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The Effect of Nonbinding Agreements on Cooperation among Forest User Groups in Nepal and Ethiopia

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Abstract

This paper summarizes the results from public goods experiments investigating the effect of nonbinding agreements on cooperation. Unlike previous studies, this experimental study was conducted among members of forest user groups in Ethiopia and Nepal with long histories of social interdependence. These countries are also characterized by a high degree of collectivism. Overall, the results show a weak effect of nonbinding agreements on cooperation in the two locations. The main reason for this is that the cooperation level is relatively high even without an agreement and only a small proportion of subjects change their behavior when the agreement option is introduced. Nonetheless, the research indicates that the willingness to enter an agreement varies between subjects and strongly correlates with their cooperativeness.

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The Effect of Nonbinding Agreements on Cooperation among Forest User Groups in Nepal and Ethiopia

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1. Introduction

Much of what we have learned about cooperation stems from laboratory public goods experiments. In the standard version of these experiments, players are endowed with a certain amount of money or tokens that they can contribute to a joint project. The total contributions to the project are then increased by the experimenter and redistributed equally to the group members irrespective of their contributions, replicating the key features of a public good. While efficiency requires everyone to contribute to the public good, individual incentives are such that each player gains monetarily if she keeps the endowment for herself. Numerous versions of the experiment have been used. For instance, settings have been created where players can punish each other in various ways, ranging from monetary and verbal punishment to outright exclusion from the group. A key result of this literature is that subjects are very sensitive to the rules of the experiment. Many of them are conditionally cooperative, i.e., they are willing to cooperate if they know or expect that others will do the same (e.g., Fischbacher *et al*., 2001; Kelley and Stahelski, 1970; Keser and van Winden, 2000; Rabin, 1993). Cooperation has empirically been shown to sustain if the conditional cooperators are provided with a mechanism to discipline or exclude the free-riders. When these options are unavailable, cooperation is much lower and deteriorates over time (e.g., Chaudhuri, 2011; Zelmer, 2004).

Most of these public goods experiments have been conducted with students from Western democratic countries characterized by a high degree of education, wealth, industrialization, and individualism.[1] Recent experiments investigating whether these results can be replicated in other regions of the world have found large heterogeneity in cooperative

[1] For a discussion on subject pools see, e.g., Henrich *et al*. (2010).

behavior. For example, Herrmann *et al*. (2008) find large cross-societal variation in the use of anti-social punishment, i.e., punishment of non-cooperative behavior. Gächter and Herrmann (2011) fail to find a cooperation-enhancing effect of punishment in their experiments with urban and rural participants from the Russian Federation.

The present study contributes to this literature by investigating the effects of pre-play communication on cooperation among members of forest user groups in Nepal and Ethiopia. We conduct an artifactual field experiment to keep the task similar and allow for comparisons with lab experiments, i.e., we also use a public goods experiment, but unlike the previous studies we use naturally occurring groups. That is, we go beyond the case of using artificially created ad-hoc groups in a laboratory setting without history of social interdependence and investigate issues of public good cooperation in rural areas of Ethiopia and Nepal. In such contexts, markets are often thin and households often depend on social ties to substitute for the arm's-length market transactions and government support observed in high-income countries. For example, when disaster strikes in high-income countries, formal insurance contracts are likely to be in place to help the victims cope with the damages, while in rural areas of low-income countries like Ethiopia and Nepal, people are much more likely to rely on family, friends, and neighbors. These interdependencies imply that such relationships are very valuable and well established. Since there is limited mobility, these interdependencies may span many years and even generations.

The management of natural resources is one area where cooperation is particularly important. Often these resources, which include forests, grazing land, water, and fish, are essentially public goods or common pool resources. Monitoring and enforcement of rules are often difficult and group members may have to rely on voluntary cooperation of their fellow group members for long periods of time until monitoring is possible. A natural way of

management is to agree on a set of rules and nonbinding agreement is a frequently applied rule.

In our public goods experiment, we capture the idea of a nonbinding cooperative agreement in the simplest way. Before the players choose their contributions to the public good, they decide whether or not to enter an agreement. The agreement requires all members to contribute the full amount to the public good, yet only forms if all players have agreed to enter. To measure the players' unconditional cooperativeness, they are also asked to announce their intended contribution should the agreement not form.

Previous experiments investigating nonbinding agreements in the lab indicate that subjects are very sensitive to the precise design of the agreement. For example, the possibility to form an agreement greatly improves cooperation when the agreement is made face-to-face or when it is combined with a punishment opportunity. Players' willingness to enter an agreement and comply with it crucially depends on the decisions made by the other players in the group. Consequently, the possibility to form an agreement improves cooperation in some groups but has detrimental effects in others (see the literature review in the next section).

From the standard economics viewpoint, nonbinding agreements are merely "cheap talk" as they do not change the payoffs of the game.[2] Since there are no economic consequences of keeping or breaking the agreement, agents have little reason to trust other people's announcements and to stick with their own announcement. However, recent advances in behavioral economics have shown that people have a preference for keeping their word.[3] This tendency implies that even cheap talk may actually contain truthful information.

[2] For discussion of "cheap talk" in a standard economic setting see for example Crawford and Sobel (1982), and Farrell and Rabin (1996).

[3] There are multiple psychological explanations for this tendency, such as an aversion to lying (e.g., Demichelis and Weibull, 2008; Gneezy, 2005; Kartik, 2009; Vanberg, 2008), an aversion to making others disappointed (e.g., Battigalli and Dufwenberg 2007; Charness and Dufwenberg, 2006;), a desire to obey to the norm that one should honor agreements (e.g., Kessler and Leider, 2012; Miettinen, 2011,), or simply to maintain self-esteem (Benabou and Tirole, 2002).

If this is the case, an agreement, once formed, may convey a cooperative signal to all group members. The preference for honesty may be stronger in groups with close social relationships and a common history, like our forest user groups have. This is why we believe it is important to reexamine cheap talk in public goods experiments with this special subject pool consisting of people from rural Ethiopia and Nepal. The student groups used in previous experiments have been formed ad-hoc, i.e., the subjects have been complete strangers to each other and might share nothing but enrollment in the same university. One might argue that this anonymous setting with only weak ties between subjects does not represent a fair test of nonbinding agreements. A key question we explore in the present paper is whether individuals who share resources in their everyday lives and who live in a collectively oriented country tend to use the agreement option to coordinate towards a higher cooperation level. The surprising answer is no. The cooperation level in both locations is relatively high even without the agreement option and most participants do not change their behavior after the agreement option has been introduced. However, we observe that the more cooperative individuals are more likely to enter the agreement which points to the importance of institutions as a sorting mechanism of people's degree of cooperativeness.

2. Previous literature

Verbal agreements made in face-to-face communication have been shown to be highly effective in boosting cooperation (for reviews see Sally, 1995; Bicchieri, 2002; Ostrom, 2006; Balliet, 2010). What seems to be important for these agreements is that everyone in the group agrees to cooperate and that deviations can be addressed in post-play discussions. As for the first point, Orbell *et al*. (1988, p. 818) observed "very strong pressures for *everyone* to make a promise. There were frequent assertions, e.g., that people would not make a promise themselves unless *everyone* did." In a common pool resource experiment

with repeated communication rounds, Ostrom *et al*. (1992, p. 410) found: “A striking aspect of the discussion rounds was how rapidly the subjects, who had not had an opportunity to establish a well-defined community with strong internal norms, were able to devise their own agreements and verbal punishments for those who broke those agreements.” The disadvantage of face-to-face discussions is that it is difficult to distinguish between the effects of having an agreement and other things that might be said, such as verbal threats, disapproval, and other post-interaction effects.

Restricting communication among players, for example to fixed verbal options or numerical pledges, rarely stimulates cooperation. Bochet *et al.* (2006) show that the exchange of numerical pledges does not improve cooperation compared with a control treatment without communication. In a follow-up study, Bochet and Putterman (2009) show that the indifferent average result masks a dispersion of outcomes: some groups used the pledge option successfully to coordinate towards high contribution levels while the opportunistic use of false signals resulted in very low contribution levels. Kroll *et al*. (2007) let their student subjects propose how much group members should contribute to the public good and then vote for one of the proposals. The results show that, as long as the vote was nonbinding, cooperation did not improve compared with the situation without communication. The possibility to form a cooperative agreement has been tested by Dannenberg (2015). The results reveal that this possibility did not improve cooperation. Some agreements were formed at the beginning of the game, and these groups indeed performed better than the groups that failed to form an agreement. However, noncompliant behavior by some players caused a complete breakdown of agreement formation and cooperation over time.

3. Experimental design

We use a three-person public goods experiment to investigate the role of nonbinding agreements. Our basic design builds on the work by Gächter and Herrmann (2011) and Rustagi *et al*. (2010), who both conducted artifactual field experiments using a standard one-shot public goods experiment with rural and urban samples in Russia and Ethiopia, respectively.

Our subjects participated in two one-shot experiments: (i) a standard public goods game and (ii) a public goods game proceeded by the possibility to form a cooperative nonbinding agreement among all group members. It should be noted that both one-shot public goods games included stranger matching (i.e., groups were reshuffled between the games) and that this feature was publically known to all subjects when making their decisions. This matching procedure ruled out any strategic motives to cooperate in the first public goods game.

In the standard public goods game each subject was asked how much of the endowment she would like to contribute to the public good, while the remainder was kept as her private income. The total amount given to the public good by all three group members was then multiplied by 1.5, and the resulting amount was shared equally among the members. Thus, the marginal per capita return to the public good equaled 0.5. This return creates the familiar conflict between the self-interested choice and the social optimum, which characterizes the public good. It is in each player's material self-interest to keep the entire endowment, whereas it is in the collective interest that all players contribute their entire endowment to the public good since the marginal social return is 1.5.

We conducted our experiments with farmers in Nepal and Ethiopia, who have little or no formal education, and to facilitate their understanding, we used the local currency directly rather than an experimental currency together with an exchange rate. Each subject was

endowed with 10 Ethiopian birr or 100 Nepalese rupees, and these amounts were approximately the same in purchasing power in the two countries at the time of the experiment.[4] Thus, the payoff function for subject *i* in Ethiopia expressed in Ethiopian birr (the function in Nepalese rupees is found by multiplying by a factor of 10) was

$$\pi_i = 10 - c_i + 0.5\sum_{j=1}^{3} c_j \,, \qquad (1)$$

where *c* is the amount invested in the public good. After a subject had chosen her contribution, we asked her to guess how much the other two group members would contribute in total. We used "total" rather than "average" contributions to make it cognitively easier for the subjects. We monetarily incentivized correct guesses by paying 5 Ethiopian birr (or 50 Nepalese rupees) for a correct guess. Other papers, e.g., Gächter and Renner (2010), use payoffs that decrease in proportion to how incorrect a guess is. We avoided this feature since it is rather complicated to explain to subjects. Instead we gave a relatively high reward for a correct guess to incentivize subjects to think hard about the question.

In the second public goods game, there was a possibility to enter a nonbinding agreement before contributing to the public good. Each individual was asked if she would agree to contribute all her endowment to the public good if the other two group members agreed to do so as well. They were furthermore asked how much they would contribute if an agreement was not reached. After that, we asked the subjects to guess the number of other group members who would contribute at least what they promised, and monetarily incentivized correct guesses with 5 Ethiopian birr (or 50 Nepalese rupees). The objective of this question was to measure the participants' trust in others' announcements. Before the subjects chose their contributions, they were informed about how many of the other group

[4] There was a trade-off between exactly the same purchasing power and figures that are cognitively easy to handle, and we opted for the latter.

members had entered the agreement to contribute their whole endowment if others did the same. It was made common knowledge that formed agreements were (technically) nonbinding and that the agreement would not take effect if one or more group members did not enter the agreement. The reason for this unanimity rule is that the ethical obligation to comply with a nonbinding agreement arguably is the strongest when everyone in the group takes part (Bicchieri, 2002; Orbell *et al*., 1988; Orbell *et al*., 1990).

The particular features imposed in our experiments of (i) one-shot games with stranger matching, (ii) anonymity, (iii) costless information about others' intentions, and (iv) absence of punishment (combined with anonymity) allow us to analyze the pure effect of nonbinding agreements. Because subjects had little or no formal education, the experimentalists read all instructions aloud to all subjects in the same session, yet all subjects reported their answers to the experimenter individually as in, e.g., Henrich *et al*. (2001). The experiments were conducted in rural villages in Ethiopia and Nepal. Each subject belonged to a group of three anonymous members assigned randomly and anonymously from groups of 15-20 villagers all familiar with each other. A total of 111 and 123 individuals participated in Nepal and Ethiopia, respectively.

4. Results

4.1 The overall effect of the agreement option

Table 1 summarizes the results of the public goods games. The contributions to the public good are shown as a proportion of the initial endowments to allow a direct comparison between the two countries. We begin by analyzing the case of Nepal. As can be seen, the behavior of the Nepalese subjects before and after the introduction of the agreement option is on average almost the same: the average contribution to the public good is 61.7% of the endowment in the standard game and 61.1% in the agreement game. The differences in

contributions between the standard game and the agreement game are statistically insignificant at conventional levels using Wilcoxon sign-rank tests that take the match pair property of the data into account (p-value=0.753).

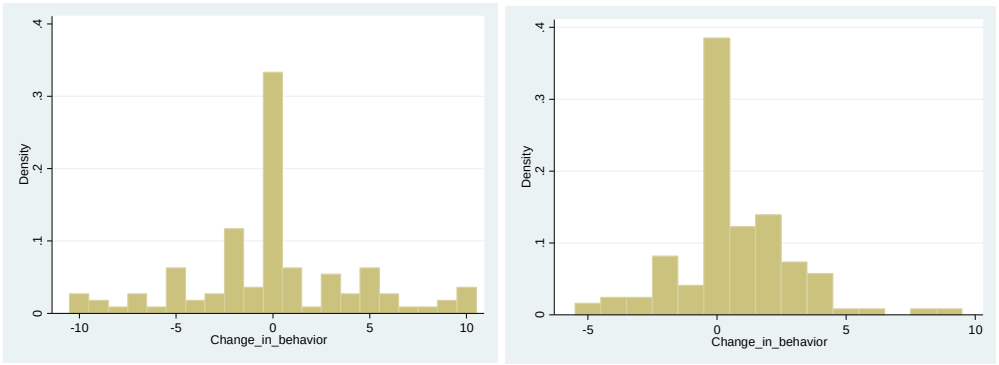
The proportion of free-riders, i.e., participants who contributed zero, is small in both games, i.e., 5.4% of the sample in the standard game and 8.1% in the agreement game. Although the fraction of free-riders is low compared with findings in public goods experiments with students, it is in line with findings using general population samples, such as Thöni *et al*. (2012) in Denmark and Bortolotti *et al*. (2015) in Italy. Logically, the average conditional contributions, i.e., the average contributions among those who contributed to the public good, are also similar between the standard game and the agreement game, with contribution levels of 65.2% and 66.5%, respectively. Finally, and interestingly, the proportion of subjects who contribute the whole endowment to the public good is very high relative to subject pools consisting of university students, and the levels are again almost identical in the two games, i.e., 27.0% and 27.9%, respectively. Using non-parametric tests, we cannot reject that the contribution behavior is the same in the standard game and the agreement game.

Figure 1 presents detailed information on how the possibility to form an agreement affects the contribution levels. Zero in the figure means that a subject did not change her contribution when the agreement option was introduced, while a positive (negative) number means that the contribution level increased (decreased). As can be seen in the left panel of Figure 1, almost 35% of the Nepalese subjects did not change their behavior at all when the agreement possibility was introduced. The remaining subjects changed their contributions in an almost symmetric way around zero, and as reported above, we cannot reject the hypothesis of no change in contributions when the agreement possibility was introduced.

Table 1. Descriptive statistics of average contributions in the public goods games.

	Average contribution		Proportion free-riders		Average contribution among contributors		Proportion full contributors		Guessed averaged contribution
	Standard	Agreement	Standard	Agreement	Standard	Agreement	Standard	Agreement	Standard
Nepal (n=111)	61.7%	61.1%	5.4%	8.1%	65.2%	66.5%	27.0%	27.9%	62.7%
Ethiopia (n=123)	43.6%	49.9%	1.6%	1.6%	44.3%	50.8%	7.3%	6.6%	41.5%

Figure 1. Change in contribution levels when the agreement option is introduced.



Nepal Ethiopia

Let us now turn to our data from the Ethiopian experiment. Here, the average contributions in both games are lower than in Nepal: 43.6% vs. 61.7% in the standard game and 49.9% vs. 66.1% in the agreement game. Unlike in Nepal, the introduction of the possibility to form an agreement had an overall positive, albeit small, effect on contributions in Ethiopia. The average contributions increased by 14.4% (from 43.6% in the standard game to 49.9% in the agreement game), and by using a Wilcoxon sign-rank test we can reject the hypothesis of no difference (p-value=0.001).

As in Nepal, the proportion of free-riders is very low compared with the usual findings in student experiments: only 1.6% of the sample were free riders in both games. The proportion of full contributors was clearly lower in Ethiopia, with 7.3% of the sample in the

standard game and 6.6% in the agreement game. The higher contributions in the agreement game, as shown in Table 1, can be explained by an increase in the average contribution level among those who contributed a positive amount; they increased their average contribution from 44.3% to 50.8%. Figure 1 (right panel) shows that 38.5% of the Ethiopian subjects did not change their behavior from the standard to the agreement game. However, among the subjects who changed their behavior the change is not symmetric, which is in line with the descriptive statistics in Table 1. A larger fraction increased (42.6%) than decreased (18.9%) their contributions to the public good in the agreement game. In summary, the introduction of the agreement option has a relatively small or no effect on cooperation in both countries.

The differences in contribution levels between the two countries are also reflected in the beliefs. After the subjects chose their contributions in the standard game, but before proceeding to the agreement experiment, they were asked in a monetarily incentivized way how much they believed the other group members would contribute to the public good. The Nepalese participants believed on average that others would contribute 62.7% of the endowment, which is very close to the actual average of 61.7%. In a Wilcoxon sign-rank test, we cannot reject the hypothesis that the amounts contributed and guessed are the same (p-value=0.688).

The Ethiopian participants believed on average that others would contribute 41.5% of their endowments, which is again close to the actual average of 43.6% (p-value=0.086). By and large, the difference between the Nepali and Ethiopian sample is mostly a level effect.

4.2 The decision to enter the agreement

The first panel of Table 2 shows the distribution of votes separated by subjects' own voting behavior and the final agreement made by the group, where the formation of an agreement to contribute the whole endowment is conditional on all subjects being part of the

agreement. In Nepal, the proportion of subjects who were willing to enter the agreement was 58.5%. In Ethiopia, 83.7% of the sample voted in favor of an agreement. Of course, not all of the yes-voters ended up in a group with an agreement since an agreement was only formed if all three group members agreed to enter. Because of this rule, 18.9% of the Nepalese subjects in the end belonged to a group with a nonbinding agreement, i.e., an additional 39.6% voted yes for an agreement but at least one other member of their group voted no. In Ethiopia, the proportion was 58.5%, i.e., an additional 25.2% voted yes but at least one other group member did not want to enter.

After deciding whether or not to enter the agreement, subjects were asked how much they would contribute to the public good if the groups did not reach an agreement. Interestingly, there is a significant difference in these pledges between yes-voters and no-voters in both countries as shown in the last panel of Table 2. In Nepal, the subjects who voted yes pledged on average to contribute 74.7% of the endowment in case of no group agreement, while the figure for those who voted no is 45.8%. We can therefore reject the hypothesis of equality (p-value<0.001). In case there was no unanimous agreement in the Ethiopian group, those voting yes pledged to contribute 61.6% while the no-voters pledged 45.0%, which is also a significant difference (p-value=0.028).

After the subjects had made their announcements (and before learning about the other group members' announcements and choosing their contributions), we elicited their beliefs about how many of the other two group members would do what they had announced. This question about beliefs should be interpreted as a general measure of trust since the subjects did not know the other players' announcements at this point. Only the no-voters already knew that there would be no group agreement. This informational advantage was due to the unanimity rule and must be taken into account when interpreting the beliefs.

In Nepal, the subjects who voted yes on average guessed that 1.29 of the other two group members would keep their word, while those voting no thought that only 0.72 would.[5] We can reject that the guesses in these two groups are the same using a Wilcoxon rank-sum test (p-value<0.001). Similarly, the fraction who thought both group members would keep their word was 46.2% for the yes-voters and only 19.6% for the no-voters as shown in the second to last panel in Table 2, i.e., again a significant difference (p-value=0.004). In the Ethiopian sample, subjects who voted yes on average guessed that 1.53 of the other group members would keep their word. The figure is lower for no-voters (1.30), but the difference is only weakly significant (p-value=0.074). The fraction of the yes-voters who thought both members would keep their word was 66.0% while only 40.0% of the no-voters thought so, which is a significant difference (p-value=0.029).

Table 2. Agreement decision and guessed behavior of others.

Subject's vote	Group agreement	Proportion of subjects		Estimated number of the other two group members who would keep their word		Proportion who guessed that both group members would keep their word		Pledged contribution if no agreement	
		Nepal	Ethiopia	Nepal	Ethiopia	Nepal	Ethiopia	Nepal	Ethiopia
Yes	Yes	18.9%	58.5%	1.48	1.51	57.1%	62.5%	75.2%	61.1%
Yes	No	39.6%	25.2%	1.20	1.58	40.9%	74.2%	74.4%	62.6%
No	No	41.4%	16.3%	0.72	1.30	19.6%	40.0%	45.8%	45.0%

4.3 The effect of the agreement option conditional on voting decisions

Table 3 shows the contribution behavior in the standard game and in the agreement game separated by the subjects' own voting decisions and the final agreement in the group.

[5] As discussed above, the yes-voters did not know the outcome of the other two voters when answering whether they expected the others to keep their word. Thus, the average guess that 1.29 of the other group members would keep their word is the weighted average from Table 2 based on the yes-voters who later ended up in a group with agreement and those who ended up in a group without an agreement.

The middle panel of the table shows the contributions in the standard game. In Nepal, the average contribution in the standard game was almost 67% among yes-voters, while no-voters contributed on average 54.6%. By using a Wilcoxon rank-sum test, we can reject the hypothesis that the contributions in the standard game are the same for yes-voters and no-voters (p-value=0.038). Also in the Ethiopian sample we find that no-voters contributed less than yes-voters in the standard game (36.0% vs. 45.0%), and this difference is weakly significant (p-value=0.058).

The right panel of Table 3 shows the average contributions in the agreement game. These contribution decisions were made after the subjects decided on whether or not to enter the agreement and after learning whether their group had reached an agreement or not. For this reason we not only distinguish between yes-voters and no-voters but also between agreement and no agreement. If a group had not formed an agreement, the members were informed about the pledges subjects had made.

As in the standard game, those who voted in favor of the agreement contributed more in the agreement game than those who voted against it. In Nepal, the players who were in groups where an agreement had been formed contributed on average 67.1% of the endowment in the agreement treatment. Interestingly, the players who voted yes but who were in a group without a unanimous agreement contributed even slightly more (69.4%). In contrast, the no-voters contributed on average 50.3%. By using a Wilcoxon rank-sum test, we can reject the hypothesis of equal contributions between yes- and no-voters (p-value=0.003). We observe a similar picture in Ethiopia. The yes-voters in groups with agreement and those in groups without agreement contributed on average 53.7% and 50.3%, respectively, while the no-voters contributed on average 36.0%. We can reject the hypothesis of equal contributions between yes-voters and no-voters (p-value=0.003).

Table 3 also shows whether the subjects in the different groups changed their contribution level from the standard game to the agreement game. The Nepali data generally show small differences in contributions between the standard game and the agreement game, as already shown in Table 1, also when separated by voting groups. For each of the three groups, we test the hypothesis that subjects did not change their behavior between the two treatments. We find that we cannot reject this hypothesis at the 5% significance level in any of the three groups. It is important to note, however, that the contributions among the yes-voters were already very high in the standard game, which can help explain why they did not increase further in the agreement game.

In Ethiopia, the yes-voters in the groups that formed an agreement increased their contributions from 45.7% in the standard case to 53.7% in the agreement case, and this difference is significant (Wilcoxon sign rank test, p-value=0.004). The yes-voters in the groups that did not form an agreement also increased their contributions significantly from 43.5% in the standard game to 50.3% in the agreement game (p-value=0.054). In contrast, the no-voters did not change their behavior and contributed on average 36.0% in both games (p-value=0.992).

Table 3. Average contributions by voting decisions.

		Contributions in standard public goods experiment		Contributions in agreement public goods experiment	
Subject's vote	Group agreement	Nepal	Ethiopia	Nepal	Ethiopia
Yes	Yes	66.9%	45.7%	67.1%	53.7%
Yes	No	66.7%	43.5%	69.4%	50.3%
No	No	54.6%	36.0%	50.3%	36.0%

4.4 Determinants of contributions

We have seen that yes-voters and no-voters differ in their contribution patterns in both the standard game and the agreement game. A somewhat surprising result is that the yes-

voters' contribution behavior did not depend much on whether or not there was an agreement in the group. As mentioned before, even when there was no group agreement, yes-voters pledged to contribute large amounts to the public good. In Nepal, the yes-voters without group agreement pledged to contribute 74.4% to the public good and in Ethiopia they pledged to contribute 62.6% (see right panel in Table 2). These numbers indicate a relatively high unconditional willingness to cooperate, even when there is no group agreement.

Table 4 shows OLS regression results on what influenced contributions in the agreement treatment when the group did not form an agreement. In both countries, the amount pledged in case there would be no group agreement has a strong positive effect on contributions. In addition, in Ethiopia, the contribution in the standard public goods experiment has a positive and significant impact on contributions. In Table 5 we run the same OLS regression model, but this time for groups that had formed an agreement. In the Ethiopian sample the contributions in the standard public goods experiment and the amount pledged in case there would be no group agreement have a positive and significant impact on contributions, while in the Nepalese sample none of the included variables is significant.

Table 4. OLS regression analyses of determinants of contributions in the agreement treatment if the group did not form an agreement.

	Nepal		Ethiopia	
Variable	Coeff.	Std. error	Coeff.	Std. error
Contribution in standard public goods experiment	-0.101	0.095	0.358***	0.107
If believe that all others will keep their promises (dummy=1)	0.031	0.644	-0.849*	0.475
Amount pledged to contribute if group did not agree	0.421***	0.110	0.407***	0.096
Amount pledged by other two group members if group did not agree	0.064**	0.025	0.048	0.060
Voted yes (dummy=1)	0.578	0.656	0.790	0.506
Constant	2.709***	0.819	0.260	0.840
Number of observations		90		51

Table 5. OLS regression analyses of determinants of contributions in the agreement treatment if the group had formed an agreement.

	Nepal		Ethiopia	
Variable	Coeff.	Std. error	Coeff.	Std. error
Contribution in standard public goods experiment	0.146	0.257	0.312***	0.092
If believe that all others will keep their promises (dummy=1)	1.540	1.367	0.605	0.410
Amount pledged to contribute if group did not agree	0.448	0.380	0.428***	0.077
Amount pledged by other two group members if group did not agree	0.339	0.211	0.018	0.050
Constant	-3.606	3.194	0.712	0.915
Number of observations		21		71

5. Discussion

This report summarizes the results from public goods experiments investigating what happens when it is possible for the players to form a nonbinding agreement requiring all players to fully contribute to the public good. There are many nonbinding agreements in the real world, for example in working groups, households, boards, and organizations. Arguably, this is a natural way to start a cooperative endeavor when external enforcement is frail or absent. Nevertheless, it is difficult to infer clear conclusions from them because we do not know the counterfactual situations of no agreement or an agreement designed differently. Also, the pure effect of having an agreement on behavior is often confounded with many other factors in the negotiation process. In an experimental setting, it is easier to separate out the different effects to investigate whether an agreement *per se* fosters cooperation.

Previous studies on the effect of nonbinding agreements on contributions to public goods have used students exclusively from Western democratic countries as subjects. The results of those studies suggest that nonbinding announcements are not enough to foster cooperation, which may not be entirely surprising when social ties are weak as is typically the case among students.

In our experiment we used two distinct samples of forest users from rural villages in Ethiopia and Nepal. Thus, our participants knew each other, had a long history of interdependencies, were part of the same forest user groups, had generally lived their whole lives as neighbors, and cooperated to greater or lesser degrees in daily life. In the experiment, though, they were matched anonymously, allowing us to compare naturally occurring groups with artificially created ad-hoc groups in a laboratory setting.

Overall, our results show a weak effect of nonbinding agreements on cooperation in the two locations. The main reason for this is that the cooperation level was relatively high even without an agreement and that relatively few participants changed their behavior when the agreement option was introduced. Nonetheless, we find that the willingness to enter an agreement varies between individuals and strongly correlates with their cooperativeness. The subjects who had optimistic beliefs and who contributed high amounts in the standard game were more likely to enter the agreement than those with more pessimistic beliefs and lower contributions in the standard game. This result points to the importance of institutions as a sorting mechanism of people's degree of cooperativeness.

The subjects who voted in favor of the agreement also pledged and contributed high amounts if the group did not form an agreement. This indicates a high unconditional willingness to cooperate and is in stark contrast to the results from the student experiments (Dannenberg, 2015). A possible explanation for the observed unconditional willingness to cooperate and the relatively stable behavior irrespective of the institution in place is that the two countries where we conducted the experiments are characterized by a high degree of collectivism. This together with the common history and close social relationships may help explain why the subjects' behavior is relatively stable.

Nevertheless, we encourage further studies in the field of nonbinding agreements to explore the reasons behind the small institutional effects on behavior as well as how factors such as repeated interaction and punishment work together in fostering cooperation.

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