

Cooperation Under the Risk of Capture

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Abstract

How does the possibility of embezzlement affect cooperation in public goods dilemmas? Using lab-in-the-field experiments with village residents in Tanzania, I show that voluntary contributions to a public good are only marginally decreased by the possibility of embezzlement. This effect is proportional to how much embezzlement can actually be expected in a community, suggesting that village residents do not ignore the risk of embezzlement. Yet, they contribute voluntarily. The reason might be a collective expectation that individuals will refrain from maximal rent extraction if voluntary contributions are entrusted to them. Consistent with this hypothesis, a second, simultaneous experiment reveals that voluntarily contributed group resources are embezzled to a lesser extent than windfall resources provided by the experimenter. Furthermore, embezzlement of group resources is lower among co-villagers, as opposed to strangers.

Introduction

The provision of local public goods often requires monetary, labor or in-kind contributions by the members of a community (Olken and Singhal, 2011). In situations where formal institutions are weak, such contributions can be hard to enforce, and public goods provision can be undermined by free riding (Habyarimana et al., 2009, Chapter 1). The problem of free riding has motivated a great deal of prior scholarship (Olson, 1965; Hardin, 1968; Ostrom, 1990; Fehr and Gächter, 2000; Ostrom, 2005), cumulating in the insight that humans have a disposition to contribute voluntarily in public goods dilemmas (see Ledyard 1995; Zelmer 2003 for reviews).¹ This disposition towards voluntary cooperation facilitates cooperative equilibria in repeated interaction (Trivers, 1971; Axelrod and

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¹In one-shot voluntary contributions public goods games, individuals typically contribute approximately half of their endowments (Levitt and List, 2007, 155). However, voluntary contributions are easily frustrated by the experience of free riding, as suggested by a literature on conditional cooperation (Keser and Van Winden, 2000; Fischbacher et al., 2001; Kocher et al., 2008).

Hamilton, 1981; Nowak and Sigmund, 1998; Nowak, 2006; Baldassarri, 2012), the formation of social norms against free riding (Fehr et al., 2002), and the altruistic enforcement of such norms (Ostrom et al., 1992; Fehr and Gächter, 2000). In this paper, I investigate experimentally how people’s basic disposition to voluntarily contribute in a public goods dilemma is affected by the possibility that their contributions can be captured or misappropriated for the private interests of an individual in their midst. In the absence of repeated interaction or sanctioning capacity, will individuals be more willing to free ride if their contributions to a public good can be captured?

I investigate this question in the context of village-level revenue mobilization in Tanzania, which is an example of a much larger empirical puzzle. Village governments in Tanzania routinely mobilize contributions to local public goods, such as the maintenance of school buildings, water pumps, and dispensaries, the organization of community activities and the provision of shared services. However, the formal capacity of village governments to enforce such contributions is weak and easily exhausted if a large enough number of village residents fails to cooperate. At the same time, many village residents believe that their village governments are corrupt and unaccountable. Yet, citizens’ willingness to voluntarily contribute to local projects is considerable. This is deeply puzzling. Why do citizens seemingly voluntarily contribute to local public goods, even if the coercive capacity of local authorities is weak and local authorities are widely perceived as corrupt?

Theories of tax compliance offer different perspectives on why citizens make hard-to-enforce contributions, even if those can be embezzled or misappropriated. Theories of predatory rule maintain that self-interested leaders can maximize their profits if they manage to sustain a level of public trust that is just sufficient to ensure that citizens contribute quasi-voluntarily. Since quasi-voluntary compliance minimizes the enforcement and transaction costs of revenue mobilization, leaders have an incentive to refrain from rent extraction to some extent (Levi, 1988).² In this perspective, both tax compliance and moderation in rent extraction are strategic, rather than driven by other-regarding preferences: The costs and consequences of coercion motivate citizens and rulers to enter a tax bargain whereby citizens comply quasi-voluntarily and rulers strategically refrain from

²Relatedly, Olson (1993) uses the metaphor of a ‘stationary bandit’ to describe rulers who refrain rent extraction as a long-term investment in their tax base, building trust among citizens that the returns of their productive activities will not be captured entirely.

maximal rent extraction. However, such a bargain can only be achieved with a latent threat of actual coercion in the background, even if coercion may not actually be observed in equilibrium. Another theoretical perspective emphasizes that centralized coercive capacity is not necessary to ensure compliance. Informal institutions, peer sanctioning and reputational incentives among the members of a community can substitute for formal enforcement capacity in order to suppress free riding (Ostrom, 1990; Bowles and Gintis, 2002; Miguel and Gugerty, 2005; Ostrom, 2005) and to constrain rent extraction by local leaders (Tsai, 2007). Both of the aforementioned perspectives have in common that they require repeated interaction and a credible threat of formal or informal enforcement, which then creates incentives for contributors to refrain from free riding, and for the providers of public goods to refrain from rent extraction.

Alternatively, a growing literature on tax morale emphasizes various sources of intrinsic motivation for citizens to voluntarily make contributions to public goods, even if those contributions cannot actually be enforced (Luttmer and Singhal, 2014). These mechanisms include altruistic motivations, such as a sense of civic duty, feelings of shame or guilt when cheating on tax obligations (Andreoni et al., 1998), a desire to comply with the law (Dwenger et al., 2014), as well as generalized reciprocity, in the sense that citizens contribute to a public good, because they perceive themselves as beneficiaries (Hallsworth and Metcalfe, 2014). However, it remains unclear how sensitive such intrinsic motivations are to the possibility that contributions can be embezzled or misappropriated.

Especially in light of evidence that tax compliance is lower if taxes are not perceived as fair or legitimate (Besley, 2014), it is puzzling why hard-to-enforce contributions would not break down if opportunities for local leaders to misappropriate contributions abound. Two mechanisms could plausibly explain this: Either, individuals' disposition to voluntarily contribute is simply not sensitive to the effects of embezzlement, i.e. neither to the individual return from contributing, nor to the distributive implications of embezzlement. Or, individuals' willingness to contribute is sensitive to embezzlement risk, but communities collectively expect that actual embezzlement will be limited, i.e. their members individually expect this and also expect most others to hold this expectation. Such an expectation would be justified if there are high levels of voluntary restraint in the embezzlement of voluntarily contributed public resources. Therefore, the possibility of em-

bezzlement might not eliminate voluntary contributions if voluntary moderation in rent extraction is collectively expected. In this paper, I argue that the latter is the case: Individuals' basic disposition to contribute to a public good is sensitive to embezzlement risk, but at the same time there is widespread voluntary restraint in embezzlement.

My argument is based on a behavioral experiment which I conducted with residents of 48 Tanzanian villages. The study combines a novel experimental design with observational comparisons across communities that differ by their members' willingness to embezzle public resources. In the experiment, I compare three different decision situations: a classic, linear voluntary contributions public goods game; a voluntary contributions public goods game with a second stage, in which the group resources can be embezzled by an individual; and a third decision situation, which consists of the second stage without the first stage. In this scenario, study participants are presented with an opportunity to capture group resources provided as a windfall by the experimenter.³ In the observational part, I use a cross section of 48 villages to test whether the sensitivity of village residents' voluntary contribution behavior to the possibility of embezzlement can be explained by the actual disposition of their co-villagers to voluntarily refrain from capturing public resources.

I find that voluntary contributions by Tanzanian village residents are only marginally reduced by the possibility that they can be embezzled or captured by an individual in their midst. On average, contributions decrease from 57 to 50 percent of study participants' endowments in groups of co-villagers and remain unaltered at 47 percent in groups of mutual strangers. Furthermore, I confirm that individuals exert voluntary moderation in capturing group resources, which would otherwise be shared equitably within the group. Voluntary restraint is potentially increased if the group resources originate from voluntary contributions, compared to a situation where windfall resources have been provided by the experimenter. Additionally, voluntary restraint is greater among co-villagers than among mutual strangers. Finally, variation in the extent to which the residents of a village voluntarily refrain from capturing public resources is strongly associated with the sensitivity

³This second stage loosely resembles the receiver's decision in a trust game that is played between a group and an individual, or, in the case of windfall resources, a dictator game between an individual and a group. A further difference in relation to conventional dictator- or trust games is the fact that the dictator has an equal stake in the group's payoff.

of voluntary contributions to the possibility of embezzlement, which is measured on a different sample of village residents. This suggests that, in the aggregate, village residents' willingness to voluntarily contribute to public goods is not independent of the possibility of embezzlement, but related to an existing disposition of their co-villagers to exert voluntary restraint in capturing public resources.

The contribution of this paper extends beyond the problem of village-level public goods provision in developing countries. By providing evidence that people are less willing to capture contributed resources than windfall resources, the paper complements existing research that deals with the relationship between taxation and rent extraction. Various authors suggest that tax revenue is treated differently by local governments than fiscal transfers and other types of windfall resources (Brollo et al., 2010; Hoffman and Gibson, 2005; Gadenne, 2014). A popular explanation is that taxation increases political accountability (Moore, 2008). In line with this view, it has been proposed that citizens are more likely to seek information about government spending (Paler, 2013), and are more likely to sanction politicians for misappropriation (Martin, 2014) if public spending is financed by tax revenue, rather than windfall resources. Such incentives notwithstanding, this paper suggests that dispositional mechanisms might be part of the explanation for why taxpayer money is less vulnerable to rent extraction than other types of public resources: Individuals might intrinsically be less willing to embezzle contributed resources.

To explain the research design and findings in detail, the paper will proceed as follows. First, I explain the empirical puzzle that motivates this research – village residents' willingness to contribute to local public goods despite the perceived possibility of embezzlement. Second, I summarize the research design. Third, I describe the implementation of the study and explain the methodological choices and practical tradeoffs that had to be addressed in the process. Fourth, I report the results for each element of the research design. This is followed by a discussion of the interpretation and implications of the experimental results.

Case and Context

Village-level public goods provision in Tanzania, like in many other countries of the world, involves a considerable amount of community self-governance. Occasional interventions by government agencies, non-governmental organizations and international donors notwithstanding, various types of public projects are initiated and implemented by the villages themselves, for example the maintenance of school buildings, water pumps, village roads, village offices, health posts, common agricultural infrastructure, etc. Villages are also self-governing in the management of common-pool resources, such as communal land and communal forests. Some villages employ individuals to provide services to the community, for example as school guards. Additionally, villages are required to mobilize their share of contributions for public goods that are shared among villages, such as road maintenance and secondary schools. To provide these public goods, villages raise internal revenues – for example project-specific contributions, user fees, and general contributions to the village budget – as well as labor and in-kind contributions from village residents.

The enforcement of such contributions can be very difficult, both at the village level and at higher levels of local government (Fjeldstad, 2001, 295ff). Depending on the village, between 60 and 100 percent of citizens who have been sampled for this study affirm that there are “serious problems with non-payment of contributions to village projects and activities”.⁴ The structures for the enforcement of such contributions are primarily internal and often informal.⁵ Internal enforcement structures are highly vulnerable to conflicts of interest, because personal relationships between enforcers and contributors cause loyalty pressures, which may lead to collusion or conflict and undermine the goal of revenue extraction. In situations of massive non-compliance, there is very little village leaders can do to enforce the payments and inputs that are needed to complete a public

⁴I administered this survey question to 480 randomly sampled adult residents between 18 and 70 years of age, in 32 villages covered by this study in the Hanang and Mufindi districts. In the median village, 80 percent of respondents affirm that there are “serious problems with non-payment of contributions”.

⁵Most villages in Tanzania have enforcement volunteers (*mgambo*) who are trained in disciplinary action and act like a village police. Some villages additionally maintain an armed village militia (*sungusungu*), and it is not uncommon that it becomes involved the enforcement of contributions. Crucially, these enforcement structures are based on voluntary collective action within the village (Abrahams, 1989) and their success varies with pre-existing collective action capacity (Paciotti et al., 2013). Lastly, village leaders have the possibility of appealing to external law enforcement institutions, for example by taking non-contributors to court. However, the costs of doing so and the time it takes to complete a court case are often in no relation to the payoff.

project.

Given their lack of direct coercive capacity, village leaders typically appeal to citizens' moral responsibility to their communities, rather than to the threat of enforcement. In some cases, this enables them to achieve remarkable levels of voluntary cooperation that would be difficult to attain through coercion alone.⁶ Across 32 villages in Hanang and Mufindi districts, the median amount of cash citizens in a village report to have contributed to village projects over the past 12 months ranges from 5800 and 80000 TZS, with the median village at 20000 TZS.⁷ Such cash contributions exist alongside the provision of labor and physical inputs to local projects by citizens, which are potentially even more difficult to monitor and enforce.

Considering that both the coercive capacity of village governments and formal accountability structures that would prevent village leaders from misappropriating public resources are weak, it is rather astounding to what extent citizens are willing to contribute to village projects. Corruption and rent extraction by village leaders are widespread. In the villages surveyed for this study, village residents complained, for example, that village leaders embezzled public funds, abused village land for their own farming enterprises, enriched themselves by selling communal land to outside investors, used village trees for timber, misappropriated agricultural subsidy vouchers, and so forth. Not only are these types of corruption very difficult to hide from the community, but village leaders often do not even seem to attempt to do so.

Unsurprisingly, in 21 out of 32 villages surveyed, a majority of sampled residents agreed with the statement that "most people in the village think that the village government is corrupt". This perception is consistent with empirical studies highlighting the extent to which village leaders are able to capture certain public resources in Tanzania (Pan and Christiaensen, 2012).⁸ While in some

⁶Some villages maintain public goods above and beyond the basic amenities that are common to most villages. Examples include school gardens, spaces for celebrations and community events, the construction and maintenance of public restrooms, the organization of large sports tournaments, etc.

⁷At the time, between 4 and 55 USD, or between 1 and 16 modal daily wages of an unskilled worker in remote rural areas, with the median village at four daily wages or 13.80 USD.

⁸For example, Pan and Christiaensen (2012) estimate that 60 percent of agricultural subsidy vouchers in the Kilimanjaro region were captured by elected village leaders, instead of being distributed to eligible households in the village.

villages local leaders are replaced in connection with corruption scandals,⁹ in many other villages surveyed for this study corruption allegations have not had consequences for the village leaders. Yet, despite weak enforcement capacity and varying levels of impunity for the embezzlement of public resources, almost all villages manage to sustain some level of contributions to village projects. How can such quasi-voluntary contribution behavior coexist with overt rent extraction by local leaders? And why do some villages exhibit much greater capacity to mobilize contributions than others?

Research Design

To shed light on these questions, I evaluate whether and why village residents in rural Tanzania have a behavioral disposition to voluntarily contribute to a public good, even if their contributions can be captured or embezzled by an individual in their midst. Such a behavioral disposition could either directly explain why quasi-voluntary contribution behavior can be observed in situations of weak enforcement capacity and accountability, or it could play an indirect role as an enabling mechanism for the formation and enforcement of a social norm that demands citizens to contribute to public goods even under the risk of capture. I approach these questions through two interrelated behavioral experiments (Figure 1), which I carried out with a sample of 964 rural residents in Tanzania, drawn from the adult population of 48 villages in three regions.¹⁰

The first experiment is a one-shot, voluntary contributions public goods game involving a group of eight co-villagers, who are not identified to each other. In the public goods game, study participants receive an endowment of 1000 Shillings and decide how much of it to contribute to a group fund. The contributions to the group fund are doubled by the experimenter and the group fund is eventually distributed in equal shares among all eight group members.

⁹See for example Lund's (2007, 315) discussion of the embezzlement of village revenues in a study of forest taxation in the Iringa region.

¹⁰The 48 villages in the study were sampled at random from three geographically distinct districts (Mpanda DC in the Katavi region, Hanang district in the Manyara region, and Mufindi district in the Iringa region, see Figure A.0.1 in Appendix A-0). Within each village, study participants were sampled at random from the population of residents aged 18-70, which corresponds to a subset of the population that is normally approached for contributions to village projects. For details on the sampling procedure, which was based on a comprehensive listing of households in every subvillage, see Appendix A-4.

There are two cross-cutting experimental treatments which modify this basic decision situation. The first treatment introduces the risk that the group money can be embezzled before the payoffs are disbursed to the group members. In this condition, study participants know that after the contributions have been made, an unidentified member of the group, who is to be selected at random, will be given the opportunity to privately capture any fraction of the group fund. The fraction of the group fund that is captured by this group member is then personally appropriated by her or him, instead of being shared equally among all group members. The remaining, un-captured fraction of the group money is shared equally among all eight group members, including the person who had the opportunity to capture the group fund.

The second treatment manipulates the social distance between the members of a group. In the second treatment, the group of eight study participants is not composed of co-villagers, but of mutual strangers. No two members of a group are from the same village, and study participants do not know from what villages the other group members are. Although the different villages are located within the same district, the distances between them are up to several hours by car.

These two treatments are randomized independently, in a factorial design. Of interest are three questions. First, whether any voluntary contributions are made at all, if the group fund can be embezzled. Second, by how much voluntary contributions are reduced by the possibility that the group fund can be embezzled. Third, whether the effect depends on the social distance between the group members.

If the experiment shows that the reduction in voluntary contributions is limited, i.e. that village residents have a disposition to contribute to a public good despite the fact that their contributions can be captured, then the question arises what the underlying causal mechanism is. One possibility is that village residents do not care whether their contributions are captured. Alternatively, it may be that village residents anticipate that the extent of capture will be limited. One way of distinguishing between these two mechanisms is to examine the consequences of heterogeneity in social norms across villages. If there is heterogeneity in village-level norms and experiences pertaining to the capture of public resources, then this heterogeneity should cause variation in

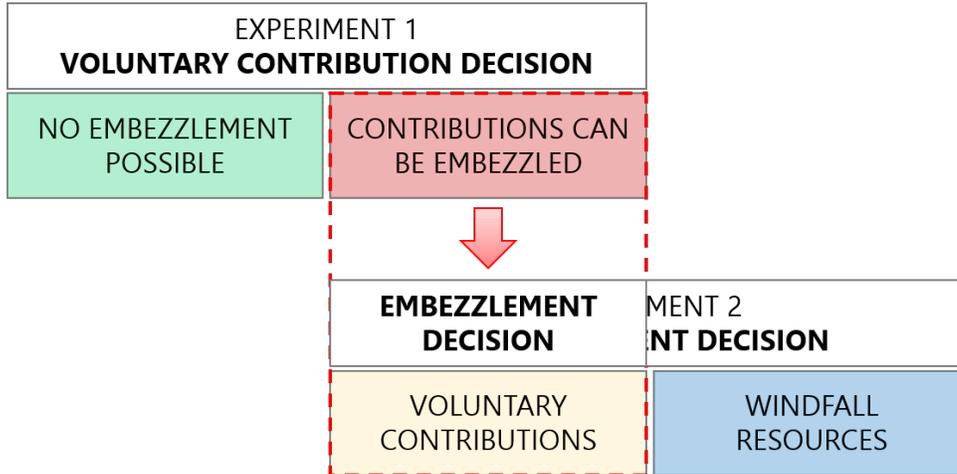
study participants' anticipation of how much embezzlement will actually take place.

If village residents do not care whether their contributions are captured or not, then the willingness of their co-villagers to capture public resources should not explain their contribution levels under the risk of capture any more than it would explain their contribution levels if there was no risk of capture. Thus, we can distinguish between the two causal mechanisms, by testing whether, across villages, the differences between village residents' voluntary contribution behavior under the risk of embezzlement and in the absence of embezzlement risk can be explained by out-of-sample measures of the actual willingness of their co-villagers to refrain from embezzling public resources.

Furthermore, if village residents' disposition to voluntarily contribute to public goods despite the risk of embezzlement can be explained by their co-villagers' voluntary restraint in capturing public resources, then we may wonder what causes this voluntary restraint. An obvious possibility is that individuals have a generalized, situation-independent disposition to refrain from capturing public resources. Additionally however, village residents might be particularly reluctant to capture voluntary contributions, compared to windfall resources. Finally, it might be that in-group bias plays a role, i.e. that individuals are more reluctant to embezzle public resources when their co-villagers, who are socially proximate to them, are concerned, compared to a situation where the stakes in the public resources where are distributed across random strangers with whom they have no social ties.

To evaluate both of these propositions, I make use of an additional experiment, which was carried out simultaneously. In this experiment, study participants are confronted with the possibility of capturing a public resource for private gain. The public resource is an amount of money, which, by default, is to be distributed in equal shares to eight group members. However, one of the eight group members has the opportunity to capture a fraction of the group fund. I vary whether the group fund is a windfall resource that has been provided by the experimenter, or whether it originates from voluntary contributions. Furthermore, I vary whether the members of a group are all from the same village, or all from different villages. The two treatments are assigned randomly in a factorial design. The outcome of interest is the fraction of the group money study participants propose to

capture for personal gain. I evaluate the average effects of each of these treatments, as well as their interaction effect.



CROSS-CUTTING TREATMENT: Co-Villager vs. Stranger Setting

OBSERVATIONAL COMPONENT: Can heterogeneous treatment effects in Experiment 1 be explained by actual embezzlement risk in the village (out-of-sample measure, 48 villages)?

Figure 1: Study Design.

Implementation

Decision exercises

Voluntary Contribution Decisions

In the first experiment, I compare voluntary contributions in a public goods game with and without the possibility that the contributions can be embezzled by an individual group member. The setup is straightforward. In a group of eight study participants, each group member receives an endowment of ten 100 Shilling coins. The group members decide how much of their endowment to keep for themselves and how much to contribute to a group fund. Study participants understand that all contributions to the group fund are doubled by the experimenter.

In the no-embezzlement condition, study participants know that the group fund will be divided in equal shares among all eight members of the group. In the embezzlement condition, study participants know that the contribution decisions are followed by a second stage, in which every group member is asked to indicate what fraction of the group fund they would capture for themselves, if they were given the chance to do so. One of the capture proposals is then selected at random and implemented. The fraction of the group fund that has been captured is paid exclusively to the group member whose capture proposal has been selected. The fraction of the group fund that has not been captured is divided equally among all eight group members.

The instructions for both treatment conditions were framed neutrally, without reference to any normatively loaded terms such as “public good”, “capture” or “embezzlement”. The neutral framing ensures that differences in study participants’ behavior between the treatment conditions can be attributed to the logic of the decision situation itself, rather than to framing effects (see Appendix A-1). Furthermore, comprehension checks were used to ensure that study participants understood the entire logic of the decision exercise before they were allowed to make their decisions. If a study participant was unable to correctly answer a comprehension question, the interviewer would re-read the relevant passage of the instructions until the study participant was able to provide the correct answer.

In both the co-villager and the stranger treatments, the identity of the other seven group members was unknown to the study participants. All contribution decisions took place in a confidential, one-on-one setting. I accomplished this by collecting the decisions of the different group members individually, then calculating every group member’s payoff, before returning to the village on a specific, agreed-on date to disburse the payoff. The decision exercise was carried out in conjunction with other, very similar activities, so that 48 study participants per village took part in a set of very similar experiments at the same time. Given the simultaneity of these decision exercises and the random assignment of study participants across groups, study participants were unable to infer the identity of the other members of their group, even in the co-villager condition, and even if they knew who else in the village was participating in the research activities. In the co-villager condition, study participants were merely informed that all other group members were from their

own village. In the stranger condition, they were informed that no two members of the group were from the same village.

To prevent that study participants' contribution decisions are contaminated by inter-temporal choices or by study participants' trust that the interviewer would actually return with the payoff on the agreed-on date, study participants were informed in advance that all parts of their payoff, including the portion of their endowments which they decided to keep for themselves, would be disbursed at the same time, i.e. when the interviewer returned to the village after all decisions had been collected.

The pecuniary stakes in the experiment were kept deliberately low, primarily for ethical reasons.¹¹ At the time of the study, the endowment of 1000 Shillings was sufficient to buy a warm meal in a village, and corresponded to about one-fifth of the modal daily wage for unskilled labor in the rural areas. A potential consequence of the low stakes is that study participants might be less concerned about the embezzlement of their contributions than they would have been if higher stakes were involved. If this were the case, the study would be biased in favor the hypothesis that the actual risk of embezzlement does not matter for study participants' disposition to contribute to a public good, which is the mechanism I ultimately reject.

Embezzlement Decisions

In the second, simultaneous experiment, I compare study participants' willingness to refrain from capturing group resources, depending on whether these group resources originate from voluntary contributions or from a windfall provided by the experimenter. For the voluntary contribution condition, the decisions from the capture stage of the first experiment (in the embezzlement condition) are used. In the windfall condition, the decision situation is identical, except that the group fund consists of a flat amount of 12,000 TZS, which has been provided by the experimenter. This amount corresponds to the average size of the group fund in the co-villager/embezzlement condition of the first experiment.

¹¹A different experiment, which is reported in a companion paper, compares the confidential contribution decisions in the no-embezzlement condition to contribution decisions that are individually attributable. The lowest still meaningful stakes were chosen for the decision exercise in order to minimize the risk of conflict between study participants after the experiment.

Thus, the difference between the two experimental conditions is that in the voluntary contribution condition, study participants know that the group fund originates from voluntary contributions in which they have personally taken part. Furthermore, the total amount of the group fund was unknown to study participants in the voluntary contribution condition. Instead, they used plastic tokens to indicate the *fraction* of the group fund they propose to embezzle. Since the amount of the group fund varied, study participants' expectations about the size of the group fund were recorded along with their capture proposals.

As in the first experiment, the decisions took place in a confidential, one-on-one setting, and payoffs were disbursed at an agreed-on date after the decisions of all group members had been collected. For the decision itself, two jars were placed in front of the study participant, one labeled "Group" in Swahili (along with a pictogram showing eight people) and one labeled "Self" (with a pictogram showing one person). The group fund (twenty four plastic tokens or twenty four 500 Shilling bills) was placed in the "Group" jar. To make an embezzlement proposal, study participants moved the desired fraction of the group fund from the "Group" jar into the "Self" jar. Comprehension checks ensured that every study participant understood that (1) if their proposal was drawn and they had proposed to embezzle nothing, they would receive the same share of the group fund as every other group member, and (2) if their proposal was drawn and they had proposed to embezzle the entire group fund, the other group members would receive no share of the group fund at all.

Treatments and treatment assignment

The assignment of decision exercises to study participants (i.e. of the public goods game without embezzlement, the public goods game with embezzlement, or the embezzlement decision by itself) was physically randomized. To determine which decision exercise to carry out with a particular study participant, the interviewers blindly drew a token from an urn. The number of tokens per decision exercise in every village was pre-determined and the tokens would be drawn without replacement.¹²

¹²When finished with a study participant, the interviewers would place the token into a different receptacle and mark it as used in a checklist. Once all tokens were used, the data collection in a village was complete.

Within each decision exercise, the assignment of the co-villager/stranger condition was randomized via the tablet computers that were used for data entry. In fact, for reasons related to a different aspect of the study which is beyond the scope of this paper (see Appendix A-2 for details), study participants repeated the decision exercise four times in four different conditions, in random order: Two of the four decisions took place in the co-villager condition and two in the stranger condition, and within each condition, one decision was guaranteed to be confidential, and one decision was personally attributable to the study participants ex post. In this paper, I focus solely on the confidential decisions, which are easily attributable to intrinsic behavioral dispositions, since they are unaffected by the need to anticipate consequences for future interactions. In a companion paper, I consider the effects of personal attributability. For each of their four decisions, study participants were randomly matched into a different group, so that there was no repeated interaction. Nonetheless, study participants' second, third and fourth decisions are inevitably contaminated by conditioning effects from earlier decisions. For the purpose of drawing causal inferences in the experiment, I therefore restrict the data to study participants' first decisions, as stated in the pre-analysis plan for this study.

Data from study participants' later decisions are, however, useful for the examination of cross-village heterogeneity in study participants' behavior. For this purpose, they are pooled with the data from study participants' first decisions, in order to obtain less noisy estimates of average contribution and embezzlement decisions in each village, by treatment conditions. By themselves, these estimates may be biased by treatment order effects, but this bias should not be systematically related to any village-level characteristics, since the order effects are generated within the experiment and the order of treatments is randomized at the individual level.

Pre-analysis plan

The basic theoretical argument and expectations for this study were detailed in a pre-analysis plan (Appendix A-2). According to the pre-analysis plan (p. 2):

“The working hypothesis is that the presence of agency problems will reduce cooper-

ation in public goods dilemmas, because the risk of capture of resources decreases the expected return from the public good. On the other hand, the beneficiaries of the public good may generally trust that capture is limited, and therefore contribute to a public good despite the risk that their contributions will not benefit everyone equally. Thus, agency problems might not cause a complete breakdown of cooperation in a public goods dilemma.”

The pre-analysis plan specified two hypotheses:

- The possibility of capture in a public goods game causes lower contributions.
- When facing the choice how much money to allocate to themselves as opposed to having it shared equally with the other group members, individuals allocate less to themselves, if the money stems from contributions by the group members.

The data analysis in the paper largely follows the pre-analysis plan, in that it uses one-tailed tests of the difference in mean contributions between the embezzlement/no-embezzlement conditions in the first experiment, and of the difference in the mean embezzlement decisions between the voluntary contribution/windfall conditions in the second experiment. Also, as stipulated in the pre-analysis plan, the data is restricted to study participants’ first decisions to prevent contamination by conditioning effects. A full report on the pre-analysis plan is provided in Appendix A-2 and A-3.

Two obvious extensions of the analysis were omitted in the pre-analysis plan, but are expected to be uncontroversial: The reporting of the results for both the co-villager and stranger treatments, and the analysis of heterogeneous effects across villages to test whether differences in voluntary contributions between the co-villager/embezzlement and the co-villager/no-embezzlement conditions can be explained by actual embezzlement risk in the village.

Results

Voluntary contributions under the risk of embezzlement

Contrary to what we might expect, the possibility of embezzlement only marginally reduces voluntary contributions to the public good in groups of co-villagers. On average, study participants contributed 57 percent of their endowment if no embezzlement was possible, and 50 percent of their endowments if a co-villager could capture their contributions. Thus, the reduction in voluntary contributions is very moderate, corresponding to 0.3 standard deviations (s.e. 0.1 standard deviations). In the stranger setting, average voluntary contributions to the public good were unaffected by the possibility of embezzlement (Table 2). This may be due to the fact that even in the no-embezzlement condition, average voluntary contributions in the stranger condition were already lower than in the co-villager/embezzlement condition, at 47 percent of study participants' endowments.

<i>DV: Voluntary Contributions to the Public Good</i>		
<i>(Co-Villager Setting)</i>		
	(1)	(2)
Embezzlement Possible	-0.070** (0.025)	-0.060* (0.027)
Constant	0.57*** (0.019)	0.63*** (0.015)
Village Fixed Effects		yes
<i>N</i>	338	338

Standard errors in parentheses (Column (1): clustering by village).

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1: The possibility of embezzlement moderately decreases voluntary contributions in the co-villager setting. The table reports coefficients from OLS regressions (dependent variable: contributions as a fraction of study participants' endowments). Standard errors in parentheses. Column (1): clustering by village. Column (2): village fixed effects.

<i>DV: Voluntary Contributions to the Public Good</i>		
	(1)	(2)
Embezzlement Possible	0.0082 (0.024)	0.016 (0.026)
Co-Villager	0.092** (0.027)	0.091** (0.029)
Embezzlement Possible \times Co-Villager	-0.078* (0.034)	-0.088* (0.038)
Constant	0.47*** (0.017)	0.51*** (0.021)
Village Fixed Effects		yes
<i>N</i>	640	640

Standard errors in parentheses (Column (1): clustering by village).

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Average voluntary contributions are lower in the stranger setting and unaffected by the possibility of embezzlement. The table reports coefficients from OLS regressions (dependent variable: contributions as a fraction of study participants’ endowments). Standard errors in parentheses. Column (1): clustering by village. Column (2): village fixed effects.

Thus, the central take-away point from the first experiment is that voluntary contribution levels in the embezzlement condition remain relatively high, both in the co-villager and in the stranger condition. This result gives rise to the question why voluntary contributions are not more sensitive to the possibility of embezzlement. Two plausible mechanisms are considered. First, that individuals’ disposition to voluntarily contribute is largely independent of the expected individual return and of the perceived equality in the distribution of the group resource. Second, that individuals collectively anticipate that others will exert voluntary restraint when they have the opportunity to embezzle contributions, so that the possibility of embezzlement has only a limited impact.

Residents’ disposition to refrain from embezzlement varies across villages

The plausibility of the second mechanism is supported by the fact that most study participants do indeed refrain from capturing contributions to the full extent. On average, study participants propose to capture 37 percent of their co-villagers’ contributions. This behavior is consistent with patterns of reciprocity that can be observed commonly observed among “responders” in trust

games (Berg et al., 1995; Levitt and List, 2007, 155). However, the average embezzlement rates also vary across villages, ranging from 18 to 52 percent. While some of this variation may be due to sampling variability, it could also be a consequence of heterogeneity in village norms and collective experiences.

Since village norms and collective experiences shape village residents' perceptions of actual embezzlement risk, the heterogeneity in embezzlement behavior across villages can be used to discriminate between the two aforementioned mechanisms. If village residents' disposition to voluntarily contribute to public goods is largely independent of the risk of embezzlement, then we should not expect that an out-of-sample measure of actual embezzlement risk in the village can explain the difference in voluntary contribution behavior between the embezzlement and no-embezzlement conditions in that village. Such an out-of-sample measure of embezzlement risk is the embezzlement behavior of study participants in the windfall condition of the second experiment. If the actual embezzlement risk does indeed matter for voluntary contributions in the embezzlement conditions, then we should observe a more negative difference in voluntary contribution behavior between the no-embezzlement and embezzlement conditions in those villages where residents are more willing to capture public resources.

Indeed, the regression in Table 3 reveals that the difference in voluntary contributions across the embezzlement and no-embezzlement conditions in a village (as the dependent variable) is highly correlated with village residents' average willingness to embezzle a windfall resource (which is measured on a different random sample of village residents). This means that a greater willingness of village residents to voluntarily refrain from embezzlement of public resources is associated with a smaller decrease in voluntary contribution behavior between the no-embezzlement and the embezzlement treatments. Although this correlation does not imply a causal relationship, it is difficult to think of a plausible mechanism that would explain how such an association could come about, if individuals were indifferent about the extent to which their contributions are embezzled.

<i>DV: Difference in Voluntary Contributions Between the Embezzlement and No-Embezzlement Conditions</i>		
	(1)	(2)
Embezzlement of Windfall Resources (Co-Villagers)	-0.29*	-0.38**
	(0.11)	(0.12)
Constant	0.12*	0.14**
	(0.054)	(0.052)
District Effects		yes
Villages	48	48
R^2	0.12	0.15

HC3 standard errors in parentheses. ⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Across villages, a greater willingness to embezzle public resources is associated with a more negative difference in contributions between the embezzlement and no-embezzlement conditions. The independent variable (the average willingness of co-villagers to embezzle public resources) has been calculated using a different sample of study participants from the same village – those assigned to the windfall condition. Therefore, the correlation cannot be due to individual-level characteristics, but must be due to village characteristics.

Voluntary restraint in the embezzlement of public resources

If study participants are indeed sensitive to the extent of embezzlement in their village, the reason why they are willing to voluntarily contribute to a public good if their contributions can be embezzled might be that they anticipate embezzlement to be limited. The results of the second experiment are consistent with this explanation. Not only do individuals voluntarily refrain from maximal rent extraction, but, among all four treatment conditions, they are least willing to embezzle public resources if those are shared within a group of co-villagers and originate from voluntary contributions by the group members.

Overall, the data support the hypothesis that village residents capture contributed resources at a lesser rate than windfall resources (Table 4). Controlling for study participants' expectations about the size of the group fund and village fixed effects, the rate at which voluntarily contributed resources are embezzled in the stranger condition is, within a 95 percent confidence interval, between 4.9 and 21 percentage points lower than the rate at which windfall resources are embezzled in the stranger condition. In the co-villager condition, the rate at which contributed resources are

embezzled is between 3.1 and 16 percentage points lower than in the stranger condition. In the co-villager condition, where embezzlement is lower to begin with, this difference is less pronounced when village fixed effects are removed. Further replications of the experiment might therefore be needed before a final conclusion can be drawn.¹³

While study participants are more reluctant to capture windfall resources in the co-villager condition than in the stranger condition, this difference is diminished in the case of contributed resources. The null hypothesis of no co-villager bias in the embezzlement of contributed resources cannot be rejected. If the group resources originate from voluntary contributions, it appears that the embezzlement rates become more similar in the co-villager and stranger conditions, but the interaction effect between the co-villager and voluntary contribution treatments remains statistically insignificant.

<i>DV: Fraction of Public Resources Captured</i>				
	(1)	(2)	(3)	(4)
Contributed Resources	-0.079*	-0.074*	-0.10**	-0.11**
	(0.031)	(0.032)	(0.031)	(0.034)
Co-Villager	-0.061*	-0.048	-0.061*	-0.048
	(0.025)	(0.031)	(0.025)	(0.032)
Contributed × Co-Villager	0.043	0.025	0.041	0.024
	(0.030)	(0.042)	(0.031)	(0.042)
Expected Amount of Group Money			-0.10 ⁺	-0.14*
			(0.060)	(0.065)
Constant	0.47***	0.28***	0.55***	0.37***
	(0.020)	(0.049)	(0.046)	(0.067)
Village Effects		yes		yes
<i>N</i>	632	632	630	630

Standard errors in parentheses. ⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Contributed resources are embezzled at a lower rate than windfall resources and

¹³In fact, in Hanang and Mufindi districts, it makes no difference for average embezzlement in the co-villager condition whether the group resource originates from voluntary contributions or from a windfall. At the same time, there is negative co-villager bias in study participants' embezzlement decisions to begin with; i.e. in these two districts even windfall resources are embezzled at a lower rate in the co-villager setting than in the stranger setting. In Mpanda DC, there is, on average, no negative co-villager bias, and the difference in embezzlement between the contribution and windfall conditions is more pronounced in the co-villager setting (see Appendix A-3).

embezzlement is lower in the co-villager condition. The table reports coefficients from OLS regressions. Robust standard errors in parentheses. Columns (1) and (3): clustering by village. Columns (2) and (4): village fixed effects.

Discussion

The experiments presented in this paper provide three empirical insights, which contribute to a better understanding of voluntary contribution behavior under the risk of embezzlement. First, village residents in Tanzania have a behavioral disposition to exert voluntary restraint when they are confronted with the possibility of embezzling public resources that have been contributed by the members of their group. Second, their willingness to refrain from embezzling public resources varies across communities. Third, voluntary contributions to a public good are only minimally reduced by the possibility that an individual in their group can secretly embezzle them. The greater the willingness of their co-villagers to refrain from embezzlement, the less negative is the effect of the possibility of embezzlement on village residents' voluntary contributions to a public good.

According to village residents' perceptions, corruption in local-level public goods provision is widespread. Yet, even in this context, the mere possibility of embezzlement is insufficient to deter voluntary contributions to a public good. Importantly, the reason does not seem to be that individuals ignore the risk of embezzlement or its allocative consequences. Quite to the contrary, the difference in voluntary contributions between the embezzlement and no-embezzlement conditions is strongly associated with the actual willingness of study participants' co-villagers to refrain from embezzlement, despite the absence of communication in the experiment.

If we conclude that actual embezzlement risk matters for individuals' willingness to contribute to a public good, their behavior in the experiments is consistent with a collective expectation that the magnitude of embezzlement will be limited. The more easily individual contributions in the embezzlement condition can be deterred by the mere anticipation that *other* group members might be less willing to contribute, the greater is the need for such an expectation to be *collective*, i.e. to encompass the higher-order expectations that all other group members have similar levels of

trust that embezzlement will be limited. If individuals believed that some group members expected different rates of embezzlement or reacted more sensitively to embezzlement risk, then they would expect lower contributions by other group members and might thus be prompted to lower their own contributions as well. Instead, individuals contribute at relatively similar rates in the embezzlement and no-embezzlement conditions.

An implication of these results is that imperfect accountability of local leaders might not be per se an obstacle to voluntary cooperation in the provision of local public goods. If there is collective trust that local leaders exert voluntarily moderation in the embezzlement of contributions, then the lack of formal accountability structures may be inconsequential for voluntary contribution behavior. In communities where local accountability structures are weak, a collective behavioral disposition to give the providers of a public good the benefit of doubt could be a distinct advantage. If the anticipation of even moderate embezzlement had immediate and deleterious consequences for voluntary contributions, then much greater enforcement capacity would be needed to provide local public goods. However, such centralized enforcement capacity is not only costly, but can also easily be abused, especially unaccountable local leaders control it. Communities with unaccountable leadership institutions might therefore be better off contributing voluntarily to public goods despite the risk that their contributions can be embezzled, than either increasing centralized enforcement capacity, or forgoing public goods provision.

Conclusions

The provision of public goods in weakly institutionalized environments is often characterized by a seeming paradox: Public goods provision requires hard-to-enforce contributions from citizens, but those contributions can easily be captured or embezzled by local authorities. In this paper, I argue that imperfect accountability of local leaders might not by itself be an obstacle to voluntary cooperation, because quasi-voluntary contributions to local public goods can be facilitated by a collective expectation that others will voluntarily refrain from maximal rent extraction.

In a context where rent extraction by local leaders is universally expected, I find evidence of a behavioral disposition among citizens to contribute to a public good, despite the risk that their contributions can be embezzled. The possibility of embezzlement causes only a very moderate reduction in voluntary contributions. To explain this behavioral tendency, I compare two potential mechanisms: Either citizens ignore the risk of embezzlement altogether, or they collectively expect that others will voluntarily refrain from maximal rent extraction, when they have the opportunity to capture their co-villagers' contributions to a public good.

Consistent with the second mechanism, individuals do indeed voluntarily refrain from maximal rent extraction, when they are confronted with an opportunity to capture a group resource for private gain. Such voluntary restraint is greatest when the group resource benefits co-villagers and originates from the group members' voluntary contributions. Furthermore, the extent of voluntary moderation varies across communities. The greater the risk of embezzlement in a community, the more negative is the effect of the possibility of embezzlement on voluntary contributions. If individuals were indifferent about the actual embezzlement risk in their community, this correlation would be difficult to explain.

These results have important implications for how we think about the provision of local public goods under weak institutions of enforcement and accountability. In particular, the paper speaks to the debate on whether local public goods should be funded through locally mobilized revenue or through fiscal transfers. A popular argument against local revenue mobilization is that local authorities lack the capacity to enforce contributions. By showing that citizens voluntarily contribute to a public good, despite the possibility that their contributions can be embezzled, this paper gives reason for optimism about the feasibility of local revenue mobilization even under weak formal enforcement capacity and accountability.

Without challenging the argument that self-interested rulers may have an incentive to create conditions under which citizens comply quasi-voluntarily (Levi, 1988; Olson, 1993), the results imply that we should not assume that citizens' willingness to cooperate with leaders who engage in rent extraction is *necessarily* caused by a latent threat of coercion. Instead, tolerance for moderate

corruption and generalized trust that local leaders will voluntarily exert moderation might facilitate cooperation in public goods dilemmas even in the presence of weak centralized enforcement capacity.

Arguments in favor local revenue mobilization tend to focus on the question whether local taxation increases accountability pressures on local leaders (Moore, 2008; Paler, 2013; Martin, 2014). This paper provides an alternative argument in favor of local revenue mobilization, by showing that voluntarily contributed resources are potentially embezzled at lower rates than windfall resources. Hence, locally contributed resources might be less vulnerable to embezzlement by virtue of a purely dispositional mechanism, regardless of the accountability pressures local leaders are facing.

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Appendix A-0: Location of the study sites

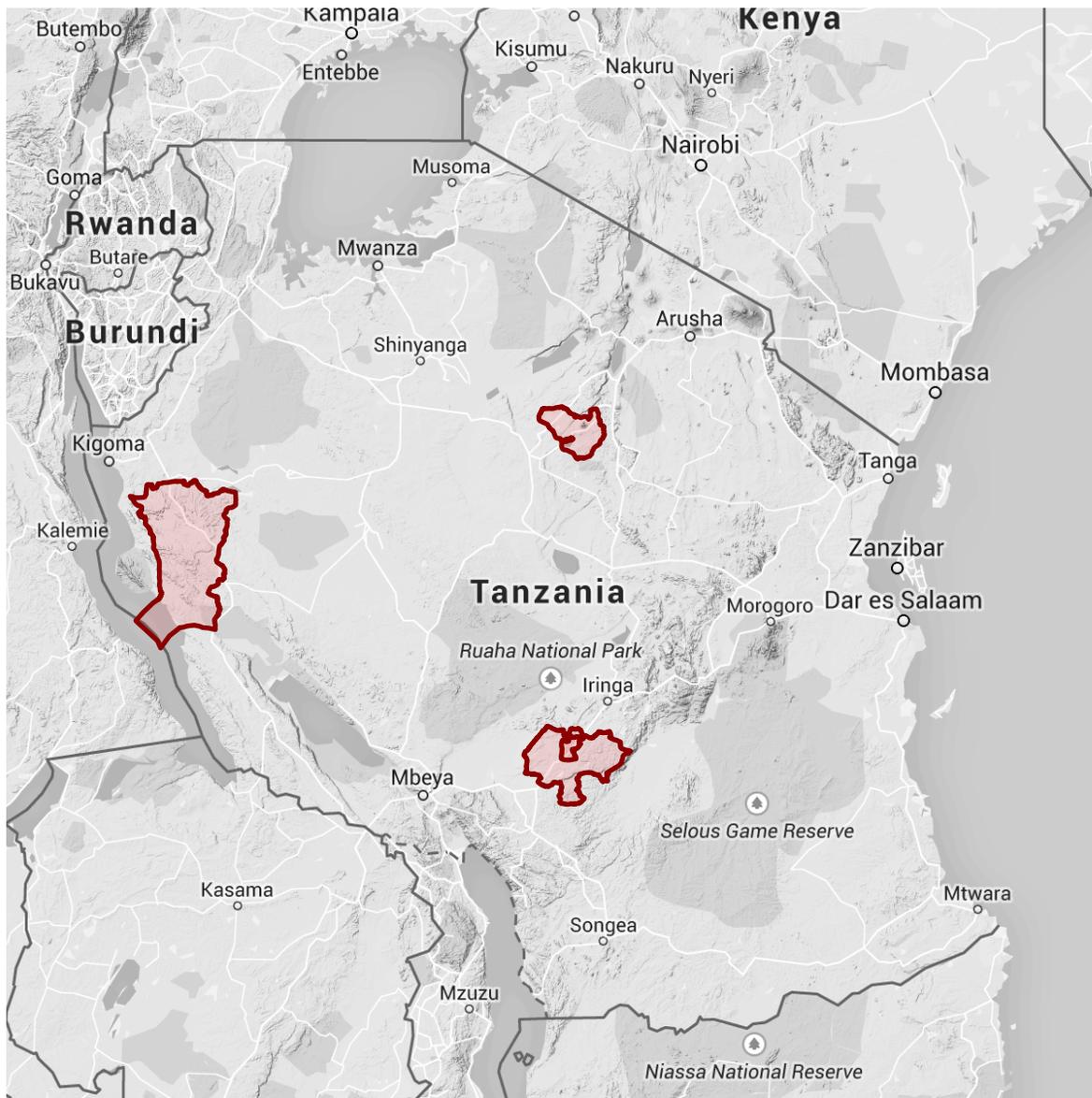


Figure A.0.1: Location of the study sites in Tanzania. In each of the three districts, 16 villages were sampled at random, stratified by ward.

Appendix A-1: Instructions for the decision exercises

Public Goods Game Without the Possibility of Embezzlement

PGG	GENERAL INSTRUCTIONS	ENG
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[BLOCK 1]

Thank you for participating in the survey. Now I would like to invite you to take part in an exercise which is about money. We will be collecting money from you as well as from seven other people who took part in the survey. Right now, I will not tell you who these other seven people are. However, we are asking each of them to contribute real money after having finished the survey.

Let me explain what we will do with the money we collect in this exercise: For each 100 Shilling coin a person contributes, we will add another 100 Shilling coin. Then we will put all the contributions from you and the other seven people together. This will be the group money. After we have collected the contributions from all eight participants, we will split the group money equally among them. Each participant will get an equal share of the group money.

We will come back on [INSERT DATE AND TIME] to give people their share of the group money from each of their exercises. We cannot give you the money before [INSERT DATE], because we first have to go around and collect the money from each of the eight participants in the group, including you.

Now let me ask you some questions. It's ok if you don't answer the questions correctly, I will just repeat the instructions of the exercise.

- From how many people we will collect money in this exercise?
- What will happen with the money we collected?
- When will you get your share of the group money?
- Why can we not give you the money before?

[BLOCK 2]

Great, I think you understand. The money you contribute will be doubled, but you will be sharing it with seven other study participants.

Let me give you some examples:

- If all seven people contribute 1000 Shillings each, each will get 2000 Shillings back from the group money.
- If all eight people contribute 100 Shillings each, each will get 200 Shillings back from the group money.
- However, if seven people contribute 1000 Shillings each, and one person contributes only 100 Shillings, then each will get a share of 1775 Shillings back. Including the participant who contributed only 100 Shillings.
- If seven people contribute 100 Shillings each, and one person contributes 1000 Shillings, then each participant will get 500 Shillings from the group money, including the person who contributed 1000 Shillings.

Do you understand, or should I explain this again?

[BLOCK 3]

I will give you ten 100 Shilling coins [SHOW THE COINS, BUT DO NOT HAND THEM OVER YET]. You will have to decide how many coins you share with the group and how many coins you keep for yourself.

Please put all of the coins that you want to keep for yourself into the jar that is labeled "SELF". We will keep this money for you and give it to you when we come back on [INSERT DATE].

Please put all of the coins that you want to share with the group into the jar that is labeled "GROUP". We will double the money you put into the group jar and put it together with the contributions from the seven other participants of this exercise. When we come back on [INSERT DATE]. We will give each participant their share of the group money.

Now let me ask you some more questions. It's ok if you don't answer the questions correctly at first; I will just repeat the instructions of the exercise.

- What will happen to the money that you put in the "SELF" jar?
- What will happen to the money that you put in the "GROUP" jar?

Before you make your decision, please be aware of the following:

1. Your decision in this exercise will be **SECRET**. I will record on the computer how much you shared with the group, but we will not tell anybody about it.
2. The other seven participants from whom we will be collecting money in this exercise will all be **FROM THIS VILLAGE**.

Let me ask you some final questions:

- Where are the other seven participants in this exercise from?
- Will we tell anybody how much money you shared with the group?
- Will we tell the village government how much money you shared with the group?
- Will we tell anyone how much money the other seven participants shared with the group?

Here are the ten 100 Shilling coins. I will give you some privacy to make your decision.

PGG	STRANGER/SECRET	ENG
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Before you make your decision, please be aware of the following:

1. Your decision in this exercise will be **SECRET**. I will record on the computer how much you shared with the group, but we will not tell anybody about it.
2. The other seven participants from whom we will be collecting money in this activity will all be **FROM DIFFERENT VILLAGES IN THIS DISTRICT**. No two people in the group will be from the same village.

Let me ask you some final questions:

- Where are the other seven participants in this exercise from?
- Will we tell anybody how much money you shared with the group?
- Will we tell the village government how much money you shared with the group?
- Will we tell anyone how much money the other seven participants shared with the group?

Here are the ten 100 Shilling coins. I will give you some privacy to make your decision.

Public Goods Game With the Possibility of Embezzlement and Embezzlement Decision Concerning a Contributed Resource

ACC	GENERAL INSTRUCTIONS	ENG
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[BLOCK 1]

Thank you for participating in the survey. Now I would like to invite you to take part in an exercise which is about money. First, we will be collecting money from you as well as from seven other people who took part in the survey. Right now, I will not tell you who these other seven people are. However, we are asking each of them to contribute real money after we have done the interview with them.

Let me explain what we will do with the money we collect in this exercise: For each 100 Shilling coin a person contributes, we will add another 100 Shilling coin. Then we will put all the contributions from you and the other seven people together. This is going to be the GROUP MONEY. After we have collected the contributions from all eight participants in the group, we will distribute the group money among these eight participants.

How are we going to distribute the group money among the participants? We will ask each of the eight people to make a proposal on how to distribute the group money. Then we will draw one of these eight proposals at random. Then we will split the money according to the proposal that was drawn.

In their proposal, each participant must indicate what share of the group money they want to allocate to themselves and what share of the group money they want to have split equally among all members of the group.

Thus, if YOUR PROPOSAL is drawn and you proposed to have all the money split equally among all members of the group, then you will get the same share of the group money as everyone else. On the other hand, if you proposed to keep all of the group money for yourself, then you will get all of the group money, and none of the other seven participants will get anything from the group money. If you proposed to keep half of the group money for yourself and to have the other half split equally among all members of the group, then you will get half of the group money, plus your share in the other half of the group money which is being split equally among all eight participants.

Of course, this is what happens if YOUR PROPOSAL is drawn. If ANOTHER PERSON'S PROPOSAL is drawn, then the money will be distributed according to that person's proposal, not according to your proposal.

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We will come back on [INSERT DATE AND TIME] to give people their share of the group money from each of their exercises. We cannot give you the money before [INSERT DATE], because we first have to go around and collect the money and the proposals from each of the eight people, including you.

Now let me ask you some questions. It's ok if you don't answer the questions correctly at first; I will just repeat the instructions of the exercise.

- From how many people will we collect money in this exercise?
- What will happen with the money we collected?
- Among whom is the group money going to be distributed?
- How is the money going to be distributed?
- How do we select the proposal according to which the money is distributed?
- What are we asking you to do in this exercise?
- If your proposal is drawn, what will happen to the money you proposed to allocate to the group?
- If your proposal is drawn, what will happen to the money you proposed to allocate to yourself?
- When will you get your share of the money?
- Why can we not give the money to you before?

[BLOCK 2]

Great, I think you understand. First we will be collecting group money, then we will ask each group member to make a proposal on how to distribute the group money.

Let me give you some examples:

- If all eight people contribute 1000 Shillings each, then there will be 16,000 Shillings in group money. If a proposal is drawn that states that all group money should be split equally among the eight people, then each will get 2000 Shillings back from the group money.
- If there are 16,000 Shillings in group money and a proposal is drawn that states that half of the group money should be split equally among the eight people and the other half should be given to the proposer, then the proposer will get $8,000 + 1000 = 9,000$ Shillings back from the group money and the other seven people will each get 1000 Shillings back.
- If there are 16,000 Shillings in group money, and a proposal is drawn that states that one fourth of the group money should go to the proposer and three fourth should be split equally, then the proposer will get $4000 + 1500 = 5500$ Shillings back from the group money and the other seven people will each get 1500 Shillings back.
- If three people contribute 1000 Shillings each, two people contribute 800 Shillings each, four people contribute 100 Shillings each and one person contributes nothing, then there will be $5000 * 2 = 10,000$ Shillings in group money.
- If nobody contributes anything, then there will be no group money to distribute.

Do you understand why, or should I explain this again?

[BLOCK 3]

I will give you ten 100 Shilling coins [SHOW THE COINS, BUT DO NOT HAND THEM OVER YET]. You will have to decide how many coins you want to share with the group and how many coins you want to keep for yourself.

Please put all of the coins that you want to keep for yourself into the jar that is labeled "SELF". We will keep this money for you and give it to you when we come back on [INSERT DATE].

Please put all of the coins that you want to share with the group into the jar that is labeled "GROUP". We will double the money you put into the group jar and put it together with the contributions from the seven other participants of this exercise.

When we come back on [INSERT DATE], we will give each participant their share of the group money.

But before that, all players have to make their proposals on how to distribute the group money. To make your proposal, I will put twenty four bottle caps into the group jar. This will symbolize the group money. By taking bottle caps out of the "GROUP" jar and placing them into the "SELF" jar, you can indicate what share of the group money you propose to keep for yourself. The remaining share will be split equally among all eight participants, including you.

Now let me ask you some more questions. It's ok if you don't answer the questions correctly at first; I will just repeat the instructions of the exercise.

- What will happen to the money that you put in the "SELF" jar?
- What will happen to the money that you put in the "GROUP" jar?
- If you want to propose to keep half of the group money for yourself, how do you do that?

ACC	COVILLAGER/SECRET	ENG
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Before you make your decision, please be aware of the following:

1. Your decision on how many of the ten 100 Shilling coins you contribute to the group will be **SECRET**.
2. Your proposal on how to split the group money will be **SECRET** in this exercise. I will record on the computer how much you proposed to keep for yourself, but we will not tell anybody about it.
3. The other seven participants will all be **FROM YOUR OWN VILLAGE**. We will ask each of them to make a proposal on how to split the group money between themselves and the group.

Let me ask you some final questions:

- Where are the other seven participants in this exercise from?
- Will we tell anybody how many of your ten 100 Shilling coins you contributed to the group?
- Will we tell anybody how much of the group money you proposed to keep for yourself?
- Will we tell the village government how much money you proposed to keep for yourself?

Here I have twenty four bottle caps in the jar with the "GROUP" symbol. These bottle caps symbolize the group money.

To make your proposal, please leave the bottle caps that you propose to allocate to the group in the jar and take the bottle caps that you propose to allocate to yourself out of the "GROUP" jar and put it into the jar with the "SELF" symbol, then I will record your decision on the computer.

ACC	STRANGER/SECRET	ENG
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Before you make your decision, please be aware of the following:

1. Your decision on how many of the ten 100 Shilling coins you contribute to the group will be **SECRET**.
2. Your proposal on how to split the group money will be **SECRET** in this exercise. I will record on the computer how much you proposed to keep for yourself, but we will not tell anybody about it.
3. The other seven participants will all be **FROM DIFFERENT VILLAGES OF THIS DISTRICT**. We will ask each of them to make a proposal on how to split the group money between themselves and group. No two people in the group will be from the same village.

Let me ask you some final questions:

- Where are the other seven participants in this exercise from?
- Will we tell anybody how many of your ten 100 Shilling coins you contributed to the group?
- Will we tell anybody how much of the group money you proposed to keep for yourself?
- Will we tell the village government how much of the group money you proposed to keep for yourself?
- Are people allowed to talk with others about this information?

Here I have twenty four bottle caps in the jar with the "GROUP" symbol. These bottle caps symbolize the group money.

To make your proposal, please leave the bottle caps that you propose to allocate to the group in the jar and take the bottle caps that you propose to allocate to yourself out of the "GROUP" jar and put it into the jar with the "SELF" symbol, then I will record your decision on the computer.

Embezzlement Decision Concerning a Windfall Resource

DIC	GENERAL INSTRUCTIONS	ENG
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[BLOCK 1]

Thank you for participating in the survey. Now I would like to invite you to take part in an exercise which is about money. In this exercise, we will be splitting 12,000 Shillings among a group that consists of you and seven other people. Let me explain how we are going to split the money:

We will ask each of the eight people in the group to make a proposal of how to split 12,000 Shillings between themselves and the group. Then we will draw one of the eight proposals at random. Then we will split the money according to the proposal that was drawn.

If YOUR PROPOSAL is drawn, the money that you have proposed to allocate to the group will be split equally among all eight members of the group, including you. Everyone in the group will get the same share of the group money. That means that you will get the same share of the group money as everybody else. However, the money that you have proposed to allocate to yourself will only be given to you and will not be shared with anyone else.

Of course, this is what happens if YOUR PROPOSAL is drawn. If ANOTHER PERSON'S PROPOSAL is drawn, then the money will be distributed according to that person's proposal, not according to your proposal.

We will come back on [INSERT DATE AND TIME] to give people their share of the money from each of their exercise. We cannot give you the money before [INSERT DATE], because we first have to go around and collect the proposals from each of the eight people, including you.

Now let me ask you some questions. It's ok if you don't answer the questions correctly at first; I will just repeat the instructions of the exercise.

- How much money are we going to distribute in this exercise?
- Among whom are we going to distribute the money?
- How is the money going to be distributed?
- How do we select the proposal according to which the money is distributed?
- What are we asking you to do in this exercise?
- If your proposal is drawn, what will happen to the money you proposed to allocate to the group?
- If your proposal is drawn, what will happen to the money you proposed to allocate to yourself?
- When will you get your share of the money?
- Why can we not give the money to you before?

[BLOCK 2]

Great, I think you understand. Each participant in this exercise makes a proposal on how to split 12,000 Shillings between themselves and the group. Then one proposal is selected at random and the money is distributed accordingly.

Let me give you some examples:

- If a person proposes to allocate 12,000 Shillings to the group and 0 Shillings to herself and that person's proposal is selected, how many Shillings will that person get in this exercise?
- How many shillings will each of the seven other people get in this exercise?
- If a person proposes to allocate 10,000 Shillings to the group and 2000 Shillings to herself and that person's proposal is selected, how many Shillings will that person get in this exercise?
- How many Shillings will each of the seven other people get in this exercise?
- If a person proposes to allocate 0 Shillings to the group and 12,000 Shillings to herself and that person's proposal is selected, how many Shillings will that person get in this exercise?
- How many Shillings will each of the seven other people get in this exercise?

Do you understand why, or should I explain this again?

[BLOCK 3]

Here I have twenty four 500 Shilling bills in the jar with the “GROUP” symbol. [SHOW THE BILLS, BUT DO NOT HAND THEM OVER YET].

I would now like to record your proposal on how to split them.

To make your proposal, please leave the money that you propose to allocate to the group in the jar with the “GROUP” symbol. Please take the money that you propose to allocate to yourself out of the “GROUP” jar and put it into the jar with the “SELF” symbol. When you are done, I will record your proposal into the computer and take the money back.

Once we have recorded the proposals from all eight people, the computer will select one of them at random. That means that each proposal has the same chance of being selected. Whether or not your proposal is selected will only depend on the lottery, it will not depend on what you have proposed in your proposal.

Now let me ask you some more questions. It’s ok if you don’t answer the questions correctly at first; I will just repeat the instructions of the exercise.

- If you want to propose that all the money is split equally within the group, how do you make such a proposal?
- If you want to propose that one third of the money is split equally within the group, and two thirds of the money are allocated to yourself, how do you make such a proposal?
- If you want to propose that all of the money is allocated to yourself, how do you make such a proposal?

DIC	COVILLAGER/SECRET	ENG
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Before you make your decision, please be aware of the following:

1. Your decision in this exercise will be **SECRET**. I will record on the computer how much you proposed to keep for yourself, but we will not tell anybody about it.
2. The other seven participants will all be **FROM YOUR OWN VILLAGE**. We will ask each of them to make a proposal on how to split 12,000 between themselves and group.

Let me ask you some final questions:

- Where are the other seven participants in this exercise from?
- Will we tell anybody how much money you proposed to keep for yourself?
- Will we tell the village government how much money you proposed to keep for yourself?

Here I have twenty four 500 Shilling bills in the jar with the "GROUP" symbol.

To make your proposal, please leave the money that you propose to allocate to the group in the jar and take the money that you propose to allocate to yourself out of the "GROUP" jar and put it into the jar with the "SELF" symbol. Then I will record in the computer and take back the money.

DIC	STRANGER/SECRET	ENG
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Before you make your decision, please be aware of the following:

1. Your decision in this exercise will be **SECRET**. I will record on the computer how much you proposed to keep for yourself, but we will not tell anybody about it.
2. The other seven participants will all be **FROM DIFFERENT VILLAGES IN THIS DISTRICT**. We will ask each of them to make a proposal on how to split 12,000 between themselves and group. No two people in the group will be from the same village.

Let me ask you some final questions:

- Where are the other seven participants in this exercise from?
- Will we tell anybody how much money you proposed to keep for yourself?
- Will we tell the village government how much money you proposed to keep for yourself?

Here I have twenty four 500 Shilling bills in the jar with the "GROUP" symbol.

To make your proposal, please leave the money that you propose to allocate to the group in the jar and take the money that you propose to allocate to yourself out of the "GROUP" jar and put it into the jar with the "SELF" symbol. Then I will record in the computer and take back the money.

Appendix A-2: Details on the Research Process

Research Context and Timeline

The two experiments reported in this paper were carried out as part of a research project which focused on measuring social incentives for cooperation and social accountability pressures in a cross-section of Tanzanian villages. This project focused on three types of decision situations that are of fundamental importance to understanding patterns of public goods provision and rent extraction in village communities: contributions to a public good, embezzlement of contributed resources, and embezzlement of windfall resources. For each of these decision situations, experiments were carried out to distinguish between preference- and incentive-based motives for pro-social behavior.

Each experiment was based on a behavioral decision exercise in which both the social proximity of study participants (co-villagers or strangers) and the personal attributability of individual decisions (attributable ex-post vs. non-attributable) were manipulated in a cross-cutting design, resulting in four experimental conditions. For purposes of validation, study participants repeated their decision exercise in each of the four experimental conditions in random order, each time within a different group of study participants. Since the later decisions are inevitably contaminated by conditioning effects from prior decisions, only study participants' first decisions were intended for causal inferences about the experimental treatments. The later decisions were used to obtain proxy measures of individual treatment responses, which were compared to real-world behaviors to validate the experiments.

For each of the three decision exercises, the experimental results are reported in two companion papers. Since the assignment of decision exercises to study participants was randomized, the comparison between the behavior of study participants in the different decision situations has a causal interpretation. In this paper, I compare the different decision exercises. I focus on the non-attributable decisions, because these have a straightforward interpretation: They reflect intrinsic behavioral dispositions, which are unaffected by the anticipation of future interactions with the other group members.

The data collection was carried out sequentially in three districts: In June 2013 in Mpanda DC (Katavi region), in November/December 2013 in Hanang District (Manyara Region) and in February 2014 in Munfindi District (Iringa Region).

The hypotheses and a proposed data analysis strategy for this paper were pre-specified in a pre-analysis plan on November 7th, 2013 (see below). Although the research design pre-dates the data collection in Mpanda DC, this pre-analysis plan was drafted after a first round of data collection in Mpanda DC had already been completed, but before the data collection from Hanang and Mufindi Districts was completed, and without knowledge of any data from Hanang and Mufindi districts. The drafting of an updated pre-analysis plan after experiences with the data collection in Mpanda DC had explicitly been anticipated in a first pre-analysis plan, dated June 16, 2013. Due to time constraints, this pre-analysis plan focused exclusively on the experimental comparisons within each of the three decision situations, not on the comparisons between the decision situations.

Since data from Mpanda DC was used to illustrate the proposed data analyses in the pre-analysis plan for this paper, Appendix A-3 reports the key data analyses under exclusion of the data from Mpanda DC, alongside separate analyses of the data from Mpanda DC. The key hypothesis tests can be replicated in both data sets.

Pre-Analysis Plan

The section of updated pre-analysis plan that refers to the experimental comparisons between the three decision exercises is included below (Source: Pre-Analysis Plan, November 7th, 2013, pp. 2-5: available at `[insert url]`).

Question A: What is the effect of agency problems on cooperation in public goods dilemmas?

Little systematic evidence exists on how cooperation in public goods dilemmas is affected by the risk of capture of contributions for private benefits, even though real-world problems of public goods provision are frequently plagued by agency problems of the provider of the public good. This experiment consists of a voluntary contributions public goods game in which, depending on the treatment condition, the contributions can be captured by a member of the group. The working hypothesis is that the presence of agency problems will reduce cooperation in public goods dilemmas, because the risk of capture of resources decreases the expected return from the public good. On the other hand, the beneficiaries of the public good may generally trust that capture is limited, and therefore contribute to a public good despite the risk that their contributions will not benefit everyone equally. Thus, agency problems might not cause a complete breakdown of cooperation in a public goods dilemma. One reason why people might expect that capture is limited is if people have a tendency to appropriate less of a group resource if this resource has been raised through contributions from the members of the group. This hypothesis is tested as well. Thus, this experiment examines whether positive contributions are realized in a public goods game with agency problems and by how much agency problems decrease the level of public goods provision.

Experimental treatments:

The study participants are randomly assigned to one of the three games described in the original research design document and in the appendix of this pre-analysis plan: (1) A classic public goods game (involving no agency problems), (2) an “accountability game” which is a public goods game in which each player then also makes a proposal on how to allocate the total contributions between themselves and the group and one proposal is implemented at random, and (3) “group sharing game” in which players make allocation proposals between themselves and the group over a fixed amount of money that has not been raised in the form of contributions. Only data from the covillager/anonymous conditions of these games is used for the purposes of this research question.

Hypotheses:

It is expected that there will be nonzero contributions in the one-shot public goods game even when agency problems are present. However, the possibility of capture is expected to decrease these contributions. At the same time, it is expected that the capture of group resources is lower when these originate from contributions from the group as opposed to from an external source.

- Hypothesis A.1: The possibility of capture in a public goods game causes lower contributions.
- Hypothesis A.2: When facing the choice how much money to allocate to themselves as opposed to having it shared equally with the other group members, individuals allocate less to themselves if the money stems from contributions by the group members.

Data analysis strategy:

The data analysis will only use the data from the covillager/anonymous conditions of the above-mentioned behavioral games. Additionally, the data analysis will be restricted to subjects' first games, in order to prevent contamination by the fact that some study participants had been exposed to different treatment conditions before. The data analysis will present easy-to-interpret one-tailed difference-of-means t-tests as well as coefficients and standard errors from Tobit regressions (clustered by village) to take into account the censoring of the data at zero and full contributions and the dependency of errors within villages.

The tables below illustrate the proposed hypothesis tests, using the data from the first wave of data collection in Mpanda DC.

Hypothesis A.1:

	Treatment (capture possible)	Control (capture impossible)	Difference	P-Value (one-tailed)
Mean Contribution	0.52	0.63	-0.11*	0.042
	(1) (2)			
	Contribution to the Public Good			
Possibility of capture	-0.108 ⁺ (0.0632)	-0.131* (0.0557)		
Female		-0.0783 (0.0777)		
Age		0.00211 (0.00177)		
Years of Education		0.0147* (0.00635)		
Interviewer effects	no	yes		
Constant	0.626*** (0.0427)	0.670*** (0.134)		
Observations	66	66		
left-censored	0	0		
right-censored	0	0		

Standard errors in parentheses (clustered by village).

⁺ $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Tobit regression of the fraction of the endowment respondents contributed to the public good on an indicator of whether the possibility of capture existed (in the accountability game) or did not exist (in the public goods game).

Hypothesis A.2:

	Treatment (contributions)	Control (windfall)	Difference	P-Value (one-tailed)
Mean Personal Appropriation	0.37	0.54	-0.17*	0.022
	(1)	(2)		
	Capture of Group Money			
Money originates from contributions	-0.216* (0.0820)	-0.228** (0.0817)		
Female		0.105 (0.115)		
Age		-0.00407 (0.00359)		
Years of Education		-0.0210 (0.0153)		
Interviewer Effects	no	yes		
Constant	0.558*** (0.0649)	0.744* (0.284)		
Observations	58	58		
left-censored	8	8		
right-censored	6	6		

Standard errors in parentheses (clustered by village).

+ $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Tobit regression of the fraction of the group resource captured by the respondent on an indicator of whether the group resource originated from contributions by group members (in the accountability game) or from a windfall (in the group sharing game).

Implementation of the Data Analyses Proposed in the Pre-Analysis Plan

For methodological reasons, the data analysis strategy that has ultimately been used in this paper deviates in several respects from the data analysis strategy that has been proposed in the pre-analysis plan.

First, instead of reporting simple comparisons of means, the regressions reported in this paper allow for clustering of errors by villages and alternatively include village fixed effects. This is a more conservative approach, considering that study participants' beliefs about their co-villagers' behavior likely depend on shared experiences within the village. For reference, implementations of the simple difference-in-means tables from the pre-analysis plan are provided below in Table A.2.1.

Hypothesis 1				
	Treatment (capture possible)	Control (capture impossible)	Difference	P-Value (one-tailed Welch t-test)
Mean Contribution	0.50	0.57	-0.07**	0.0025

Hypothesis 2				
	Treatment (contributed)	Control (windfall)	Difference	P-Value (one-tailed Welch t-test)
Mean Embezzlement	0.37	0.41	-0.04	0.10

Table A.2.1: Implementation of comparison of means tables from the pre-analysis plan (using data from the co-villager condition, as in the pre-analysis plan).

Second, since the number of censored observations at zero/full contribution and zero/full embezzlement is low, simple OLS regressions were used, rather than Tobit regressions. The advantage of reporting OLS coefficients is that these are easier to interpret and the hypothesis tests are independent of modeling and distributional assumptions. For reference, Tobit coefficients are reported below in Tables A.2.2 and A.2.3, using data from the co-villager condition as in the pre-analysis plan.

	Contribution to the Public Good			
	(1)	(2)	(3)	(4)
Possibility of capture	-0.074** (0.027)	-0.080** (0.025)	-0.061* (0.027)	-0.061* (0.026)
Female		0.069* (0.028)		0.053+ (0.027)
Age		-0.00015 (0.00097)		0.00030 (0.0011)
Years of Education		.0042 (.0036)		0.0051 (0.0035)
Interviewer effects	no	yes	no	yes
Village Fixed Effects	no	no	yes	yes
Constant	0.57*** (0.021)	0.65*** (0.096)	0.65*** (0.065)	0.70*** (0.11)
Observations	338	338	338	338
left-censored	7	7	7	7
right-censored	22	22	22	22

Standard errors in parentheses (Columns (1) and (2): adjusted for clustering by village).

+ $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided)

Table A.2.2: Columns (1) and (2): Implementation of comparison Tobit regressions from the pre-analysis plan (using data from the co-villager condition). Standard errors in parentheses, adjusted for clustering by village. Columns (3) and (4): Inclusion of village fixed effects.

	Capture of Group Money			
	(1)	(2)	(3)	(4)
Money originates from contributions	-0.037 (0.033)	-0.016 (0.032)	-.064 ⁺ (0.035)	-0.037 (0.035)
Female		-0.097*** (0.027)		-0.087** (0.030)
Age		-0.0017 (0.0011)		-0.0023* (0.0011)
Years of Education		-0.0075 (0.0051)		-0.0060 (0.0060)
Interviewer Effects	no	yes	no	yes
Village Fixed Effects	no	no	yes	yes
Constant	0.40*** (0.029)	0.58*** (0.14)	0.27*** (0.016)	0.45*** (0.14)
Observations	328	328	328	328
left-censored	34	34	34	34
right-censored	8	8	8	8

Standard errors in parentheses (Columns (1) and (2) : adjusted for clustering by village).

⁺ $p < 0.1$ * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided)

Table A.2.3: Columns (1) and (2): Implementation of Tobit regressions from the pre-analysis plan (using data from the co-villager condition). Standard errors in parentheses, adjusted for clustering by village. Columns (3) and (4): Inclusion of village fixed effects.

Appendix A-3: Results Excluding Mpanda DC

In Mpanda DC, the data had been collection prior to submission of the pre-analysis plan. Although the choice of the two working hypotheses was theoretically motivated and not influenced by the initial data analysis, the credibility of the study is strengthened if the results from Mpanda DC can be replicated in the subsequent data collection (Tables A.3.1. and A.3.2).

<i>DV: Voluntary Contributions</i>				
<i>(as fraction of endowment)</i>				
	Excluding Mpanda DC		Only Mpanda DC	
	(1)	(2)	(3)	(4)
Embezzlement Possible	0.0057 (0.026)	0.012 (0.030)	0.069 (0.057)	0.043 (0.057)
Co-Villager	0.091** (0.030)	0.088** (0.029)	0.10 (0.067)	0.10 (0.064)
Embezzlement Possible × Co-Villager	-0.067 ⁺ (0.036)	-0.078 ⁺ (0.041)	-0.18 ⁺ (0.099)	-0.14 (0.094)
Constant	0.46*** (0.019)	0.51*** (0.072)	0.53*** (0.039)	0.56*** (0.12)
Village Fixed Effects		yes		yes
<i>N</i>	524	524	116	116

Standard errors in parentheses (Columns (1) and (3): adjusted for clustering by village).

⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided)

Table A.3.1: Experiment 1, excluding Mpanda DC. Excluding Mpanda DC does not alter the sign of the effects or the conclusions from hypothesis tests. Reported are OLS coefficients, with standard errors in parentheses. Columns (1) and (3): Standard error estimates are adjusted for clustering by village. Columns (2) and (4): Village fixed effects are included.

<i>DV: Embezzlement Decisions</i>						
<i>(as fraction of group resource)</i>						
	Excluding Mpanda DC			Only Mpanda DC		
	(1)	(2)	(3)	(4)	(5)	(6)
Contributed Resources	-0.071*	-0.073*	-0.100**	-0.13	-0.082	-0.13
	(0.033)	(0.033)	(0.036)	(0.079)	(0.10)	(0.11)
Co-Villager	-0.083**	-0.070*	-0.069*	0.062	0.080	0.074
	(0.026)	(0.032)	(0.032)	(0.057)	(0.10)	(0.10)
Contributed \times Co-Villager	0.060 ⁺	0.054	0.054	-0.039	-0.12	-0.12
	(0.033)	(0.043)	(0.044)	(0.066)	(0.14)	(0.14)
Expected Amount of Group Money			-0.10			-0.23
			(0.068)			(0.19)
Constant	0.47***	0.28***	0.36***	0.48***	0.32 ⁺	0.50*
	(0.021)	(0.050)	(0.069)	(0.060)	(0.17)	(0.23)
<i>N</i>	527	527	525	105	105	105

Standard errors in parentheses (Column (1): adjusted for clustering by village).

⁺ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided)

Table A.2.5: Experiment 2, excluding Mpanda DC. Excluding Mpanda DC does not alter the sign of the effect of voluntary contributions on embezzlement. However, in one respect, the results in Mpanda DC differ from those in Hanang and Mufindi Districts: In Mpanda DC, voluntarily contributed group resources are embezzled at significantly lower rates than windfall resources in the co-villager condition ($p = 0.009$, one-sided t-test, adjusted for clustering by village), but less so in the stranger condition ($p = 0.059$, one-sided t-test, adjusted for clustering by village). In Hanang and Mufindi districts, voluntarily contributed group resources are embezzled at significantly lower rates than windfall resources only in the stranger condition ($p = 0.021$, one-sided t-test, adjusted for clustering by village), but not in the co-villager condition ($p = 0.37$, one-sided t-test, adjusted for clustering by village). At the same time, in Hanang and Mufindi districts, embezzlement is significantly lower in the co-villager condition to begin with, due to negative co-villager bias. By contrast, in Mpanda DC there is *positive*, but statistically insignificant co-villager bias in the embezzlement of windfall resources, meaning that study participants are willing to embezzle windfall resources to a greater extent if these are shared among co-villagers, as opposed to strangers. The table reports OLS coefficients, with standard errors in parentheses. Columns (1), (2), (4) and (5): Standard error estimates are adjusted for clustering by village. Columns (3) and (6): Village fixed effects are included.

Appendix A-4: Sampling Procedure

The study was carried out in three districts in Tanzania: Mpanda DC (Katavi Region), Hanang District (Manyara Region) and Mufindi District (Iringa Region). These districts were chosen pur-

positively, based on geographic and cultural variation and the availability of existing ethnographic research about social dynamics at the village level. In each district, 16 villages were sampled at random.¹⁴ In Mpanda DC, eight adult residents per village were sampled for each decision exercise. Subsequently, in Hanang and Mufindi, the number of participants per decision exercise was increased to 16.

Unknown to their co-villagers, the village chairperson and the village executive officer (VEO) were also invited to participate in the decision exercises as well. The interviewers were instructed to approach the village leaders at the end of the data collection, to avoid biasing study participants' decisions by knowledge of their village leaders' participation. In this paper, the data from the village chairperson and the VEO has been excluded, and only data from randomly sampled adult residents has been used.

The sampling of the study participants was preceded by a listing of all households in each of the subvillages (*vitongoji*).¹⁵ The listing was carried out by village residents who were hired for this task, typically the chairpersons of the subvillages. To ensure that the listing was complete, public meetings were held at which everyone could verify their household's inclusion into the list. The listing agents knew about this in advance and therefore had an incentive to carry out a complete listing. The public meetings also served to inform the residents about the planned research activity, to answer questions, and to build enough trust that most residents felt comfortable volunteering to participate in the study.

In each village, the sample was stratified by subvillage, with sample sizes proportional to the number of households in each subvillage. Within each subvillage, households were sampled at random with equal probabilities of inclusion.¹⁶ In the sampled households, either a male or a female household

¹⁴In Hanang District, 12 out of a total of 68 villages were excluded from the sampling frame, because they were not covered by the National Agricultural Input Voucher Scheme (NAIVS), which was a requirement for a different component of the research project. In Mpanda DC, the local authorities of one village chose not to participate in the study. This village was replaced by a randomly selected village from the same ward.

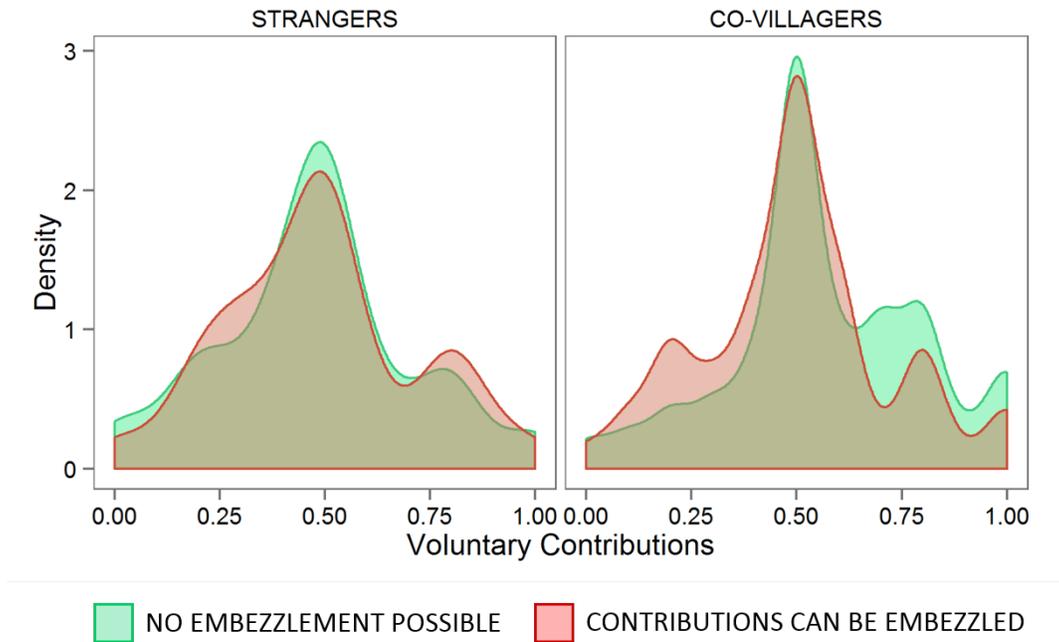
¹⁵In Mpanda DC, study participants were sampled from existing resident lists that were maintained by the village government. Many were updated recently in conjunction with the 2012 Census. While it did not appear that the quality and completeness of these lists was systematically related to governance outcomes in the village, the approach was nonetheless abandoned to prevent the risk of sampling bias.

¹⁶The sample was drawn at the public meeting, using a specifically programmed tablet computer application. The transparent demonstration of the process was a key measure to build trust in the villages and to prevent the spread

member between 18 and 70 years of age was invited to take part in the study, with the gender being chosen at random. If more than one person of the chosen gender met the selection criteria, then the person whose birthday was coming up soonest was invited. If no household member met the selection criteria and consented to participating in the study, then the household would be replaced by another randomly selected household from the same subvillage.

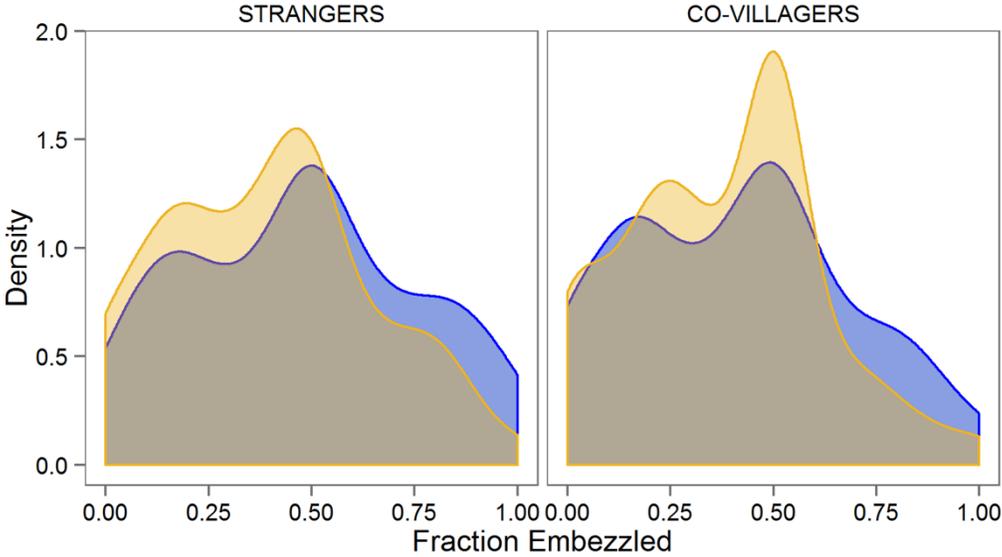
Appendix A-5: Distribution of Outcomes by Treatment Condition

Experiment 1: Voluntary Contribution Decisions



of false information about the study.

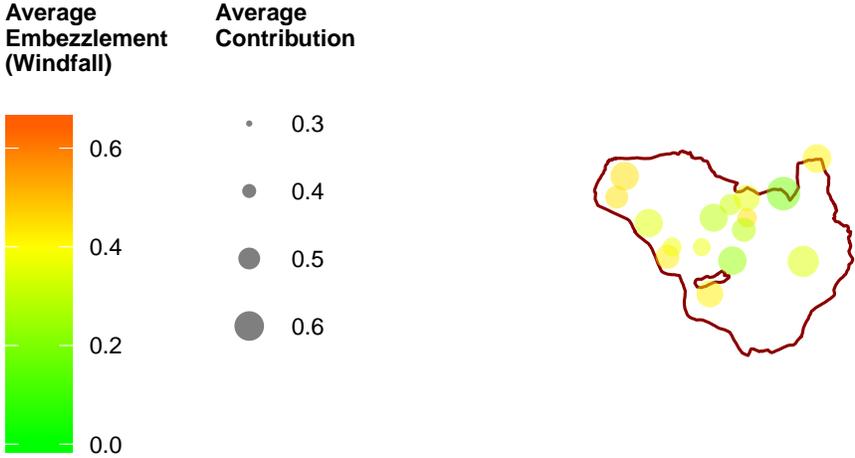
Experiment 2: Embezzlement Decisions



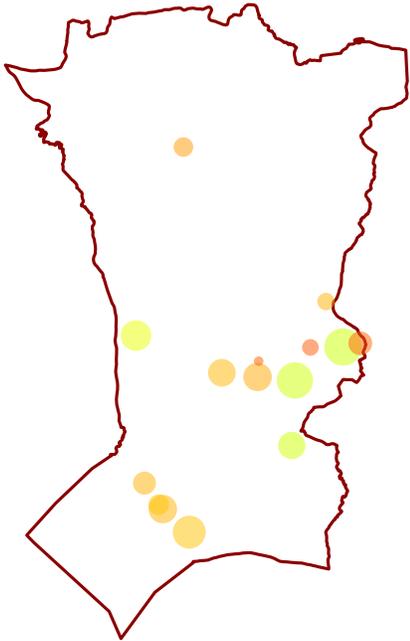
■ WINDFALL RESOURCES ■ VOLUNTARY CONTRIBUTIONS

Appendix A-6: Contributions vs. Actual Embezzlement Risk

Hanang District



Mpanda DC



Mufindi District

