were asked related to different aspects of the variable, and responses were collected from a variety of sources. These values were then collapsed into single measures using principal component analysis[39].

To construct individual's ability measure we used information on respondent's ability to read and write, educational attainment, and English proficiency[40]. Respondents also completed two types of cognitive tests[41]. Out of these variables we constructed two measures of ability, one that used all variables, and the other that used all ability proxy variables, except the cognitive tests[42]. All of the variables that are included in the ability measure are positively correlated, and the first principal component was able to explain more than 61% of the variance. Several checks give us confidence in the ability measure. For example, we see that group members who hold high-skilled off-farm jobs have significantly higher ability than those that do not (Appendix D, Figure 11, Panels A-C). Second, we observe that the representatives elected by the village-level groups have higher ability on average than ordinary members (Appendix D, Figure 11, Panel D). Third, we find that ability is highly correlated with wealth (Appendix D, Figure 12).

The model makes an important distinction between the associations' effort demand ($\bar{e}$) and the leaders' realized effort once in office (e_i). To measure the effort leaders spend producing the public good, we combined effort ratings from sampled members and from the DC representatives. We also used information on the number of times the leader organized collective marketing in the past season. All of these variables were positively and highly correlated, with the first principal component explaining 45% of the variance of these variables. To check the reasonableness of the effort measure, we compare it with the leader's self-reporting regarding their effort. We find that

---

[37]We use individual marketing decisions rather than crop prices, since the former is a much less noisy signal of the performance of the leader. This is because coffee prices depend to large extent on exogenous factors.

[38]We check our results against three alternative measures of collective marketing, gathered from interviews with group leaders and the associations' books and records. These alternative measures deliver similar results.

[39]This technique is used to re-express multiple variables as one (or more) variables that explain as much of the variation in the original variables as possible. In technical terms, the first principal component of a set of variables $X_1, X_2, \ldots X_n$ is the linear combination of these variables that exhibits maximum variance. A good source for more information about principal component analysis is Lattin *et al.* (2003). For an example of the use of principal component analysis in practice see McKinzie (2005).

[40]Because no local language is spoken by more than 20% of Ugandans, English is the lingua franca of the business and political class. English proficiency allows individuals to communicate with potential trading partners outside their small geographic areas.

[41]Information on the cognitive tests can be found in the technical appendix.

[42]Some regression results reported in this paper use the variable constructed without the cognitive tests, since logistical hurdles prevented us from administering the cognitive tests to all individuals. Both variables are highly correlated (0.948%) and produce similar results.

leaders who have high effort scores also report working longer hours and have a better sense of whether members are following the association's rules and by-laws.

The measure of associations' effort demand ($\bar{e}$), must take into account both the amount of effort demanded by groups and the amount of monitoring undertaken to ensure that these demands are met. This is because effort demand is ineffective without monitoring. Table 3 gives a sense of the types of information we used to construct the measure of group effort demands. The included variables come from both the member's and the representative's surveys. The variables were combined using principal component analysis to obtain one measure of effort demand for each DC. All of the variables are positively correlated, often strongly, with the first principal component explaining more than 46% of the variance.

Question	From Member's Survey	From Rep's Survey
Whether someone is responsible for monitoring the DC manager	X	X
How accountable is the DC manager?	X	
Whether receipts were given when bulking	X	X
Whether there is a rule regarding the DC manager's time commitment		X
Whether external auditors are used		X
If the respondent had ever asked to see the DC's books		X

Table 3: Variables used to measure group effort demand

Another important variable in the model is the local availability of private income opportunities (α). This is a group-level variable, which was constructed using survey questions that asked about the respondent's employment status[43]. Only data from the representatives' survey (complete sample) were used to construct this measure, since this is the relevant candidate pool that we are concerned with. The primary measure of a group's private income opportunities is the fraction of representatives in the association holding off-farm jobs (except as unskilled laborers). Alternative measures were also tested and produced similar results.

In order to test whether higher values of the group public good have positive welfare effects, we construct a measure of the change in a member's welfare since joining his or her farmer group. The measure was constructed using questions about ownership of 12 different assets that reflect the purchasing power of farmers, such as bicycles and livestock[44]. For each asset type, respondents were asked to provide information on the number of items they currently have and the number of items they had in the year before joining the group. Measurement errors, typical in

---

[43]In the theory, α measures the value of private income opportunities in relation to the potential value of the public good. Because we are not able to accurately measure the *potential* value of the public good, we will look only at private income opportunities. We expect a negative correlation between private income opportunities and the potential value of the public good, in which case our measure is valid. For example, a group located closer to a market town is likely to have more private income opportunities, but also fewer asymmetrical information problems and therefore a lower potential value of the public good.

[44]Using asset ownership to measure the welfare of poor households is a commonly used technique in poor developing countries where monetary measures of income and wealth are problematic. See, e.g., Filmer & Pritchett (2001).

survey-based recall questions, are reduced given that (i) the median member joined her group merely three years ago, (ii) the creation of the farmer group is considered a major milestone to the majority of members, and (iii) the included assets are central to households in rural Uganda.

We begin our empirical analysis in the next section, by describing a case study of associations in two district-areas, Masaka and Iganga. Then, in Section 6, we test more rigorously the main predictions of the theoretical model.

5   Case studies: Iganga district vs. Masaka district

This section describes the experience of farmer associations from two district-areas, Masaka and Iganga, that represent extreme cases in our sample. Masaka is a relatively well-off district, benefiting from it's proximity to the capital Kampala. Compared to Iganga, coffee growers in Masaka are more educated, have more available land, and are wealthier. For example, whereas the median member of a farmer association in Iganga grows coffee on less than one acre, producing a seasonal median yield of 250 KGs, the median group member in Masaka grows coffee on 1.5 acres, yielding 363 KGs per season. Given these facts, one might expect that the farmer associations in Masaka would function more effectively than in Iganga. Yet, we find that farmer groups in Iganga have higher levels of public goods production. For example, 85% of the members of the farmer associations in Iganga report selling at least once via their association in the past season, compared with 49% of the members of groups from Masaka. In addition, members in Iganga sell 69% of their seasonal yield via their farmer groups. In Masaka the figure is 31%.

Our model suggests that variation in the value of the public good depend on leaders' ability and effort. According to the data, the mean ability scores of leaders in Iganga is between 0.17 to 0.34 standard deviations above the mean ability scores of leaders in Masaka. Furthermore, when we examine the entire network of DC representatives, the mean ability of Iganga representatives is, on average, 0.25 standard deviations higher than those in Masaka. This contrast sharply with our findings from the members' survey, in which the average *member* in Masaka is significantly more educated than members in Iganga. In other words, high ability group members in Masaka appear to be less willing to take on leadership positions than those in Iganga. Turning to the leader's effort, we observe that the average effort that leaders in Masaka exert, e_i, is 2 standard deviations *lower* than the effort exerted by Igangan leaders. This occurs even though, in Masaka, the mean effort demand is 1.5 standard deviations *higher* than in Iganga.

Given that leaders in Iganga have higher ability and spend more time in producing the public good, it is not surprising that farmer groups in that district are more effective. The question then, is why groups in Masaka, which are endowed with higher ability members on average, end up with lower quality leadership than groups in Iganga. The model provides an explanation to this result, by pointing to the important role of private income opportunities.

According to the model, in areas that have high private income opportunities, both the discipline and self-selection effects are present, and groups face a trade-off between leaders' effort and ability. This causes higher-ability members to drop-out of the candidacy pool at lower levels of

effort demand, and causes elected leaders to exert less effort. In contrast, when private income opportunities are low, our framework suggests that this trade-off is not present (i.e., groups will be in Region A in Table 1). In this case, high ability members have an advantage in public goods production and greater candidacy incentives. Under these conditions, high ability members will choose to be candidates and will exert high levels of effort if they are the leader, *even without the incentives created by effort demands*.

Turning to the data, we observe that groups in Masaka have, on average, the highest level of private income opportunities for representatives, with a mean across DCs that is 0.65 standard deviations above the mean for the entire sample. Groups in Iganga, on the other hand, have the lowest mean score of private income opportunities for representatives, at 0.95 standard deviations below the mean for the entire sample.

These findings support the predictions of the model. In particular, they suggest that, because of high local private income opportunities, groups in Masaka are forced to trade-off between leader effort and ability. The result is that groups demand more effort from their leaders, with the result that, in Masaka, high ability members tend to opt out of being the leader. In contrast, low levels of local private income opportunities in Iganga mean that groups do not face this trade-off, and are therefore able to obtain leaders with high ability, who are also willing to invest more time in public goods production, resulting in a higher group public good value[45]. In the next section we test the model's predictions on the entire sample.

6 Empirical analysis

In this section we look for evidence of the main predictions of the theoretical model: the discipline effect, the self-selection effect, and the existence of an inverted U-shaped relationship between group effort demands and the value of the public good produced. At the end of the section we present evidence linking the public good to group members' welfare outcomes.

6.1 Discipline effect

The model makes two key predictions with respect to the manager's effort. The first prediction – formalized in Theorem 1 – is that an increase in effort demands ($\bar{e}$) increases the amount of effort exerted by the group leader. The second prediction is that, when private income opportunities (α) are sufficiently high, high-ability leaders choose to exert less effort, all else equal (Theorem 5). To explore these predictions we regress the standardized score of the leader's effort of group j (e_j) on the group's effort demand ($\bar{e}_j$), private income opportunities (α_j), the ability of the association's leader (A_j) and the interactions between the key variables. OLS regression results are shown in Table 4. The first specification includes only group effort demands and strata fixed effects, while the second model adds DC-level controls for the age and size of the association, the mean size

---

[45]These findings are consistent with an optimization strategy by Masaka coffee growers, who seem to be diverting efforts away from agriculture towards other income generating activities. We do not claim that the low performance of Masaka cooperatives is the result of individual members failing to optimize.

of members' seasonal coffee yield, the association's density of associational life and a measure of ethnic fractionalization among the association's representatives[46]. The third model adds a variable measuring private income opportunities and its interaction with effort demands, and the fourth specification adds the ability of the associations' manager and its interaction with private income opportunities.

Results suggest that, in accordance with the discipline effect, there is a positive, substantial, and significant relationship between groups' effort demands and the amount of effort exerted by the group leader (see also Appendix D, Figure 13). Turning to the second prediction, which is tested in model D, we find evidence of a negative correlation between manager's ability and effort, *but only when outside income opportunities are high*, as predicted in Theorem 5. When private income opportunities are sufficiently high (more than about 1.5 standard deviations above the mean), the marginal effect of leader's ability on the effort the leader exerts is negative and significant at 90% confidence intervals (see Appendix D, Figure 14) . For example, when the value of private income opportunities is two standard deviations above the grand mean, one standard deviations increase in leader's ability is associated with about 0.5 standard deviations decrease in the leader's realized effort ((-0.88)–(-0.06), p-value=0.059).

An increase in the leader's effort level is only valuable if it increases the value of the group public good. We observe significant variation in group public good levels across associations and district-areas, as shown in Appendix D, Figures 9 and 10. For example, the share of member selling through the association in the past season varies from a low of 49% in Masaka to a high of 85% in Iganga. The share of member's yield sold through the group varies from 31% in Masaka to 69% in Iganga. To explore how leader's effort and ability translates into the value of the public good, we run a series of multi-level random intercept logistic regressions, where the dependent variable y_{ij} indicates whether member i sold his coffee through his farmer association j during the last season (rather than selling it all to a local middleman)[47]. The key independent variables are the ability of the DC leader A_j and effort e_j, and the interaction between the leader's ability and effort. In model (2) we add a set of individual level controls X_{ij}, and in model (3) we add group-level controls J_j. All three models include strata fixed effects F_s. The full model's specification is below in Equation 6. We use two different measures of the dependent variable – one which is derived from the reporting of the producer organizations' leaders and one which is derived from members' self-report.

$$y_{ij} = I[\tilde{y}_{ij} > 0]$$

$$\tilde{y}_{ij} = \quad \beta_0 + \beta_1 A_j + \beta_2 \bar{e}_j + \beta_3 (A_j \times \bar{e}_j) + X_{ij}\Gamma_1 + J_j\Gamma_2 + F_s\Gamma_3 + \zeta_j + \epsilon_{ij} \quad (6)$$

Results, which are displayed in Table 5, suggest that both leader's effort and ability are positively related to the value of the public good, though only the coefficient on the leader's effort

---

[46]The Ethnic fractionalization index was constructed using a simple Herfindahl concentration index: $ELF = 1 - \sum_{i=1}^{n} s_j^2$ where s_j is the share of group j, and $(j = 1 \dots n)$. To measure the density of associational-life we calculate the group mean of the number of voluntary associations in which DC representatives are regular participants.

[47]This is equivalent to clustering standard errors at the association level.

DV: LEADER'S REALIZED EFFORT IN PRODUCING THE PUBLIC GOOD

	Model A	Model B	Model C	Model D
Effort Demand (std.)	0.715***	0.668***	0.651***	0.731**
	(0.15)	(0.18)	(0.18)	(0.26)
Private Income Opportunities			-0.033	-0.009
			(0.12)	(0.15)
Effort demand $\times$ PIO			-0.040	0.109
			(0.18)	(0.15)
Leader ability (std.)				-0.005
				(0.14)
Leader ability $\times$ PIO				-0.233
				(0.11)
Age of DC		-0.097	-0.095	-0.172
		(0.09)	(0.10)	(0.10)
N members (units of 50)		0.085	0.085	0.057
		(0.06)	(0.06)	(0.09)
Mean seasonal yield (units of 100)		0.059	0.062	0.073
		(0.07)	(0.08)	(0.08)
Ethnic fractionaliztion		-0.557	-0.578	0.348
		(0.71)	(0.69)	(0.97)
Associational-life		0.058	0.061	0.065
		(0.13)	(0.12)	(0.13)
Constant	0.291**	0.070	0.063	0.353
	(0.10)	(0.43)	(0.45)	(0.51)
Strata FEs	X	X	X	X
Observations	50	50	50	46
Regions (strata)	5	5	5	5
r^2	0.586	0.635	0.636	0.678

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Relation Between the association's effort demands and the leaders' realized effort. Results from OLS regressions using group-level data. PIO stands for private income opportunities.

is significant. Using the full specification of model A3, moving from one standard deviation below the mean effort to one standard deviation above the grand mean (a range that covers 38% of associations) is associated with a 21 percentage points increase in the predicted probability that a member sells his coffee through his farmer association, holding the control variables at meaningful values (means or medians for categorical variables)[48].

---

[48]The signs of the control variables in these regression (not shown) seem to be generally reasonable. Women and older members are more likely to sell in bulk. The probability of selling via the group i spositively related to the total size of coffee yield, the dishonesty of local middlemen, and with a member's richness of associational-life. The

	Leader's Reporting			Self-Reporting		
	A1	A2	A3	B1	B2	B3
Leader's effort (std.)	0.791***	0.790***	0.610*	0.605***	0.549**	0.407*
	(0.23)	(0.23)	(0.24)	(0.17)	(0.17)	(0.17)
Leader's ability (std.)	0.311	0.296	0.281	0.143	0.150	0.140
	(0.20)	(0.20)	(0.20)	(0.14)	(0.14)	(0.14)
Ability × effort	-0.193	-0.205	-0.062	-0.034	-0.082	-0.112
	(0.19)	(0.18)	(0.19)	(0.13)	(0.13)	(0.14)
Constant	0.828**	-1.563**	-2.758***	0.291	-2.856***	-3.079***
	(0.30)	(0.55)	(0.73)	(0.21)	(0.49)	(0.60)
Strata FEs	X	X	X	X	X	X
Individual Controls		X	X		X	X
Group Controls			X			X
Random Intercept	-0.097	-0.141	-0.145	-0.486**	-0.537**	-0.626**
Constant	(0.15)	(0.16)	(0.16)	(0.16)	(0.17)	(0.20)
Observations	1535	1328	1274	1568	1358	1287
Regions (strata)	5	5	5	5	5	5
SD of Regions Intercept	.909	.871	.868	.614	.584	.535
Log Likelihood.	-866	-721	-672	-944	-763	-718

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Random intercept logistic regressions, in which members' decision to cooperate is modeled as a function of the leader's ability and effort. In Models A1-A3, the dependent variable is obtained from the group leaders, whereas in models B1-B3, we rely on members' self-reporting. In both cases, we first run the model with only the key independent variables and strata fixed effects (A1, B1), we then add a series of individual-level controls (A2, B2), and group-level controls (A3, B3).

6.1.1 Self-selection effect

The next central prediction of the model, presented formally in Corollary 1, is that an increase in effort demands decreases the likelihood that high ability members will be candidates (and thus the probability that they become the group leader), *but only in areas with sufficiently high private income opportunities*. In particular, the model predicts that when there are ample private income

---

further a member lives from the DC's crop collection point, the less likely he is to bulk. Selling in bulk is positively correlated with distance to the nearest trading center. This distance likely affects the availability of information about market prices and of buyers 'outside' the group, so as the distance to the local trading center increases, farmers are likely to have greater information asymmetry and less bargaining power. Under such conditions, farmer groups are well-positioned to increase the value of the public good for members. A full set of results can be obtained from the authors, on request.

opportunities and effort demands are high, high ability individuals will opt out of candidacy, so lower ability leaders will be elected.

We explore this prediction by looking at how the identity of the elected leader is affected by effort demands and private income opportunities. We run an individual-level logit regression across all DC representatives where the dependent variable indicates whether the individual is the group leader.[49]. The key independent variables are the individual's ability, group effort demands, private income opportunities, and the interactions between these variables. Our regression equation is given below, where $\tilde{y}_{ij}$ is an unobserved latent variable that determines whether an individual becomes the group leader, y_{ij} is an indicator variable that takes the value one if individual i in group j is the group leader, A_{ij} represents ability, α_j represents private income opportunities, $\bar{e}_j$ represents group effort demands, X_{ij} is a set of individual level controls, and F_j is a set of group fixed effects. To account for correlation in the error terms of members of the same DC, in all models we cluster standard errors at the association level.

$$y_{ij} = I[\tilde{y}_{ij} > 0]$$

$$\tilde{y}_{ij} = \quad \beta_0 + \beta_1 A_{ij} + \beta_2 \alpha_j + \beta_3 \bar{e}_j + \beta_3 (A_{ij} \times \alpha_j) + \beta_4 (A_{ij} \times \bar{e}_j) + \beta_5 (\alpha_j \times \bar{e}_j) + \\ \beta_6 (A_{ij} \times \alpha_j \times \bar{e}_j) + X_{ij}\Gamma_1 + F_j\Gamma_2 + \epsilon_{ij} \tag{7}$$

The main coefficient of interest in this analysis is β_6, the coefficient on the interaction between ability, effort demands, and private income opportunities. Based on the model's predictions we should expect a negative coefficient, since effort demands should decrease the probability that a higher ability individual is the leader when there are more private income opportunities.

Two measures of ability are used in this regression: the baseline ability measure, constructed from information on education, literacy, English proficiency, and cognitive test results ("Ability"), and an ability measure that does not include the cognitive test results ("Edu"). Using the measure without cognitive test results allows us to increase our sample size. We include a number of individual-level controls. For example, member's wealth is included because it is likely to be related to the individual's standing in the community, which will affect the likelihood that they become the group leader. Member's coffee yield is included because it indicates how much the individual values the public good produced by the group. Members that place a higher value on the public good are expected to devote more effort as leaders and therefore should be more likely to be elected[50].

Results obtained from the regressions are displayed in Table 6[51]. These results support the main prediction of the model, as we observe a negative and significant coefficient on the interaction term between ability, effort demands, and private income opportunities. Other coefficients

---

[49]The model's predictions are most clear for the identity of the elected leader (DC manager). In contrast, the model's predictions are less clear about the identity of the losing candidates.

[50]Since all DC managers are men, adding an indicator for gender is not identified, and therefore drops from the estimation.

[51]We have tested specifications that included other individual-level control variables, such as age, land size, sex and other group-level controls, but none improved the model fit, and none were close to being significant.

take values that seem reasonable. As expected, individual's ability, wealth, and the size of their coffee yield all have a positive influence on an individual's likelihood of being the leader.

In order to get a sense of the magnitude of the relationships found in this regression, we use a graphical representation. In Figure 3 we plot the marginal effects of private income opportunities on the likelihood that any member of the association's "potential candidates" is the actual leader, as group's increase their effort demand in it's entire range, while setting members' ability constant[52]. In the top panel, members' ability is set to one and two standard deviations above the grand mean, while in the bottom panel it is set to one and two standard deviations below the mean. As Figure 3 makes clear, when members' ability is *low* (bottom panel), the marginal effect of private income opportunity on the likelihood of being the group's leader is no different than zero, when group's effort demand is low. As group effort demand becomes increasingly high, the marginal effect of private income opportunities for low-ability members becomes positive. This change reflects the fact that high-ability members begin dropping out of the candidacy pool. By contrast, when members' ability is *high* (top panel) the marginal effect of private income opportunity on the likelihood of being the leader is negative and significant once effort demand increase above about one standard deviation below the mean. At this level, both the low and high lines representing a 95% confidence interval are below zero. Comparing the two top panels, the higher the ability of the member, the stronger is the negative effect of private income opportunity.

6.1.2 Inverted U-shaped relation: effort demand and the value of the public good

This subsection explores the third main prediction of the model: the existence of an inverted U-shaped relationship between the value of the public good and effort demand. The approach that we use involves running locally weighted regressions of the value of the public good (group-means) on the group-level effort demand[53]. Figure 4 graphs the results using two different specifications of the public goods. Though understandably crude, the inverted-U shape is observed in both specifications.

6.1.3 Welfare effects

In the last piece of the empirical analysis, we look at the relationship between the value of the group public good and group members' welfare. We expect that in groups with a high public good value, i.e., where many members sell via their association, there is a larger increase in welfare since the members joined the group. Furthermore, the change in any member's welfare should depend on the total amount of collective marketing by the group, rather than how much they sell via the group individually. In fact, generating the group public good involves overcoming a collective action problem in which each individual would be better off not selling to the group, as long as the other group members bulked enough to drive up the local coffee price (Grossman & Baldassarri, 2010). The reason is that by not selling via their association, members can take

---

[52]Note that the regression coefficients represent unconditional effects, whereas the marginal effects of each of the independent variables is conditional on the values of the other two variables.

[53]This approach was inspired by Urquiola & Verhoogen (2009).

DV: IDENTITY OF THE ASSOCIATION'S LEADER

	Edu		Ability	
	Model 1	Model 2	Model 3	Model 4
Rep Ability (std.)	0.67***	0.67**	0.92***	0.93***
	(0.20)	(0.21)	(0.20)	(0.20)
Group Effort Demand (std)	-0.01	-0.12	0.22	0.18
	(0.17)	(0.21)	(0.21)	(0.27)
Private Income Opportunity	0.11	0.09	-0.08	-0.09
	(0.14)	(0.15)	(0.16)	(0.17)
Rep Ability × Effort Demand	0.05	0.05	-0.06	-0.06
	(0.19)	(0.20)	(0.21)	(0.23)
Rep Ability × PIO	-0.47**	-0.46*	-0.20	-0.19
	(0.18)	(0.18)	(0.17)	(0.17)
Effort Demand × PIO	0.16	0.15	0.21	0.23
	(0.08)	(0.10)	(0.11)	(0.12)
Ability × Effort Demand × PIO	-0.27*	-0.26	-0.31**	-0.32**
	(0.14)	(0.14)	(0.11)	(0.12)
Seasonal Coffee Yield (units 100)	0.04**	0.04**	0.05**	0.04**
	(0.01)	(0.01)	(0.02)	(0.02)
Wealth (std.)	0.42***	0.43***	0.44***	0.46***
	(0.12)	(0.13)	(0.12)	(0.13)
Member in good health	1.28	1.30	1.22	1.24
	(0.80)	(0.82)	(0.82)	(0.84)
Born in village	0.29	0.32	0.39	0.41
	(0.35)	(0.36)	(0.38)	(0.38)
Household Head	1.43	1.43	1.22	1.25
	(1.10)	(1.11)	(1.12)	(1.13)
N of group members (units of 50)	-0.13**	-0.14**	-0.14**	-0.15**
	(0.05)	(0.05)	(0.05)	(0.06)
Constant	-6.08***	-6.16***	-5.88***	-6.03***
	(1.35)	(1.42)	(1.37)	(1.46)
Strata FEs		X		X
Observations	1297	1297	1051	1051
Regions (strata)	5	5	5	5
Log Likelihood	-162.16	-162.02	-143.91	-143.69

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: The ability measure in Model 1 and Model 2 does not include information from the cognitive tests, whereas in Model 3 and Model 4 the ability measure includes the cognitive tests. Models 2 and 4 include strata fixed effects. Standard errors are clustered at the association level. PIO stands for private income opportunities.

DV: Leader's Identity
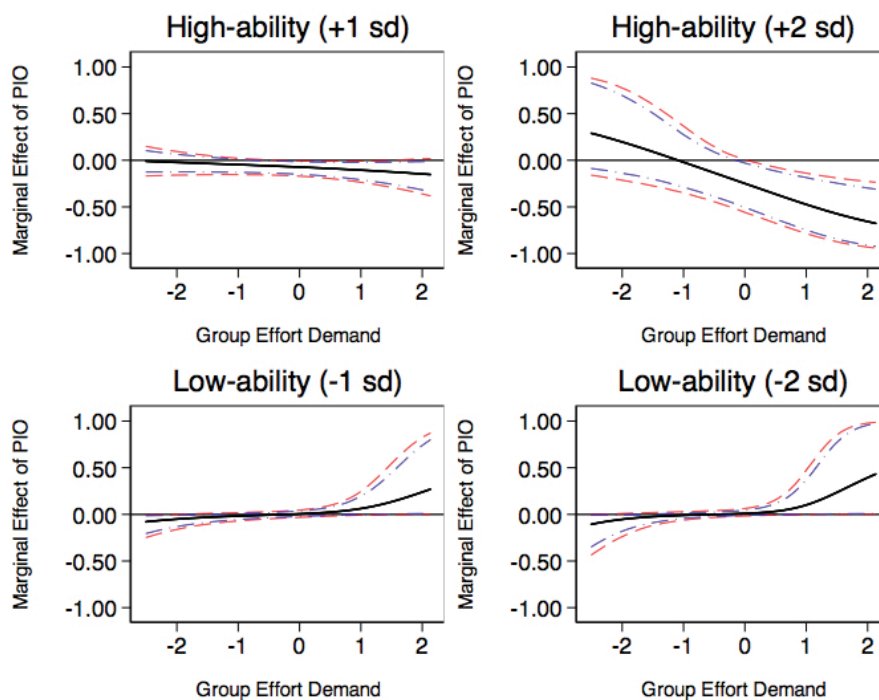
Figure 3: Marginal Effect of Private Income Opportunity on the likelihood that of being elected as leader as effort demand increases, for high-ability (top panel) and low-ability (bottom panel) representatives. Red and blue dashed lines represent 95% and 90% confidence intervals, based on bootstrap SEs (20,000 iterations). In all panels, the marginal effect of private income opportunity is measured for a significant change: from two standard deviations below the mean to two standard deviations above the mean.

advantage of the greater convenience of selling to local traders, while still enjoying the high local prices set by the group through yardstick effects[54]. If this is true, we should observe that welfare is increasing in the amount of collective selling done by the group, but decreasing in individual's own decision to sell in bulk.

To test these predictions, we run individual-level OLS regressions, in which a member's welfare increase since joining the group is modeled as a function of the amount of collective marketing done by the group and the member's own marketing decision. We include two measures of individual's marketing decisions: an indicator of whether they sold through the association in the past season, and a measure of the share of their yield that was sold through the association. In some specifications we include individual level controls for sex, age, year of joining the group, and level of education, as well as association level controls for group age and membership size. In all models we include strata fixed effects and cluster standard errors at the association level. Two different group-level measures of participation in collective marketing are used: the share

---

[54]Local traders (middlemen), tend to collect the crops from the producers' farm, pay cash-on-delivery, while also paying scant attention to quality.
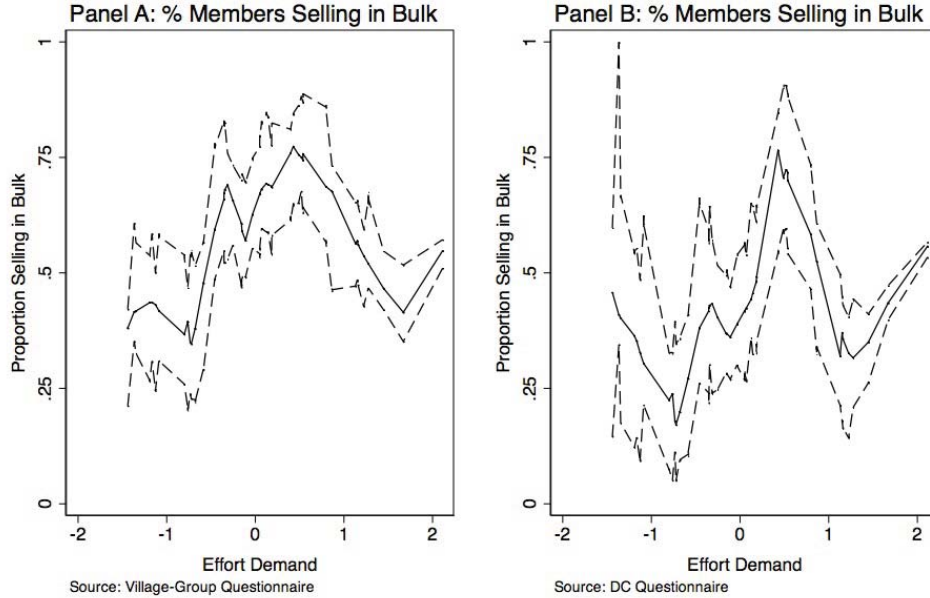
Figure 4: Effort Demand and the value of the Public Good. In each panel, the lines plot fitted values of locally weighted regressions (using Stata's *lowess* command and a bandwidth of 0.3) of group-level means of the value of the public good on group-level effort demand. Standard errors are based on bootstrap simulation with 1,000 replications. The figures omit observations at the bottom of the effort demand from Iganga district, for reasons that we discussed in Section 5.

of group members selling at least some coffee through the association, and the average share of group member's output sold via the group. Note that while we believe that these results can be informative, they should be only viewed as suggestive given the identification strategy.

Table 7 presents the regression results. We find that the change in member's welfare since joining the farmer group is positively related to the value of the public good for either measure of the group-level value of the public good, and that this relationship is generally statistically significant. Turning to an individual member's decision to sell through the association, we find that cooperation towards the production of the group's good is negatively related to welfare increase. This is consistent with the idea that selling through the association is a collective action problem. If the member does sell through the group, then there appears to be a positive relationship between the amount that she sells and the change in welfare, as shown in the fourth line of the table. This suggests that, conditional on a member selling through the association, they are better off selling a greater share of their output through the association. In sum, these results seem consistent with the idea that selling collectively through the association is a group public good that contributes positively to members' welfare, but one which each individual member would be better off not contributing to.

DV: CHANGE IN A MEMBER'S WELFARE SINCE JOINING THE FAMER GROUP

	Indicator Measure		Proportion Measure	
	(A1)	(A2)	(B1)	(B2)
Fraction of members selling via DC	0.082**	0.073*		
	(0.03)	(0.03)		
Mean Share of members' output sold via the DC			0.076*	0.057
			(0.04)	(0.04)
Member sold at least once via the DC	-0.272	-0.357*	-0.248	-0.338*
	(0.16)	(0.15)	(0.16)	(0.15)
Share of Yield member sold via the DC	0.247**	0.256***	0.238**	0.251***
	(0.07)	(0.07)	(0.07)	(0.07)
Constant	0.070	-0.015	0.028	-0.093
	(0.10)	(0.24)	(0.10)	(0.23)
Ind and Group Controls		X		X
Strata FEs	X	X	X	X
Observations	1628	1620	1628	1620
Regions (strata)	5	5	5	5
r^2	0.046	0.110	0.045	0.108

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Relation Between Value of the PG and Welfare. In models A1 and A2 the group-level value of the public good is measured as a proportion of members who report selling their coffee at least once via the group, in the past season. In models B1 and B2, the value of the public good is the group mean of the share of total seasonal yield that members sold via their group. In A2 and B2 we controls for member's sex, age, year of joining the group, and level of education and for the association's age and membership size. All models include strata fixed effects and clustered standard errors at the association's level.

7 Conclusions

The main argument of this paper is that small groups face a complex problem when deciding how much effort to ask from their leaders. The problem arises out of a tension between two possible outcomes of increasing effort demand: extracting more effort from the leader and driving higher ability members out of the candidate pool. The result is an inverted U-shaped relationship between the amount of effort demanded by a group, and the value of the public good produced. Private income opportunities play a key role in determining the importance of this trade-off. The trade-off will be particularly important in locations with high private income opportunities, where high ability individuals face a greater opportunity cost of devoting time to public goods production. Evidence from the sample of Ugandan farmer associations that we surveyed support these predictions.

These results tend to support the predictions of existing models designed for larger political units, but show that previous results must be modified in order to accomodate the small group setting. On the other hand, some of our new results may be useful in understanding larger political units. For example, Kotakorpi & Poutvaara (2010) have speculated that differences in available private income opportunities may explain why they find evidence of the self-selection effect for women, but not men. We present evidence that this intuition is correct, at least for small groups. Thus, we argue that, while small groups are worthy of study in themselves, research on small groups can inform our understanding of larger political units.

From a policy perspective, this paper suggests that the quality of group leaders should be considered, at least partially, to be endogenous. Thus, small groups should be structured in ways that take into account how these structures will affect the quality of leadership obtained. Also, because the level of private income opportunities in a location plays a central role in determining leader quality, care should be taken to assess the trade-offs that these opportunities create when structuring small group institutions. Moreover, changes in the level of private income opportunities in an area can affect the success of small groups operating in that area. Thus, it may be necessary to build flexibility into the governance structures of small groups so that they can adjust to changing local economic conditions. Finally, interventions that affect the level of local private income opportunities may have unexpected consequences for small groups.

There remain a number of outstanding questions related to leadership quality in small groups. One interesting set of questions centers on the ability of small groups to adjust the costs and rewards of holding office in order to obtain better leadership. In the case we study, groups were constrained by institutional structures imposed when the groups were formed, a time when they likely lacked the information and experience to choose optimal effort demand levels. The theory suggests that there can be substantial gains if groups are able to adjust effort demands (and leader remuneration) in order to obtain better leaders. However, allowing flexible institutional structures may increase the chances that incumbent leaders can make changes to benefit themselves. Perhaps this is why we often observe institutional structures that change slowly over time. Understanding these issues is likely to be a fruitful avenue for future research.

Acknowledgment

References

Agrawal, Arun, & Goyal, Sanjeev. 2001. Group Size and Collective Action. *Comparative Political Studies*, **34**(1), 63–93.

Barro, Robert J. 1973. The Control of Politicians: An Economic Model. *Public Choice*, **14**, 19–42.

Bates, Robert H. 1981. *Markets and states in tropical Africa: The political basis of agricultural policies*. Berkeley: University of California Press.

Berdegué, Julio S. Antonio. 2001. *Cooperating to Compete: Associative Peasant Business Firms in Chile*. Ph.D. thesis, Wageningen Universiteit en Researchcentrum, Netherlands.

Bernard, Tanguy, Collion, Marie-Héléne, de Janvry, Alain, Rondot, Pierre, & Sadoulet, Elisabeth. 2008. Do Village Organizations Make a Difference in African Rural Development? A Study for Senegal and Burkina Faso. *World Development*, **36**(11), 2188–2204.

Bernheim, Douglas B., & Kartik, Navin. 2010. Of Candidates and Character. *Unpublished*, Nov.

Besley, T. 2004. Paying Politicians. *Journal of the European Economic Association*, **2**(2-3), pp. 193–215.

Besley, T. 2005. Political Selection. *Journal of Economic Perspectives*, **19**(3), pp. 43–60.

Besley, T. 2006. *Principled Agents?* Oxford University Press.

Besley, T., & Coate, S. 1997. An Economic Model of Representative Democracy. *The Quarterly Journal of Economics*, **112**(1), pp. 85–114.

Biénabe, Estelle, & Denis, Sautier. 2005 (London, 28 February–1 March). The role of small scale producers' organizations to address market access. *In: Paper presented at the international seminar: Beyond agriculture— making markets work for the poor*.

Bingen, Jim, Serrano, Alex, & Howard, Julie. 2003. Linking farmers to markets: different approaches to human capital development. *Food Policy*, **28**(4), 405–419.

Bosc, P.M., Eychenne, D., Hussein, K., Losch, B., Mercoiret, M.R., Rondot, P., & S., Mackintosh-Walker. 2002. *The role of rural producers organizations in the World Bank rural development strategy*. Rural development strategy background paper : World Bank, 8.

Caselli, F., & Morelli, M. 2004. Bad Politicians. *Journal of Public Economics*, **88**(3-4), 759–782.

Chattopadhyay, Raghabendra, & Duflo, Esther. 2004. Women as Policy Makers: Evidence from a Randomized Policy Experiment in India. *Econometrica*, **72**(5), 1409–1443.

Ferejohn, John. 1986. Incumbent Performance and Electoral Control. *Public Choice*, **50**(1/3), 5–25.

Ferraz, Claudio, & Finan, Frederico. 2010. Motivating Politicians: The Impacts of Monetary Incentives on Quality and Performance. *Unpublished*.

Filmer, Deon, & Pritchett, Lant H. 2001. Estimating Wealth Effects Without Expenditure Data – Or Tears: An Application to Educational Enrollments in States of India. *Demography*, **38**, 115–132.

Gagliarducci, Stefano, & Nannicini, Tommaso. 2010. Do Better Paid Politicians Perform Better? Disentangling Incentives from Selection. *CEIS Tor Vergata, Research Paper Series*.

Gagliarducci, Stefano, Nannicini, Tommaso, & Naticchioni, Paolo. 2010. Moonlighting politicians. *Journal of Public Economics*, **94**(9-10), 688–699.

Gehlbach, S., Sonin, K., & Zhuravskaya, E. 2010. Businessman Candidates. *American Journal of Political Science*, **54**(3), 718–736.

Grossman, Guy, & Baldassarri, Delia. 2010. Centralized Sanctioning and Legitimate Authority in the Provision of Public Goods: Evidence from a "Lab in Field" Experiment In Uganda. *In: Paper presented at the Annual Meetings of the American Political Science Association, Washington, D.C., September 1-4.*

Hellin, Jon, Lundy, Mark, & Meijer, Madelon. 2009. Farmer organization, collective action and market access in Meso-America. *Food Policy*, **34**(1), 16–22.

Hussi, P., Murphy, J., Linberg, O., & Brenneman, L. 1993. *The Development of Cooperatives and Other Rural Organisations*. Washington DC: World Bank.: World Bank Technical Paper No.199.

Jones, Benjamin F., & Olken, Benjamin A. 2005. Do Leaders Matter? National Leadership and Growth Since World War II. *Quarterly Journal of Economics*, **120**(3), 835–864.

Kotakorpi, Kaisa, & Poutvaara, Panu. 2010. Pay for Politicians and Candidate Selection: An Empirical Analysis. *Journal of Public Economics*.

Kyamulesire, Aloysius R. 1988. *A history of the Uganda cooperative movement, 1913-1988*. Uganda Cooperative Alliance.

Lattin, J., Carrol, JD, & Green, P. 2003. *Analyzing Multivariate Data*. Brooks/Cole.

Mattozzi, Andrea, & Merlo, Antonio. 2008. Political careers or career politicians? *Journal of Public Economics*, **92**(3-4), 597–608.

McKinzie, David J. 2005. Measuring Inequality with Assett Indicators. *Journal of Population Economics*, **18**(2), 229–260.

Messner, M, & Polborn, MK. 2004. Paying politicians. *Journal of Pubic Economics*, **88**(12), 2423–2445.

Narayan-Parker, Deepa. 2002. *Empowerment and poverty reduction: a sourcebook*. Washington, DC: World Bank.

Osborne, Martin J., & Slivinski, Al. 1996. A Model of Political Competition with Citizen-Candidates. *The Quarterly Journal of Economics*, **111**(1), 65–96.

Persson, Torsten, Roland, Gerard, & Tabellini, Guido. 1997. Separation of Powers and Political Accountability. *The Quarterly Journal of Economics*, **112**(4), 1163–1202.

Ponte, Stefano. 2002. *Farmers and Markets in Tanzania: how policy reforms affect rural livelihoods in Africa*. Oxford: Heinemann.

Sexton, Richard J. 1990. Imperfect Competition in Agricultural Markets and the Role of Cooperatives: A Spatial Analysis. *American Journal of Agricultural Economics*, **72**(3), 709–720.

Shepherd, Andrew. 2007. *Approaches to linking producers to markets. A review of experiences to date*. Rome: Food and Agriculture Organization (FAO).

Staatz, John M. 1987. Recent Developments in the Theory of Agricultural Cooperation. *Journal of Agricultural Cooperation*, **2**, 74–95.

Stringfellow, Rachel, Coulter, Jonathan, Lucey, Trevor, McKone, Colin, & Hussain, Ambereene. 1997. Improving the Access of Smallholders to Agricultural Services in Sub-Saharan Africa: Farmer Cooperation and the Role of the Donor Community. *Natural Resource Perspectives*, **20**.

Sykuta, Michael E., & Cook, Michael L. 2001. A New Institutional Economics Approach to Contracts and Cooperatives. *American Journal of Agricultural Economics*, **83**(5), 1273–1279.

Urquiola, Miguel, & Verhoogen, Eric. 2009. Class-Size Caps, Sorting, and the Regression-Discontinuity Design. *American Economic Review*, **99**(1), 179 – 215.

Young, Crawford, Sherman, Neal P, & Rose, Tim H. 1981. *Cooperatives & development: agricultural politics in Ghana and Uganda*. Madison, Wis.: University of Wisconsin Press.

A Proofs

A.1 Proof of Prop. 1

Applying the implicit function theorem to Equation 4, it can be shown that

$$\frac{de_i^*}{d\bar{e}} > 0 \qquad \frac{de_i^*}{d\alpha} < 0$$

A.2 Proof of Prop. 2

An increase in effort demands increases the expected sanctions (or decreases the expected rewards) from being the leader, causing CP_i to fall.

$$\frac{dCP_i}{d\bar{e}} = -\frac{dC(\bar{e} - e_i^*)}{d\bar{e}} < 0$$

This expression is negative given our assumptions on the C function.

A.3 Proof of Prop. 3

Consider candidacy choices for two ability levels, A_i and A_j, where $A_i > A_j$. Suppose that $\bar{e}$ is such that member i just decides to drop out of the candidate pool, i.e., $CP_i = 0$. Given Assumption 2, we know that $CP_j > CP_i = 0$. Prop. 2 tells us that $dCP_i/d\bar{e} < 0$. Therefore, the level of $\bar{e}$ at which the equilibrium in which member j chooses Candidacy becomes unsustainable must be higher than the level at which the equilibrium in which member i chooses candidacy becomes unsustainable.

A.4 Proof of Prop. 4

Taking the derivative of Equation 9 with respect to α, we obtain the following.

$$\frac{d^2CP_i}{dA_i d\alpha} = \left[\frac{\partial I(A_i, 1 - e_i^*)}{\partial A_i} - \frac{\partial I(A_i, 1)}{\partial A_i}\right] + \left[\frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial e_i^* \partial A_i}\alpha + \frac{\partial^2 P(A_i, e_i^*)}{\partial e_i^* \partial A_i}(1 - \alpha)\right]\frac{de_i^*}{d\alpha}$$

Note that $de_i^*/d\alpha < 0$, $\partial^2 I(A_i, 1 - e_i^*)/\partial A_i \partial e_i^* < 0$, and $\partial^2 P(A_i, e_i^*)/\partial A_i \partial e_i^* > 0$. Thus, all terms are negative except $(\partial^2 I(A_i, 1 - e_i^*)/\partial A_i \partial e_i^*)(de_i^*/d\alpha) > 0$. Denote $-de_i^*/d\alpha = \Delta > 0$. We rewrite the equation above by splitting the first term into two.

$$\begin{aligned}
\frac{d^2CP_i}{dA_i d\alpha} &= \left[\frac{\partial I(A_i, 1 - e_i^*)}{\partial A_i} - \frac{\partial I(A_i, 1 - e_i^* + \Delta)}{\partial A_i}\right] + \left[\frac{\partial I(A_i, 1 - e_i^* + \Delta)}{\partial A_i} - \frac{\partial I(A_i, 1)}{\partial A_i}\right] \\
&\quad - \left[\frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial e_i^* \partial A_i}\alpha + \frac{\partial^2 P(A_i, e_i^*)}{\partial e_i^* \partial A_i}(1 - \alpha)\right]\Delta
\end{aligned}$$

Next, we take a linear approximation of the first term on the right-hand side.

$$\frac{d^2 CP_i}{dA_i d\alpha} \approx \Delta \frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial A_i \partial e_i^*} + \left[\frac{\partial I(A_i, 1 - e_i^* + \Delta)}{\partial A_i} - \frac{\partial I(A_i, 1)}{\partial A_i} \right]$$
$$- \left[\frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial e_i^* \partial A_i} \alpha + \frac{\partial^2 P(A_i, e_i^*)}{\partial e_i^* \partial A_i} (1 - \alpha) \right] \Delta$$

Rewriting,

$$\frac{d^2 CP_i}{dA_i d\alpha} \approx \left[\Delta \left(\frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial A_i \partial e_i^*} \right) - \Delta \left(\frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial A_i \partial e_i^*} \right) \right] \alpha$$
$$+ \left[\Delta \left(\frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial A_i \partial e_i^*} \right) - \Delta \left(\frac{\partial^2 P(A_i, e_i^*)}{\partial e_i^* \partial A_i} \right) \right] (1 - \alpha)$$
$$+ \left[\frac{\partial I(A_i, 1 - e_i^* + \Delta)}{\partial A_i} - \frac{\partial I(A_i, 1)}{\partial A_i} \right] < 0$$

A.5 Proof of Prop. 5

Applying the implicit function theorem to Equation 4, we obtain,

$$\frac{de_i^*}{dA_i} = -\frac{\frac{\partial^2 I(A_i, 1 - e_i^*)}{\partial A_i \partial e_i^*} \alpha + \frac{\partial^2 P(A_i, e_i^*)}{\partial A_i \partial e_i^*} (1 - \alpha)}{\frac{\partial^2 I(A_i, 1 - e_i^*)\alpha}{(\partial e_i^*)^2} + \frac{\partial^2 P(A_i, e_i^*)(1 - \alpha)}{(\partial e_i^*)^2} - \frac{\partial^2 C(\bar{e} - e_i^*)}{(\partial e_i^*)^2}}$$

The denomenator of this expression is negative, so the sign depends on the numerator. When $\alpha = 1$ the numerator will be $\partial^2 I(A_i, 1 - e_i^*)/\partial A_i \partial e_i^* < 0$. Therefore, since this is a continuous function, we must have $de_i^*/dA_i < 0$ for sufficiently high α.

B Tradeoffs and key assumptions appendix

B.1 Advantage in public goods production

The condition under which higher ability leaders produce a *higher public good value* is given in Equation 8 below.

$$\frac{dP(A_i, e_i^*)}{dA_i} = \frac{\partial P(A_i, e_i^*)}{\partial A_i} + \frac{\partial P(A_i, e_i^*)}{\partial e_i^*} \frac{de_i^*}{dA_i} > 0 \tag{8}$$

The first term on the right hand side represents the direct effect of ability on the public good value and will always be positive. The second term represents how ability affects the public goods value through effort. Equation 8 tells us that high ability individuals will have an advantage in public goods production whenever an increase in ability does not cause too large a substitution of effort away from public goods production, i.e., whenever de_i^*/dA_i is not too negative. We can be sure this holds whenever the complementarity between ability and effort in generating private income is not too much larger than the complementarity in producing the public good.

B.2 Greater candidacy incentives

Equation 9 below gives the conditions under which low ability individuals will have greater candidacy incentives[55].

$$\frac{dCP_i}{dA_i} = \alpha \left[\frac{\partial I(A_i, 1 - e_i^*)}{\partial A_i} - \frac{\partial I(A_i, 1)}{\partial A_i} \right] + (1 - \alpha) \frac{\partial P(A_i, e_i^*)}{\partial A_i} \tag{9}$$

The first bracketed expression on the right hand side, which is negative, represents the extra opportunity cost that high ability members pay for allocating effort away from producing private income. The second term on the right hand side is positive, since higher ability members benefit from the higher valued public good that they produce.

C Simulation appendix

The following functional forms are used in the simulation exercise.

$$I = A_i^\beta (1 - e_i)^{1-\beta} \qquad P = A_i^\beta e_i^{1-\beta} \qquad C = 10^{(\bar{e} - e_i)} - 1$$

The parameter values used for the simulations are $N = 10$, $\beta = .5$, and $\phi = .1$. The simulations are run for values of $\bar{e}$ from 0 to 0.9 by steps of .1 and for $\alpha = \{0.1, 0.6, 0.8, 0.95\}$.

Figure C presents additional results from the simulation exercise. The data are constructed by ranking the individuals in each group by their ability, with 10 being the highest and 1 being the lowest ability member. It shows the ranking of the member that ultimately becomes the leader. The main point here is that not only is leader ability falling, but that it is falling even though higher ability members are available.
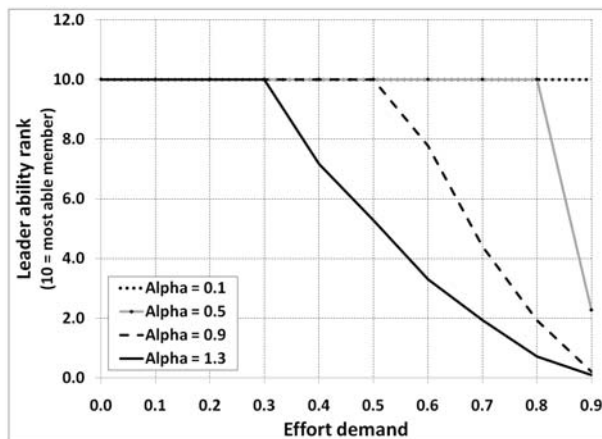

Figure 5: Simulated Leader Ability Rank

---

[55] We do not need to account for the effect on $\tilde{P}$ in this equation because the increase in A_i will not affect the value of the public good produced by the next best leader unless the next best leader changes, in which case an increase in A_i will increase individual i's ability to free ride, thereby further reducing CP_i.

We also calculate results where we take average values over all supportable equilibria for each set of parameter values. The average leader effort, leader ability, and public good value produced are displayed in Figures 6 and 7 below. These show the same results as obtained when we focused only on the best available equilibrium. Note that in many cases there will be only one supportable equilibrium and that under these conditions these results will be exactly the same as those displayed in Figures 1 and 2. This occurs most often for low levels of effort demand.
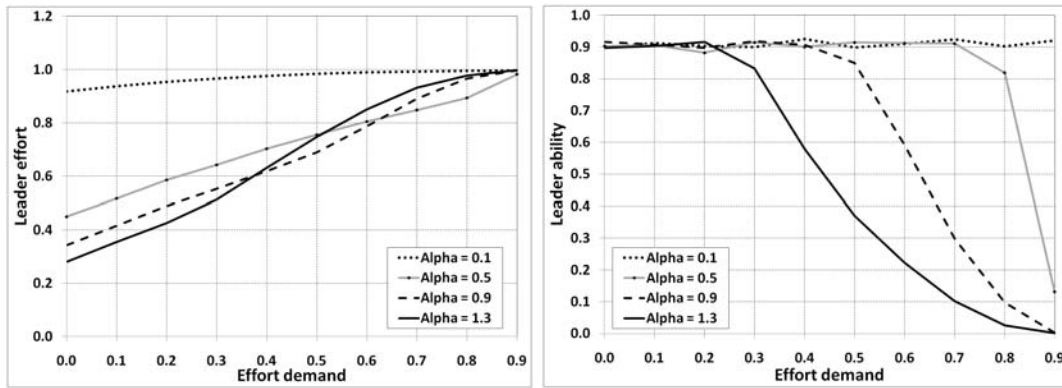
Figure 6: Simulated Leader Effort and Ability Averaged Over All Supportable Equilibria
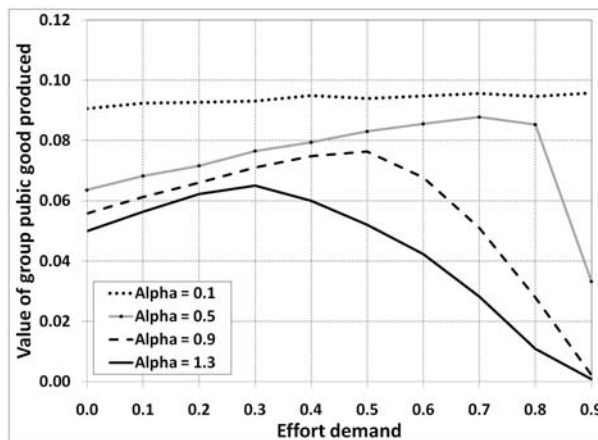
Figure 7: Simulated Public Good Value Averaged Over All Supportable Equilibria
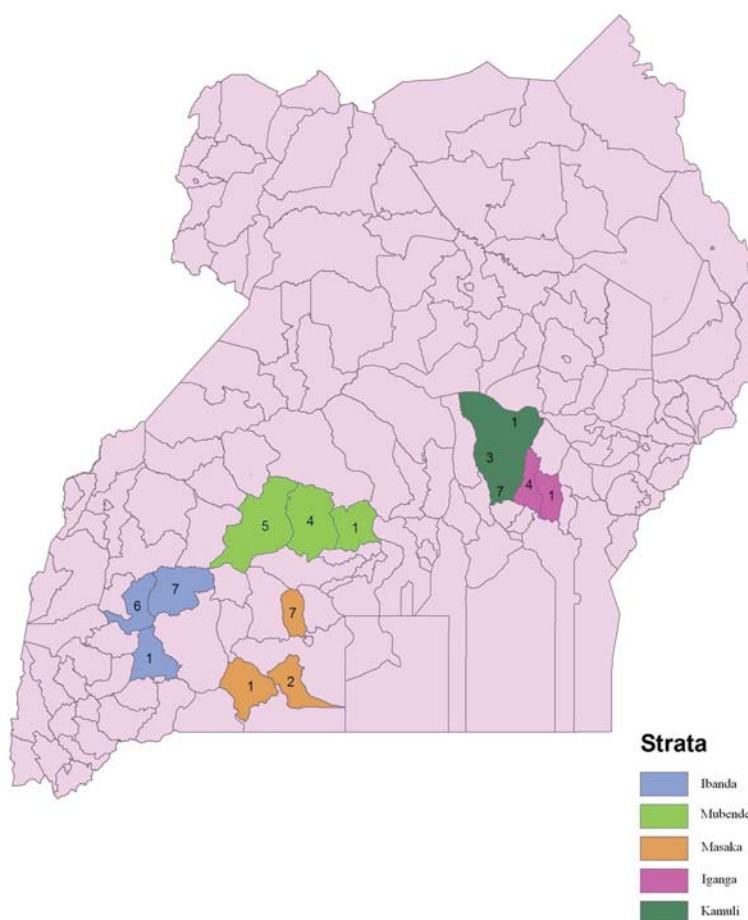
D   Data appendix

Figure 8: Number of Sampled Farmer Associations (DCs), by Strata

Table 8: Farmer Associations: Summary Statistics

Variable	Mean	(Std. Dev.)	Min.	Max.	N
Age of DC	2.84	(1)	1	5	50
No. of group members	211.92	(111.59)	61	536	50
DC Manager's Effort	0	(1)	-2.66	2.5	50
Effort Demand (std.)	0	(1)	-2.35	2.23	50
Leader's ability without cognitive tests (std.)	0	(1)	-1.69	1.49	46
Leader's ability with cognitive tests (std.)	0	(1)	-1.86	1.65	42
Mean seasonal yield (units of 100)	3.79	(1.8)	0.89	7.76	50
Ethnic fractionaliztion	0.23	(0.25)	0	0.8	50
Associational-life	0	(1)	-2.08	1.74	50

Table 9: Members: Summary Statistics

Variable	Mean	(Std. Dev.)	Min.	Max.	N
Dependent Variables					
Bulked at least once with DC (self-report)	0.61	(0.49)	0	1	1746
Bulked at least once with DC (leaders-report)	0.61	(0.49)	0	1	1712
Welfare Increase (std.)	0	(1)	-4.52	3.04	1759
Independent Variables					
Sex (male)	0.68	(0.47)	0	1	1781
Age	45.58	(14.42)	14	95	1781
Education (Std.)	0	(1)	-1.53	1.88	1781
Log Total Seasonal Yield	5.22	(1.16)	0	8.72	1776
Years since Joining Group	3.71	(1.76)	1	8	1769
Middleman honesty	0.91	(0.28)	0	1	1698
Same village as leader	0.11	(0.31)	0	1	1782
Associational-life (std.)	0	(1)	-3.14	2.85	1633
Farming Primary Occupation	0.56	(0.5)	0	1	1766
Village distance to District Capital	29.18	(18.01)	0	96.60	1705
Village Distance to Trading Center	1.09	(2.72)	0	28.98	1719
Village Distance to DC Crop Collection	2.49	(2.99)	0	19.32	1715

Table 10: Representatives: Summary Statistics

| Variable	Mean	(Std. Dev.)	Min.	Max.	N
Sex (male)	0.8	(0.4)	0	1	1316
Age	46.83	(11.88)	20	86	1316
Ability with cognitive tests (std.)	0	(1)	-3.69	1.9	1058
Ability without cognitive tests (std.)	0	(1)	-2.66	1.69	1316
Log Total Seasonal Yield	5.63	(1.15)	0	9.62	1313
Years since Joining Group	4.1	(1.65)	1	8	1314
Associational-life (std.)	0	(1)	-2.93	2.37	1140
Wealth (std.)	0	(1)	-2.39	9.15	1310
Member in good health	0.84	(0.37)	0	1	1305
Born in village	0.51	(0.5)	0	1	1316
Household Head	0.89	(0.32)	0	1	1316
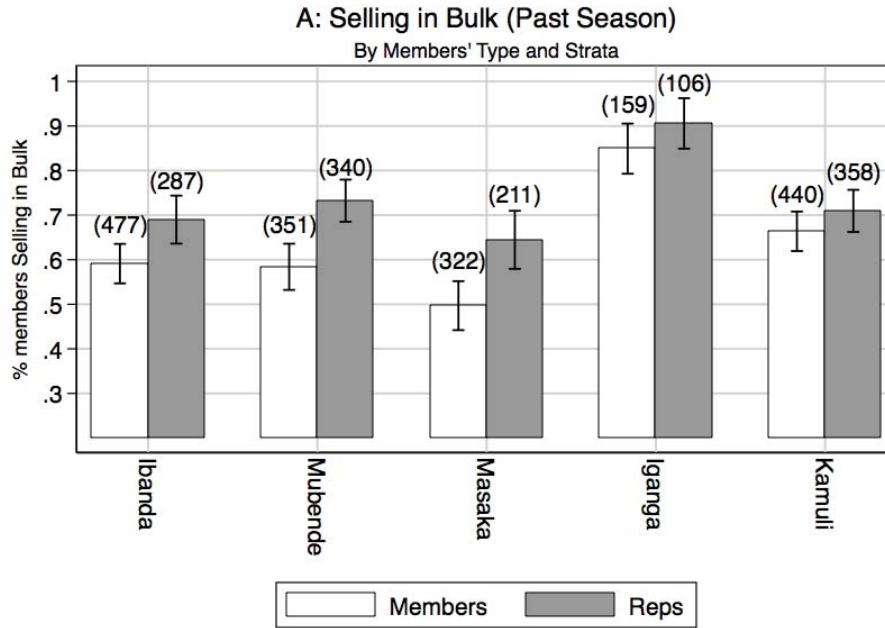
Figure 9: Proportion of respondents reporting to sell coffee via their farmer group, at least once, in the past season, by type of member and region. Number of observations in parenthesis. Caps represent 95% CI.
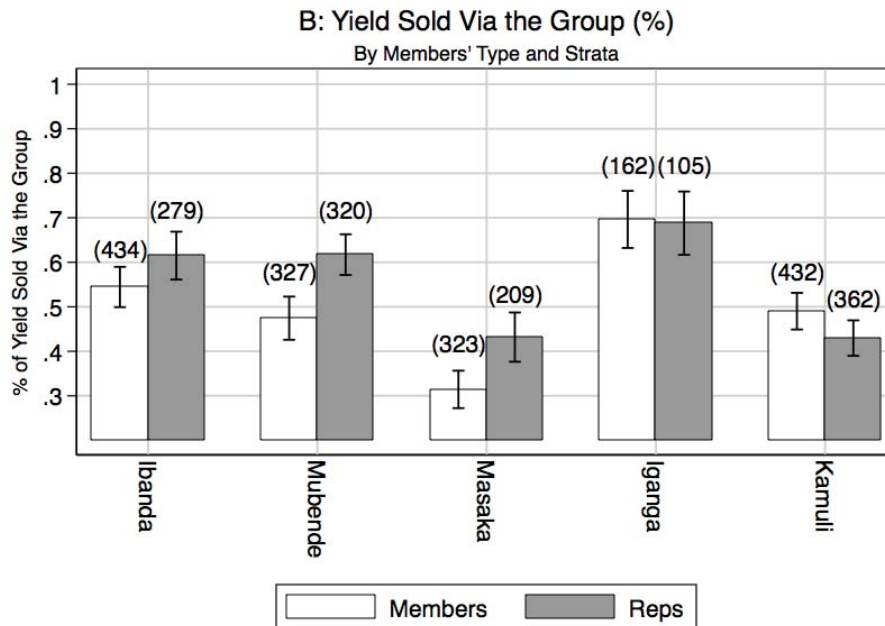

Figure 10: Mean of the proportion of a member's total seasonal yield sold via her group, by type of member and region. Number of observations in parenthesis. Caps represent 95% CI.
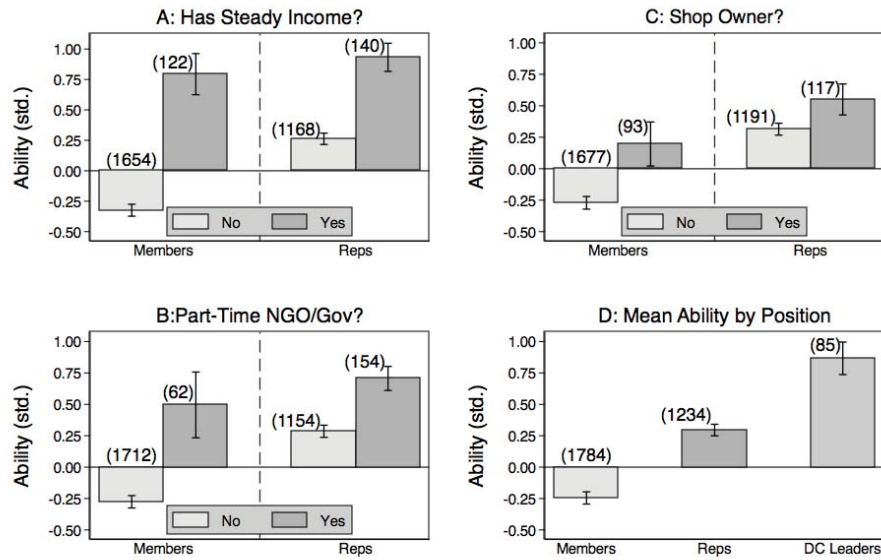
Figure 11: Figure provides information on the relationship between a continuous ability measure and a binary indicator of employment status, broken down by position in the association (ordinary group members and DC representatives). In each graph, point estimates represent the mean ability score for survey respondents who report having any steady source of off-farm income (panel A), work part-time in an NGO or a local government (panel B) or own a store (panel C), against the mean ability score for those who do not have such jobs. Caps represent 95% confidence intervals.
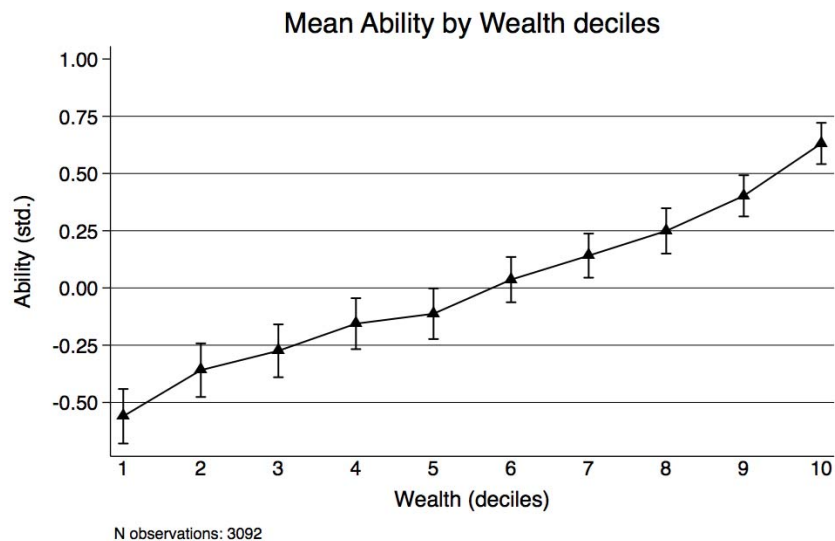

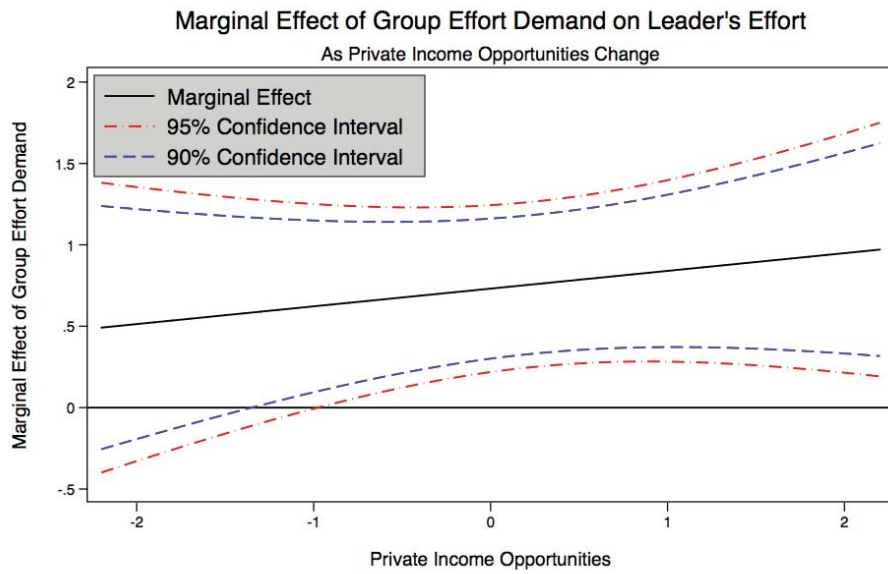Figure 12: Relationship between wealth (deciles) and ability (std), for the entire sample (N=3092).

Figure 13: Marginal effect of the association's effort demand ($\bar{e}_j$) on the association's leader's effort (e_j) as the value of private income opportunities (α_j) changes in its entire range.
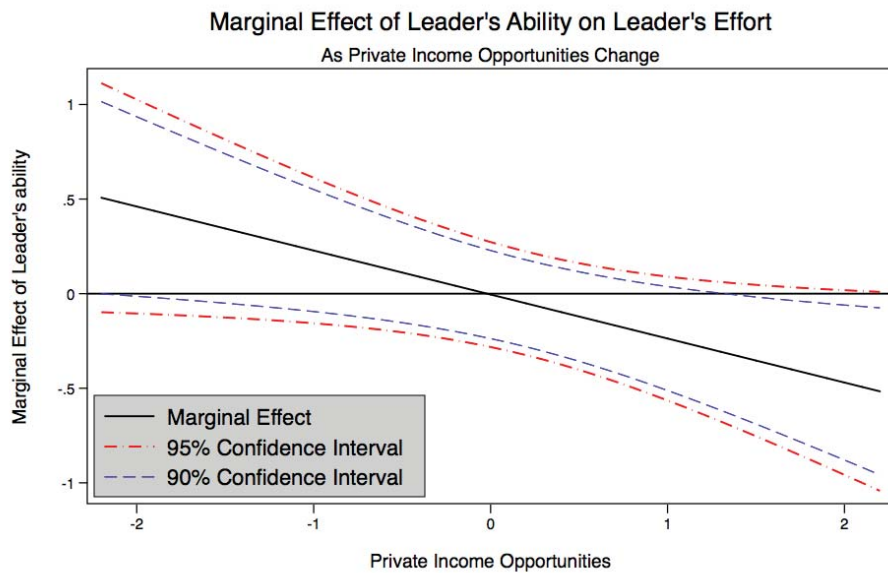
Figure 14: Marginal effect of the association's leader's ability (A_j) on leader effort (e_j) as the value of private income opportunities (α_j) changes in its entire range.