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Framing and Minimum Levels in Public Good Provision

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Abstract

Using a laboratory experiment in the field, we examine how the choice architecture of framing a social dilemma – *give to* or *take from* a public good – interacts with a policy intervention that enforces a minimum contribution level to the public good. We find that cooperation is significantly higher in the give frame than in the take frame in our standard public goods experiment. When a minimum contribution level is introduced, contributions are significantly higher in the take frame since contributions are crowded out in the give frame but crowded in in the take frame. Our results therefore stress the importance of choosing the frame when making policy recommendations.

Keywords: Choice architecture, Framing, Public goods, Minimum level, Experiment, Ethiopia.

JEL Classification: C91, H41.

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1. Introduction

This paper focuses on the design of institutions that foster cooperation in the provision of local public goods, for example local environmental quality. Using lab-in-the-field experiments, we investigate the role of framing and minimum levels in public good provision in rural Ethiopia. These are two prominent institutional factors that policy makers can use in their role as choice architects.[1] Thaler and Sunstein (2009) coined the expression nudging to describe that the policy makers, i.e., choice architects, have the possibility to affect people's behavior and still respect freedom of choice, i.e., libertarian paternalism. The objective of our paper is to investigate the interaction effects between framing and minimum levels in a non-student and non-Western subject pool. Although previous experiments have shown that other institutions such as monetary punishment and exclusions are promising institutions to increase cooperation (e.g., see overview in Chaudhuri, 2011), we firmly believe that framing and minimum level are the institutions that are possible and easy to affect by policy makers, especially in developing countries. To our knowledge, this is the first study that experimentally explores the interaction between framing and formal institutions such as minimum levels in public good games.

Policy makers can affect cooperative behavior by changing the frame of a given cooperation problem, by choosing whether the activity should be designed in terms of giving to or taking from a public good. We frame public goods in terms of giving or taking and investigate the impact on cooperative behavior. Previous experimental literature on framing effects in social dilemmas has mostly focused on understanding the difference in behavior, and the results show more cooperation in give frames, or no difference,[2] despite the fact that individuals face the same fundamental economic problem in both frames (e.g., Andreoni, 1995; Cox, 2015; Dufwenberg, et al., 2011; Fosgaard et al., 2014; Khadjavi and Lange, 2015). However, our focus is on the relevance of framing for policy design, in particular concerning the interaction between framing and minimum levels in public good provision. Minimum levels are often imposed in order to secure some provision of a public good. For example, in developing countries it is common to provide local public goods directly through mandatory community-based labor exchange, with provision of the public good enforced without a formal institution,

[1] A neutral design does not exist. Any design choice a decision maker makes influence people's behavior, from the order of food choices on a menu to whether CO_2 compensation of a flight is by default included or not included in the flight price.

[2] For a summary of previous experiments on take and give frames, see Gächter et al. (2014). See also Cookson (2000).

through peer-pressure and social norms (Olken and Singhal, 2011; Ostrom, 1991). A minimum level should increase the total provision of the public good since any free rider is forced to contribute at least the announced minimum, and this in turn might make conditional cooperators increase their contribution since they want to cooperate if others cooperate and vice versa (e.g., Fischbacher et al., 2001). However, the minimum level could also result in crowding out, i.e., that individuals contribute less to the public good when the minimum level is imposed than when it is not imposed because the minimum level might send a signal of distrust to intrinsically cooperative agents. In this case the minimum level entails a "hidden cost of control" (Falk and Kosfeld, 2006; Ziegelmeyer et al., 2012).[3] Results from previously conducted experiments of minimum levels using the standard give frame, i.e., subjects are asked to give to the public good, are mixed regarding the effect of minimum levels on public good provision. For instance, Andreoni (1993) and Gronberg et al. (2012) find a positive effect of a minimum level on public good provision using concave payoff functions, Eckel et al. (2005) implement a dictator game with a charity as recipient and find that a minimum level crowds out donations to the charity when it is framed as a tax, and Kocher et al. (2016) use a linear public goods game and find instances of both crowding out and crowding in following the introduction of a minimum level.

The decision maker has the important role of being a choice architect. In order to use framing as a policy design tool it is helpful to distinguish between situations where it is possible to meaningfully change the frame of a given cooperation problem and situations where the frame is simply a structural aspect of the cooperation problem. In the former case, changing the framing can be a policy tool in itself and hence an important design problem for a choice architect. For instance, cooperative behavior can be encouraged by using positive language (e.g., emphasize the positive effect of doing something which is good for the community) or negative language (e.g., emphasize the negative effect of doing something which is bad for the community), and the policy maker can also affect the design of the activity itself such that it involves either giving to or taking from a public good.[4] In the latter case, understanding framing as a structural aspect of the cooperation problem could be useful in the selection of other policy tools such as minimum levels. It is very important for policy makers to know

[3] See for instance Deci (1971, 1975) and Bowles and Polanía-Reyes (2012) for general discussions on crowding out of intrinsic motivation and control aversion.

[4] This is closely related to the literature on choice architecture. For instance, framing has been found to affect savings behavior (Brown et al., 2008), energy conservation (Gromet et al., 2013), and the impact of conditional incentives on worker productivity (Hossain and List, 2012) and teacher performance (Fryer et al., 2012).

whether minimum levels work differently for give and take frames when considering future choice architecture designs.[5] This is indeed the key motivation for exploring the interaction between framing and minimum levels.

Framing can influence how subjects conceive their own actions and others' actions (Tversky and Kahneman, 1981). In terms of our public goods game, actions are kind in the give frame ("to give") but unkind in the take frame ("to take"), and this possibly affects behavior. For instance, we might expect higher public good provision in the give frame because of reciprocity (since subjects reciprocate kind actions with kindness; Cox et al., 2008, 2013); or because of "warm glow," if subjects derive more utility from doing something good than from refraining from doing something bad (Andreoni, 1995).[6] However, if subjects care about what is socially appropriate, then we might instead expect higher provision in the take frame (since it is a less socially appropriate action to take than to give; Krupka and Weber, 2013). The minimum level could have an effect along some or all of these dimensions. It could for instance act as a signal or reference point, thus affecting subjects' view of what is socially appropriate and also their belief about what others are doing. These effects might differ depending on whether public good provision is framed as give or take. Moreover, the minimum level might be perceived as more lenient in the take frame since it is binding from above ("take at most") and thus someone who considers taking less than the imposed maximum might feel unaffected by this constraint; conversely, by contributing more than the imposed minimum in the give frame, one might feel that the part of the contribution stipulated by the mandatory minimum ("give at least") was a forced choice. Thus, the predicted net effects are difficult to pin down theoretically. Our experiments provide empirical evidence on the relationship between framing and minimum levels.

Our results are based on lab-in-the-field experiments in rural Ethiopia, where the subjects were farm household heads actively engaged in a number of public-good-like decisions such as environmental rehabilitation and the maintenance of local infrastructure. Thus, we also contribute to extending the conventional analysis of cooperation to a non-student and non-

[5] It is possible that both dimensions of framing as policy are applicable to the same cooperation problem. For example, the problem of labor contribution to a local public good can be considered as a structural give frame, while the problem of over-harvesting from a local public good can be considered as a structural take frame. It is however possible to highlight the positive and negative consequences of individuals' actions in each of the above problems.

[6] See also Cubitt et al. (2011), who find that subjects condemn free riding more strongly in give situations than in take situations.

Western subject pool (e.g., Henrich et al., 2010). This is especially important since societies across the world differ substantially in terms of social organization, trust, fairness norms, and also in the nature of day-to-day cooperation problems.[7] Results from developing-country subject pools like ours could therefore be particularly important both in examining the generalizability of experimental findings and in drawing conclusions about social dilemmas prevalent in such places. Moreover, our results provide information for the choice architecture of public goods projects. Fosgaard et al. (2014) were the first to implement a public goods game framed as either take-from or give-to in a non-student sample, namely a large-scale sample of the Danish population. Interestingly, their treatment effects differ from the majority of experiments using conventional student samples in that they find more cooperation in the take frame. We extend the analysis further by conducting experiments with more than 300 farmers in Ethiopia. We find strong effects of framing and minimum levels on cooperation. More precisely, we find that cooperation is significantly higher in the give frame than in the take frame in our standard public goods experiment. When a minimum contribution level is introduced, contributions are significantly higher in the take frame since contributions are crowded out in the give frame but crowded in in the take frame. Overall, the highest level of cooperation is observed in the give frame with no minimum level. Our results show the importance of framing for choice architects. Furthermore, our results could be important inasmuch as they point to situations where policy makers can increase the efficiency of interventions with simple and cost-efficient framing techniques combined with formal institutions such as minimum levels in public good provision. These interventions are easier to implement than other institutional features such as monetary punishment or exclusion. The rest of the paper is organized as follows. Section 3 describes the experimental design, Section 4 presents the results, and we provide concluding remarks in Section 5.

2. Experiment

2.1. Design

The primary focus of our paper is to investigate the effect of (i) framing phrased as either give to (GIVE) or take from (TAKE) the public good combined with (ii) a minimum level. We begin with a description of the framing of the public goods and then we explain how the

[7] See for instance Henrich et al. (2001) for cross-cultural comparisons of economic experiments in small-scale societies. See also Herrmann et al. (2008) and Vieder et al. (2015).

minimum level was implemented and finally how we tested for the effect on contributions to the public goods in both frames.

We implement a linear public goods experiment based on the design developed by Fischbacher et al. (2001), which in addition to eliciting unconditional contributions to public goods also uses the strategy method to elicit contributions to public goods conditional on others' average contributions.[8,9] We begin with a description of the public goods using the give frame, i.e., how much a subject would like to give[10] to a public good. This is the common way to phrase contributions in public goods experiments. Subjects are matched into groups of four, each with an endowment of 10 Ethiopian birr and the possibility to contribute any integer amount *c* from 0 to 10 Ethiopian birr to the public good. To facilitate understanding, we choose to use the real currency directly rather than an experimental currency.[11] The marginal per capita return from the public good is 0.5, i.e., a contribution of one unit results in 0.5 units of income for each of the four group members. This can easily be explained to the subjects by explaining that the total amount contributed to the public good is doubled and then split equally between the subjects. Since the marginal per capita return is 0.5 and the social marginal per capita return is 2, it is a dominant strategy for a payoff-maximizing individual to contribute nothing to the public good. However, it is socially optimal to contribute the whole endowment. The payoff for subject *i* is given by

$$\pi_i = 10 - c_i + 0.5 \sum_{j=1}^{4} c_j. \qquad (2)$$

The Fischbacher et al. design employs the strategy method. Subjects make two types of giving decisions, one unconditional and one conditional. In the unconditional decision, subjects decide how much they wish to give to the public good without knowing anything about

[8] For a discussion on the validity of using the strategy method to elicit cooperative preferences, see, e.g., Fischbacher et al. (2012). For a general discussion on the policy implications of results from public goods experiments, see Gächter (2007). For other experiments based on this design, see, e.g., Fischbacher and Gächter (2010), Herrmann and Thöni (2009), Kocher et al. (2008), Martinsson et al. (2013), and Martinsson et al. (2015). See also Rustagi et al. (2010) and Kosfeld and Rustagi (2015) for interesting applications to the management of forest commons in Ethiopia.

[9] We chose a design with linear rather than concave payoff functions (e.g., Andreoni, 1993) since it facilitates understanding and the use of the strategy method, which we think is important. This means that the minimum level is set above rather than below the Nash equilibrium of zero contribution, which makes the welfare effect of the minimum level more salient.

[10] To facilitate understanding, we deliberately use the word "give" instead of "contribute" when we write about the GIVE and TAKE treatments.

[11] In our Ethiopian case, this worked particularly well since the value of Ethiopian birr matched well with the opportunity cost we intended to use. The experiment with two stages was calibrated to give on average almost a daily salary (30 birr).

anybody else's contributions. In the conditional decision, each subject decides on the amount to give conditional on the average amount given by the other three group members. This is implemented by each subject stating how much she/he would give to the public good for each possible average amount given (in integers) by the others in the group ranging from 0 to 10.

To make the decisions incentive compatible, the unconditional decision will be payoff relevant for three randomly selected group members, and by using the average unconditional amount given (rounded to the next integer) by them, the amount given by the fourth member is determined as his or her conditional giving matching that specific average amount. Payoffs are then calculated based on these amounts.

In the take frame, the decision is framed as how much a subject would like to take from the public good. We follow standard procedures in the framing literature when we implement this frame (e.g., Andreoni, 1995; Fosgaard et al., 2014). In this treatment, subjects are not endowed with 10 Ethiopian birr as in the give frame. Instead, the public good consists of 4×10 = 40 Ethiopian birr and subjects decide on the (integer) amount *w* from 0 to 10 birr that they wish to take from the public good. The payoff function for subject *i* is given by

$$\pi_i = w_i + 0.5\left(40 - \sum_{j=1}^{4} w_j\right). \qquad (3)$$

The incentives are exactly the same across GIVE and TAKE since equations (2) and (3) describe the same underlying payoff function and only differ in how it is framed.

In addition to testing for framing effects, we investigate the effect of introducing a minimum level in each frame. In the give frame, subjects must give at least the announced minimum level of 2 Ethiopian birr, which corresponds to 20% of the endowment. We follow Andreoni (1993) and present the minimum level as a restriction on individuals' choice set. For instance, conditional giving is elicited by subjects making eleven giving decisions (one for each possible integer average amount given by the others in the group); when the minimum level of 2 Ethiopian birr has been implemented, subjects make nine giving decisions instead of eleven and they know that they are not allowed to give less than 2 Ethiopian birr. In the take frame, where the procedures are exactly the same with the exception that the game is presented as take-from rather than give-to the public good, subjects must not take more than an announced amount of 8 Ethiopian birr, and hence leave at least 2 Ethiopian birr in the public good.

In the experiment, subjects participate in sessions with public goods experiments framed as TAKE or GIVE and within each session they complete two stages. The first stage (Baseline) is a standard public goods experiment. It is followed by a second stage (MCL) which is a public goods experiment with an imposed minimum contribution level.[12] We use stranger matching, i.e., they are re-matched with three new group members in the second stage, and as described above a subject makes two types of decisions (unconditional and conditional) in each stage. They are paid for their decisions in both stages but learn nothing about the decisions of others in the group until they are paid some days after the experiment.

2.2. Procedural details

The experiment was conducted in 2013 in rural Ethiopia. It was a separate module of a household survey on community forestry that covered 15 villages scattered across the four major regions of the country. We ran experiments in eight of these villages.[13] In each region we first randomly selected two villages from each region. Then one of the two villages was randomized into the give treatment and the other into the take treatment.[14] With randomization of treatments at the regional level, we obtain a balanced sample where the regional mix of subjects is similar across the treatments. This is to ensure that our results are not driven by regional differences, which could be quite large given the wide (and diverse) geographical area covered.

In each village, households were randomly selected for participation in the survey. The household heads were interviewed in their respective houses in private by a trained enumerator. At the end of the household survey, they were asked if they would like to participate in an economic experiment. All household heads covered in the survey agreed to participate in the experiment. The experiment was conducted face-to-face similar to in for example Henrich et al. (2001). The above described public goods experiment was clearly described to the subjects, who after a number of comprehension questions completed both stages of the experiment. Subjects were informed that similar experiments had or would take

[12] We do not test for order effects and the reason is that the order we impose is natural in most cases, in the sense that we are interested in the effect of a minimum level when subjects are experienced with the baseline, which is a voluntary contribution mechanism in the form of either take-from or give-to the public good. This is what typically happens in reality: a public goods problem is identified and a remedy is sought and implemented.

[13] The 15 villages in the household survey were selected on the basis of certain criteria, including the extent of forest cover, product diversity, and year and purpose of establishment of the community forestry program.

[14] Randomization of treatments within a village was not feasible since the experiments had to be rolled out over the course of several days and thus mixing treatments within a village would risk that subjects learn about this variation.

place in other households in their village and that they would be randomly and anonymously matched against other household heads in their village. They were also informed that payments would be distributed on a specific date and that this procedure was the same for everybody else participating in the experiment.[15] The enumerators were trained to carefully explain and demonstrate the structure of the experiment according to a script, and they knew the importance of doing so in a neutral manner.[16] A total of 360 subjects participated in the experiment, 180 in each treatment.

3. Results

Table 1 presents descriptive statistics of the sample. As can be seen, about 90% of the household heads are males and over 50% are literate. Farming is the predominant activity for the households and the total size of parcels for own cultivation is slightly over 4 acres.

Table 1. Descriptive statistics of subjects (household heads) separated by treatment.

	GIVE	TAKE	H_0: No difference between GIVE and TAKE (*p-value*[*])
Age	49.0	46.0	0.03
Male	87.2%	90%	0.40
Can read and write	51.1%	50.6%	0.92
Farming is main activity	91%	91%	0.86
Trust Kebele	2.51	2.46	0.56
Off-farm labor	23%	28.3%	0.23
Household size	7.0	6.8	0.40
Parcel size (acres)	4.56	4.17	0.38
Has savings	19.4%	23.3%	0.37
Remittances	7.8%	10.6%	0.36
Observations	180	180	

Note: [*]Mann-Whitney U test. *Trust Kebele:* Kebele is the smallest administrative unit in Ethiopia and the question is phrased, "Most people who live in your Kebele can be trusted" (1 = agree fully, 5 = disagree fully); *Off-farm labor:* at least one household member worked off the farm at least once during last year; *Parcel size:* the size of the household's land used for own cultivation; *Remittances:* the household received a remittance during last year.

When comparing the socio-economic characteristics between the treatments, there is no statistical difference based on non-parametric tests, except that subjects in the TAKE

[15] We established a credible procedure through the involvement of the Kebele leader in the organization of the experiments, and also by running the experiments, which were approved by the national government, through the Ethiopian Development Research Institute.

[16] The instructions are available from the authors upon request.

treatment are statistically significantly younger at the 5% level (49.0 years vs. 46.0 years; Mann-Whitney U-test; $p = 0.03$). However, we do not consider this average difference of 3 years to be of any economic significance. Overall, the randomization of subjects into treatments seems to have worked well.

Next, we turn to the impact of framing on unconditional contributions. For ease of comparison, we will mostly refer to "contributions" also in the take frame, and by this we mean the *effective contribution*, i.e., $10 - w_i$, where w_i is the amount withdrawn from the public account. The results are presented in Table 2. Subjects in the GIVE treatment contribute on average 5.02 birr out of the endowment of 10 birr, i.e., 50.2%, whereas the average contribution in the TAKE treatment is 40.0%. In standard one-shot linear public goods games, average voluntary contributions (and normally a give frame is used) usually range from 40% to 60% of endowments (see, e.g., Chaudhuri, 2011). The difference between the two treatments is significant at the 1% level (Mann-Whitney U-test; $p < 0.01$). Furthermore, there is a substantial difference across treatments in the share of subjects opting for free riding by contributing nothing and full contribution, respectively. In the GIVE treatment, 2.2% of the subjects contribute nothing and 7.8% contribute their full endowment. In the TAKE treatment, 19.4% opt to free ride and only 1.1%, i.e., two subjects, contribute the whole endowment. At both ends of the spectrum – zero and full contribution – there is a highly significant difference in proportions between the treatments (Kruskal-Wallis tests; $p < 0.01$ in both cases). These results are in line with other experiments and thus we replicate the pattern of higher contributions in the GIVE frame using a non-standard subject pool, namely farmers in Ethiopia. Interestingly, the stark difference in proportion of free riders between the frames is remarkably similar to the results in Andreoni (1995).

Table 2. Effect of framing on unconditional contributions in the baseline.

	Average	Contributes nothing	Contributes everything
GIVE ($n = 180$)	5.02 (2.15)	2.2%	7.8%
TAKE ($n = 180$)	4.00 (2.44)	19.4%	1.1%
p-value	< 0.01[a]	< 0.01[b]	< 0.01[b]

Note: Standard deviations in parentheses. n = number of subjects. [a] Mann-Whitney U test. [b] Kruskal-Wallis test.

Result 1. *The average contributions are significantly higher and the proportion of free riders is significantly lower in the GIVE frame.*

We implement a minimum level in both frames and the results are presented in Table 3. In the GIVE treatment, the minimum level has a negative effect on contributions: the average contribution decreases from 5.02 birr to 4.46 birr, i.e., by 0.56 birr, which corresponds to 5.6 percentage points in terms of the initial endowment, and this difference is significant at the 1% level (Wilcoxon signed-rank test; $p < 0.01$). Conversely, in the TAKE treatment the average contribution increases from 4.03 birr in the baseline to 4.74 birr after the introduction of the minimum level, which corresponds to a 7.1 percentage point increase (Wilcoxon signed-rank test; $p < 0.01$). The contributions are significantly different between the two treatments at the 10% level (Mann-Whitney U-test; $p = 0.08$).

Table 3. Effect of a minimum level on unconditional contributions (separated by treatment).

	Baseline	MCL	*Difference*	*p-value*
GIVE (n = 180)	5.02 (2.15)	4.46 (1.98)	-0.56	< 0.01[b]
TAKE (n = 177)	4.03 (2.44)	4.74 (2.06)	+0.71	< 0.01[b]
p-value	< 0.01[a]	0.08[a]	< 0.01[a]	

Note: Standard deviations in parentheses. n = number of subjects. [a] Mann-Whitney U test. [b] Wilcoxon signed-rank test (H_0: *Difference* = 0). Three subjects in the TAKE treatment report unfeasible contributions in MCL and we thus exclude them from the analysis.

Result 2. *When a minimum level is introduced in the GIVE frame, contributions to the public good decrease significantly; in contrast, when a minimum level is introduced in the TAKE frame, contributions increase significantly. Thus, the framing has a substantial effect on the efficiency of minimum levels.*

We provide more detailed information regarding the effect of the minimum level in Table 4, which is a disaggregation of the results in Table 3. For the baseline contributions, subjects are split into three categories: below, at, and above the minimum level of 2 birr. For contributions in the second stage, i.e., when the minimum level is implemented, subjects are separated into those who precisely match the minimum level of 2 birr, and those who contribute above it. This results in six possible contribution profiles, and thus we can obtain richer information on how different groups of subjects react to the minimum level and how these reactions differ between the two treatments. The top two rows of Table 4 make it clear that the effect along the extensive margin is much stronger in the TAKE treatment. Here, the minimum level has a direct effect on 22% of the subjects who contributed less than 2 birr in the baseline, compared with only 4% of the subjects in GIVE. Interestingly, however, in the TAKE treatment about half of the subjects who contributed less than 2 birr in the baseline, i.e., 10% of the total number of subjects in this treatment, substantially increase their contribution in the second

stage, on average from 0.6% of the endowment in the baseline to 57.1% when the minimum level has been implemented. Hence, they are strongly crowded in. Looking at the bottom two rows of the table, we can see that the majority of subjects contribute more than 2 birr in the baseline in (89% in GIVE and 74% in TAKE). When the minimum level is introduced, some of these subjects reduce their contribution all the way down to the postulated minimum and this effect is similar across treatments. Still, the majority of subjects in both treatments voluntarily contribute above the imposed minimum level and herein lays the main source of difference between the treatments, since subjects in the GIVE treatment on average decrease their contributions whereas those in the TAKE treatment instead increase their contributions.

Table 4. Disaggregation of the effect on unconditional contributions.

Contribution profile	GIVE			TAKE		
(Baseline, MCL)	Share of subjects	Baseline contr.	MCL contr.	Share of subjects	Baseline contr.	MCL contr.
(<2, =2)	(2%)	0.33	2.00	(12%)	0.14	2.00
(<2, >2)	(2%)	0.50	3.75	(10%)	0.06	5.71
(=2, =2)	(4%)	2.00	2.00	(2%)	2.00	2.00
(=2, >2)	(3%)	2.00	4.50	(2%)	2.00	6.00
(>2, =2)	(8%)	4.90	2.00	(10%)	5.82	2.00
(>2, >2)	(81%)	5.60	4.90	(64%)	5.21	5.56

Note: The share-of-subjects columns show the frequency of subjects who contributed according to the profile described in column one. The cells show the average contribution to the public good in the baseline and in MCL among subjects who behave according to this pattern, for GIVE and TAKE, respectively.

Using the full sample, we summarize subjects' reactions along the intensive margin by looking at the extent to which the average subject is crowded in, by voluntarily increasing their contribution, or crowded out, by voluntarily decreasing their contribution, when the minimum level is imposed. We calculate the average difference between subjects' baseline contribution and their contribution when the minimum level has been imposed, counting only the contributions that are above 2 birr, which is the minimum level in both cases, but averaging over all subjects in each treatment.[17] Subjects in the GIVE treatment are crowded out by an average of 0.63 birr (Wilcoxon signed-rank test; $p < 0.01$) while subjects in the

[17] Mechanically, we follow Falk and Kosfeld (2006) and proceed as follows. First, baseline contributions below the minimum level are manually adjusted up to this level. Then we test whether the average difference between MCL and baseline contributions is different from zero using all subjects (the average difference is zero for contribution profiles in rows 1 and 3 of Table 4). A positive difference implies crowding in and a negative crowding out.

TAKE treatment are crowded in by an average of 0.31 birr, yet this effect is only significant at the 10% level (Wilcoxon signed-rank tests; $p = 0.08$). These two effects are statistically different from each other at the 1% level (Mann-Whitney U test; $p < 0.01$), which means that subjects act differently along the intensive margin in GIVE and TAKE. Among the subjects who already contributed above 2 birr in the baseline, 56% are crowded out and 17% are crowded in in the GIVE treatment, whereas 38% are crowded out and 35% are crowded in in the TAKE treatment. The average crowding-out effect in GIVE within this subsample is 0.85 birr, which is significant at the 1% level (Wilcoxon signed-rank test; $p < 0.01$). In the TAKE treatment, the crowding-in effect we found when looking at the full sample does not exist within this subsample and instead there is a weak but insignificant crowding-out effect of 0.19 birr (Wilcoxon signed-rank test; $p = 0.49$).

Result 3. *The minimum level significantly crowds out voluntary contributions to the public good in the GIVE frame but weakly crowds in contributions in the TAKE frame.*

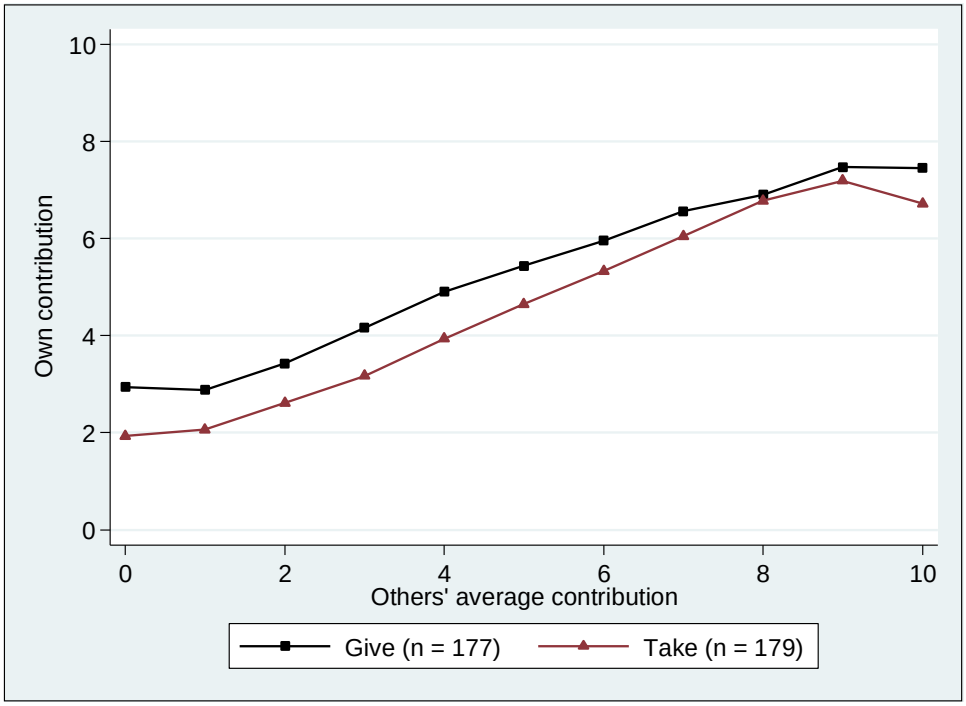
The other part of the public goods experiment elicited conditional contributions following Fischbacher et al. (2001). Subjects stated their contribution for each possible average contribution of the other group members and we can thus investigate the impact of framing and minimum levels on subjects' contribution strategies. Figure 1 displays average conditional contributions in the baseline for both treatments. The positive slope suggests that subjects are on average conditional cooperators, i.e., they contribute more when the other group members contribute more. The contribution schedule in the GIVE frame consistently lies above the schedule in the TAKE frame, which is in line with the theoretical prediction since a given outcome, e.g., the others contribute nothing to the public good, reveals less generosity in TAKE than in GIVE and is thus met with comparatively more negative reciprocity.

Figures 2 and 3 illustrate the main effect of introducing the minimum level. Interestingly, the minimum level seems to have little overall effect on subjects' contribution strategies; only in TAKE and at low levels of others' public good contributions is there a marked difference, but the schedules gradually converge. Table 5 provides further information. In column 1, individual contributions in the baseline are regressed on others' average contribution, a treatment dummy, and an interaction term between the two.[18] The estimated intercept – own

[18] We report from OLS regressions in Table 5 but a Tobit model gives similar results.

contribution conditioned on the others contributing nothing to the public good – is 2.68 birr in the base category, i.e., the GIVE treatment.

Figure 1. Average conditional contributions in the baseline (separated by treatment).

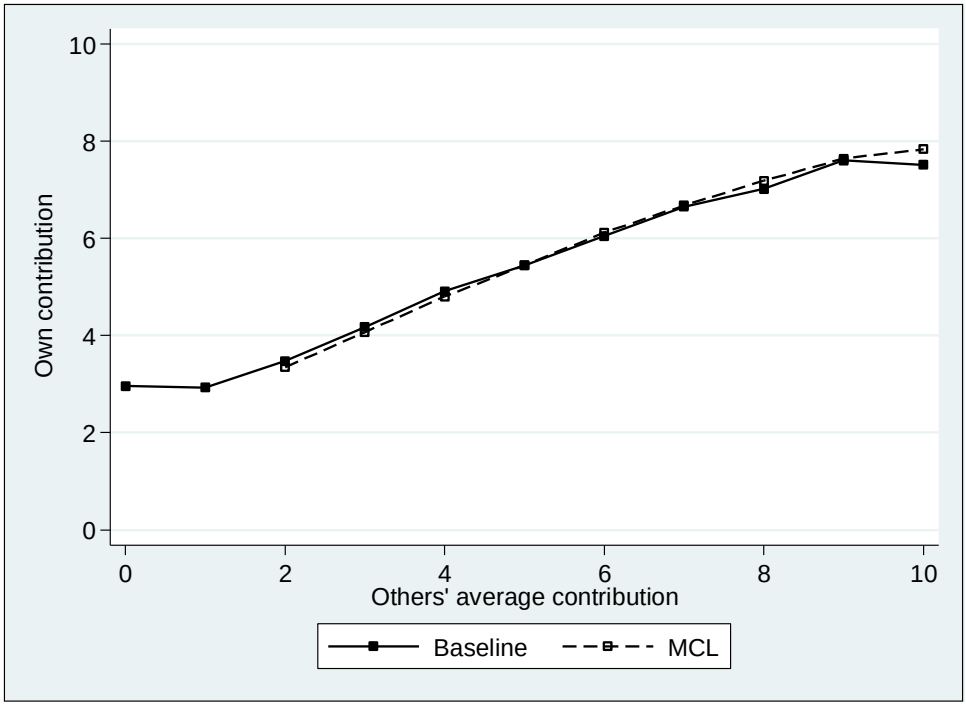


Note: One subject in the GIVE treatment and three subjects in the TAKE treatment either did not complete the contribution table or reported unfeasible numbers. These four subjects are excluded from the analysis.

The TAKE dummy identifies the difference in constant compared with the GIVE treatment. The difference is 1.01 birr less, which is significant at the 1% level. The interaction term captures the difference in slope compared with the GIVE treatment. It is statistically significant (steeper in TAKE) but the point estimate of 0.06 is small in both absolute economic terms and compared with the estimated slope in GIVE, which is 0.52 birr. By and large, the strong framing effect regarding baseline contributions to the public good thus prevails when we assess subjects' contribution strategies by allowing them to condition their contribution on the other group members' contributions.[19] In column 2, the specification is the same but concerns contributions after the minimum level has been implemented.

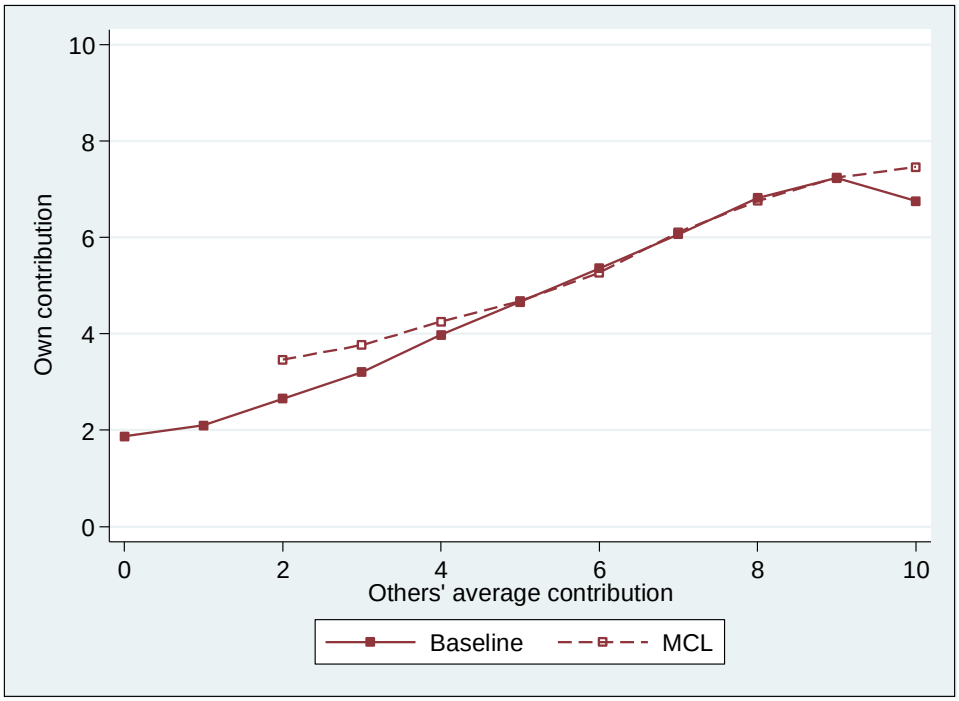
[19] We can see in the table that there is a positive effect of others' average contribution on individuals' own contribution to the public good and this indicates that subjects on average are conditional cooperators. Another way to investigate this is to look at the correlation between subjects' unconditional contributions and their beliefs about others' unconditional contributions, which is similar to the information we get from the contribution table except for the additional uncertainty that subjects face concerning the accuracy of their beliefs. Regressing unconditional contributions on beliefs yields a positive effect that is significant at the 1% level in three of the four treatment combinations (it is insignificant in the TAKE treatment with a minimum level).

Figure 2. Average conditional contributions in GIVE (n = 168).



Note: Twelve subjects in this treatment reported unfeasible conditional contributions after the introduction of the minimum level and are therefore excluded from the analysis.

Figure 3. Average conditional contributions in TAKE (n = 172).



Note: Eight subjects in this treatment reported unfeasible conditional contributions after the introduction of the minimum level and are therefore excluded from the analysis.

The main difference compared with the regression in column 1 is that both the TAKE dummy and the interaction term are insignificant, which means that there is no difference in contributions between the two treatments. The regression in column 3 is a difference-in-difference specification and captures how the effect of introducing a minimum level compares across the GIVE and TAKE treatments. The MCL dummy and the interaction with the slope variable (Others) capture the effect of the minimum level in the GIVE treatment. The effect on the constant is an insignificant -0.26 birr and the effect on the slope is significant but not very large. The point estimate on TAKE×MCL captures the difference-in-differences in constant between TAKE and GIVE: when a minimum level is introduced, the effect on the constant is 0.74 birr stronger in TAKE than in GIVE. Interestingly, however, the difference in the effect on the slope goes in the other direction: when the minimum level is introduced, the effect on the slope of the contribution schedule is 0.09 birr weaker in TAKE than in GIVE.

Table 5. Effect of framing and minimum level on cooperative preferences (OLS regression).

Dependent variable: conditional contribution	Baseline (1)	MCL (2)	Full sample (3)
Constant	2.68 (0.16)***	2.45 (0.15)***	2.70 (0.17)***
Others	0.52 (0.03)***	0.58 (0.03)***	0.53 (0.03)***
TAKE	-1.01 (0.25)***	-0.30 (0.24)	-1.02 (0.26)***
TAKE × Others	0.06 (0.04)***	-0.03 (0.04)	0.06 (0.04)
MCL			-0.26 (0.16)
MCL × Others			0.05 (0.02)**
TAKE ×MCL			0.74 (0.22)***
TAKE ×MCL × Others			-0.09 (0.03)**
Observations	3916	3096	6800
- Clusters	356	344	340

Note: Robust standard errors clustered on individuals (in brackets). *Others* is the average contribution of the others in the group. *TAKE* is a treatment dummy and *MCL* is a dummy for the second stage public goods game (when the minimum level is imposed). The dependent variable is individual i's conditional contribution. *** denotes significance at the 1% level, ** significance at the 5% level, and * significance at the 10% level. Four subjects either did not fill out the contribution table or reported unfeasible contributions in the baseline and these subjects are excluded from the analysis in (1). A further sixteen subjects made a similar mistake after the introduction of the minimum level and thus sixteen and twenty subjects are excluded from the analysis in (2) and (3), respectively.

Result 4. *The framing has a substantial impact on subjects' contribution strategies. When subjects can condition their decisions on the other group members' contributions, they contribute significantly more in the baseline GIVE frame than in the baseline TAKE frame. To some extent, the framing also has an effect on the efficiency of minimum levels on subjects' contribution strategies.*

Using the Fischbacher et al. design further enables us to classify subjects into contribution types following the convention introduced by these authors. We thus consider subjects as either conditional cooperators, free riders, hump-shaped contributors, or others. We define types as follows: conditional cooperators either have a weakly increasing conditional contribution schedule, or their Spearman's rho (correlation with the others' average contribution) is positive and significant at the 1% level; free riders always contribute the lowest amount allowed; hump-shaped contributors display a positive Spearman correlation up to their highest contribution, whereafter the correlation is negative (both correlations should be significant at the 1% level); others do not fit into any of these categories. The distribution of contribution types is displayed in Tables 6 and 7. We can see that the distribution is stable: the baseline type distribution is not significantly different between the GIVE and the TAKE treatment (Kruskal-Wallis test; $p = 0.70$), and, furthermore, 76% of subjects in the GIVE treatment and 74% in the TAKE treatment are classified as the same type in the baseline as in MCL (observations on the diagonal in either table).[20]

Table 6. Distribution of contribution types in GIVE ($n = 168$).

Baseline \ MCL	Conditional cooperators	Min-level ("free riders") (=2)	Hump-shaped	Others	Total
Conditional cooperators	56.55%	1.19%	0.00%	9.52%	67.26%
Free riders (=0)	0.00%	0.60%	0.00%	0.00%	0.60%
Hump-shaped	0.00%	0.00%	0.00%	1.19%	1.19%
Others	0.60%	0.60%	1.79%	19.05%	30.95%
Total	66.07%	2.38%	1.79%	29.76%	100%

Note: Type definition follows Fischbacher et al. (2001). Conditional cooperators: increasing schedule or positive Spearman's rho (correlation with others' average contribution) at 1%; Free riders: contribute the lowest amount allowed; Hump-shaped: positive (negative) Spearman correlation at 1% up to (beyond) their highest contribution. Twelve subjects in this treatment report unfeasible conditional contributions after the introduction of the minimum level and are therefore excluded from the analysis.

[20] Thus, in neither treatment is the distribution significantly altered following the introduction of a minimum contribution level (Kruskal-Wallis tests; $p = 0.70$ in GIVE and $p = 0.18$ in TAKE). However, the MCL type distributions do differ between frames (Kruskal-Wallis test; $p = 0.04$).

Table 7. Distribution of contribution types in TAKE (n = 172).

Baseline \ MCL	Conditional cooperators	Min-level ("free riders") (=2)	Hump-shaped	Others	Total
Conditional cooperators	47.09%	0.00%	0.00%	13.37%	60.47%
Free riders (=0)	1.16%	1.74%	0.00%	0.00%	2.91%
Hump-shaped	1.74%	0.00%	0.00%	2.33%	4.07%
Others	5.23%	0.58%	1.16%	25.58%	32.56%
Total	55.23%	2.33%	1.16%	41.28%	100%

Note: Type definition follows Fischbacher et al. (2001). Conditional cooperators: increasing schedule or positive Spearman's rho (correlation with others' average contribution) at 1%; Free riders: contribute the lowest amount allowed; Hump-shaped: positive (negative) Spearman correlation at 1% up to (beyond) their highest contribution. Eight subjects in this treatment report unfeasible conditional contributions after the introduction of the minimum level and are therefore excluded from the analysis.

Result 5. *The distribution of contributor types is stable. Neither across the two frames in the baseline nor within each frame with respect to the implementation of a minimum contribution level do contributor type distributions differ significantly.*

4. Conclusion

Contribution to public goods is an important issue for policy makers. In their role as policy makers, however, they have the possibility to act as choice architects. Two institutional factors they can affect fairly easily are whether to frame public goods in terms of giving or taking, and also whether or not to impose a low compulsory minimum level of contributions. These factors are easier to implement than other institutional features such as monetary punishment and exclusion. Our focus is on the relevance for policy design and we conduct our public goods experiments as a lab-in-the-field experiment in rural Ethiopia. The objective of our paper is to investigate the interaction effects between framing and minimum levels.

We find a strong frame dependency in the efficiency of minimum levels. Overall, we find the highest contributions in the give frame without a minimum level. In the standard public goods experiment, the give frame results in significantly higher contributions than the take frame. When the minimum level is introduced, the contribution levels between the frames are

reversed and the levels are significantly higher in the take frame. Cooperation is crowded out in the give frame but crowded in in the take frame.

The paper makes several contributions. First, some real-life cooperation problems might exhibit the aspects of the give frame whereas other problems might instead resemble the take frame. For example, the problem of labor contribution to a local public good can be considered a give frame, while the problem of over-harvesting from a local public good can be considered a take frame. Our results indicate that introducing minimum levels in order to curb underinvestment in local public goods is an efficient policy only in the latter case, despite the fact that individuals face the same underlying economic problem in both frames. Furthermore, this finding highlights the potential importance of framing lab experiments in accordance with the structural aspects of the real-life cooperation problem that we as researchers are trying to address. This is a question of external validity and could be relevant to the literature that examines institution formation, policy interventions, and the general impact of incentives on cooperation in public goods experiments, since these results almost exclusively rely on experiments using the give frame (rather than the take frame). Second, changing the framing can sometimes be a policy tool in itself. Our results indicate that the success of a policy intervention, like the introduction of minimum levels in public goods provision, can depend on the manner in which the situation is framed (e.g., whether cooperative behavior is encouraged by focusing on aspects of doing good or avoiding harm). To the extent it is possible, policy makers in the role as choice architect should thus use the best frame in a given context and for a given policy intervention.

Framing and minimum levels are cheap and easy-to-implement local-level policy options, and they could be especially important in situations with comparatively weak centralized formal institutions. However, a potential drawback with a minimum level is the substantial heterogeneity in subjects' reactions to it. It is important to acknowledge the fact that the high proportion of free riders found in experiments using students as subjects has not been replicated to the same extent using non-student samples, making the case for pure efficiency gain of a minimum level weaker but a negative effect of crowding out more possible. We find a high share of conditional cooperators, which policy makers need to account for in their choice of policy instruments. For example, Rustagi et al. (2010) and Kosfeld and Rustagi (2015) implement novel experiments in rural Ethiopia and document the importance of conditional cooperation for successful management of forest commons. By using the design in Fischbacher et al. (2001), our study together with those two papers and the large-scale study

by Fosgaard et al. (2014) contribute to improve our knowledge about people's cooperative preferences in non-student subject pools.

There are potentially large gains in using simple policy regimes, especially in developing countries. Framing and minimum levels in public good provision are two such options. We analyze their interaction and impact on public good provision, looking at the net effects of implementing these institutions. The behavioral effects in our experiments are likely shaped by a combination of several mechanisms and an interesting avenue for future research would be to pin them down in more detail.

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