COOPERATION PREFERENCES IN THE PROVISION OF PUBLIC GOODS: AN EXPERIMENTAL STUDY ON THE EFFECTS OF SOCIAL IDENTITY

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An Experimental Study on the Effects of Social Identity

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Abstract

Traditionally economic theory assumes that preferences are stable facilitating positive predictions of economic policy. While there is conflicting experimental evidence on the temporal stability of cooperation preferences in public goods provision, surprisingly little is known about their stability in different institutional settings. We contribute to this literature by testing whether social identity impacts on cooperation preferences in public goods provision. Specifically, our experiment features a within-subject design based on one-shot public good games in strategy method, which are carried out in random, in- and out-group matching protocols. Our findings indicate that cooperation preferences are not stable across these matching circumstances. Quite to the contrary, we find that when matched with in-group members, subjects consistently show the preference for higher levels of conditional cooperation and thus less self-serving bias than in out-group matching. Additionally, while the probability to be a conditional cooperator remains stable under each treatment, we identify an elevated propensity to be a free-rider when matched with individuals of a different identity. These results indicate that it can be reasonable to devise policy institutions that strengthen the feeling of belonging to a particular group in order to enhance social welfare.

Keywords: Public goods; cooperation preferences; conditional cooperation; free-riding; social identity; experimental economics

JEL classification: C9; D7; H4

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1 Introduction

The core function of positive economic theory is to predict effects of economic policy. This requires assumptions about people's preferences ultimately guiding behavior and influencing outcomes. Inherent in the model of homo oeconomicus, these preferences are traditionally assumed to be exogenously given and stable, both across time and decision circumstance. Providing an empirical underpinning for this assumption, within this article we employ an experimental approach to contribute to the knowledge on stability of cooperation preferences in the provision of public goods. Recently, the temporal dimension of preference stability has received some attention. On the one hand, using repeated one-shot public good games in strategy method, Volk et al. (2012) argue that both at the aggregate and the individual level cooperation preferences are to a relatively high degree indeed stable. Brosig et al. (2007), on the other hand, provide evidence that they may actually decay over time, which they derived from repeatedly carrying out sequential prisoners' dilemma games. These diffuse findings notwithstanding, we still lack understanding of whether cooperation preferences are stable across various institutional settings in which the public good is provided.

Recent literature on social identity, however, demonstrates that social preferences are not systematically stable. Experimental research by Chen and Li (2009), for instance, shows that social identity significantly increases subjects' degree of positive reciprocity and their propensity to make social welfare maximizing choices when interacting with individuals of a common identity. Although having immediate relevance for the provision of public goods, this relationship has not been experimentally analyzed, so far. Consequently, we ask whether cooperation preferences in the provision of public goods are stable under the institution of social identity, making salient the persons' identity with which an individual interacts.

To this purpose, we induce social identity in the laboratory by having subjects solve a simple group identity task with anonymous communication via chat. The experiment features a within-subject design that is based on one-shot public good games in strategy method, which is an often used method for the elicitation of cooperation preferences.[4] Three matching protocols are in effect: in-group matching, when subjects interact with individuals of their own identity; out-group matching, when groups are composed of subjects of different identities and random matching, in which no identity is induced, serving as a control.

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[4] Obviously, preferences do not lend themselves to direct measurement. We are aware of the fact that all the strategy method may enable us is to observe subjects' responses to other subjects' hypothetical behavior and to measure cooperation strategies. However, these allow for an adequate approximation of actual cooperation preferences (cf. Volk et al. (2012)).

Our results clearly show that cooperation preferences in public good provision are not stable across matching circumstances with salient group identity. Quite to the contrary, we find that when matched with individuals of a common identity, subjects consistently show the preference for higher levels of conditional cooperation and thus less self-serving bias than when interacting with individuals that are perceived to belong to different identities. What is more, we identify an elevated propensity to be a free-rider when being matched with individuals of a different identity than in in-group matching. These findings have direct relevance for positive predictions of policy effects. The hitherto standard assumption of preference stability neglects that social identity systematically changes peoples' preferences to cooperate with one-another which directly influences social welfare. It is thus reasonable to device institutions that stress the belonging to the group providing the public good.

The remainder of the article is organized as follows. Section 2 reviews the relevant literature on cooperation preferences in public goods provision as well as on social identity and formulates the research hypotheses. Section 3 presents the experimental design, which is followed by a detailed presentation of our results. The article concludes in section 5 and derives implications for economic policy.

2 State of Research and Hypotheses

2.1 Literature Review

Cooperation preferences in public goods provision were first empirically analyzed by Fischbacher et al. (2001). Using a variant of the strategy method (Selten, 1967) in a one-shot public good game the authors elicited subjects' contributions as a function of the average contributions of their group members. The authors find that 50 percent of the subjects can be classified as conditional co-operators, i.e. subjects whose contributions are positively correlated with the level of others' average contributions, and 30 percent as free riders.[5] Similar findings were reported in various replication studies, reviewed by Chaudhuri (2011).

While free-riding is best explained by assuming individuals maximize their own utility instead of the groups' utility based on purely selfish preferences, conditional cooperation may be understood best

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[5] The remaining types are either "hump-shaped cooperators", i.e. individual whose contributions are positively correlated with the average of the others up to a maximum and then decline again, or belong to the class "others".

as social preference for positive reciprocity (cf. Falk, 2003).[6] As per Fehr and Fischbacher (2002, pp. C3-C4) a positive reciprocal individual "[…] responds to actions that are perceived to be kind in a kind manner […]". In that sense, conditional cooperators perceive high contributions of their remaining group members to be a kind action and reciprocate this kindness by high own contributions. It is to be noted, however, that even conditional cooperators show a self-serving bias to some extent since on average they do not reciprocate their team members' contributions by an equal own contribution (perfect conditional cooperation), but depart in the selfish direction. This has direct bearing on the amount of public good provided, especially in long term interactions. Fischbacher and Gächter (2010), for instance, argue that the self-serving bias alone may be responsible for decaying public good contributions in the long run.[7]

To what extent these heterogeneous cooperation preferences are stable across institutional settings, is still poorly understood. Existing studies typically test for their stability by observing individuals' decision across different games or variants of the same game (cf. Blanco et al., 2011). Yet, to the best of our knowledge there exists no study that specifically examines the stability of cooperation preferences in public goods provision in relation to social identity.

The origin of experimental economic research on social identity defined as "[…] a person's sense of self derived from perceived membership in social groups" (Chen and Li, 2009, p. 431), lays in the social identity theory pioneered by Tajfel and Turner (1979). This theory was developed in order to establish the psychological foundations of discriminatory behavior and comprises three components – categorization, identification and comparison. Categorization denotes the apparently quick process of placing individuals including oneself into certain social categories such as religious, ethnic or other groups. The second process, identification, characterizes the process by which individuals associate themselves with certain groups – the in-group(s). Conversely, out-groups are social groups that an individual does not identify with. In the last process of social comparison individuals start to compare their in-group with the out-group, which generally leads to in-group favoritism and out-group discrimination (cf. Tajfel and Turner, 1986; Chen and Li, 2009; Hoff and Pandey, 2006).[8] This phenomenon, termed as *in-group bias*, is increasingly attributed to the different expectations on the

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[6] Conditional cooperation may as well be explained by the social preference for inequity aversion, as modeled by Fehr and Schmidt (1999) and Bolton and Ockenfels (2000). Nevertheless, in this article we will proceed by referring to positive reciprocity.

[7] Additionally, the heterogeneity of cooperation types may explain decaying contributions to public goods as well. In the course of repeated interactions, conditional cooperators may get increasingly frustrated by interacting with individuals that are free-riding on their contributions and react with lower own contributions as well Burlando and Guala (2005).

[8] See Chen and Li (2009) for a detailed account on theoretical and empirical findings on social identity theory.

behavior of in-group as opposed to out-group members (cf. Yamagishi and Kiyonari, 2000; Jackson, 2011; Ioannou et al., 2012).

Studies outside the public goods environment show furthermore that social identity positively influences social welfare when individuals interact with in-group matches as opposed to random[9] and/or out-group matching. These findings thus provide a hint that in case of public good provision subjects may exhibit a stronger preference for cooperation, as well. Firstly, studying the effects of social identity on social preferences in dictator and two-person response games Chen and Li (2009) find that group identity has a significant positive effect on the likelihood of social welfare maximizing choices. The authors consequently predict that "in games with a unique Pareto-efficient outcome, people with salient group identities are more likely to choose cooperation when matched with an in-group member" (Chen and Li, 2009). Next, employing a two-player coordination game with induced social identity Charness et al. (2007) also find that a salient group identity may enhance social welfare, depending on the institutional structure. They manipulate the saliency of group membership by varying whether the decision maker's group is present when decisions are made, whether feedback is given about the outcome of the game and whether there is payoff dependence. Similarly, McLeish and Oxoby (2007) verify that individuals show higher cooperation with in-group than with out-group matches, measured by the offers extended by the proposer in a two person response experiment with induced social identity. Making use of real identification with Swiss army platoons Goette at al. (2006) similarly identify greater cooperation in a prisoners' dilemma game when individuals are matched with members of their own platoon. Lastly, Chen and Chen (2011) detect that in in-group matching individuals coordinate to the socially efficient high effort equilibrium in minimum-effort games. All in all, these findings demonstrate that social identity renders individuals more likely to strive for social welfare when matched with in-group members.

What is more, two studies establish a direct connection between social identity and the preference for conditional cooperation, by revealing that social identity impacts on subjects' preferences for positive reciprocity.[10] Firstly, based on the results of a series of two-person response games in a within-subject design Chen and Li (2009) find that when matched with in-group members individuals reward perceived "good behavior" to a higher extent than when matched with out-group members. Specifically, individuals exhibit a significant 19 percent increase in positive reciprocity (Chen and Li,

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[9] In random matching subjects interact with others that are not perceived to belong to any particular identity.

[10] In a third study with trust and dictator games, Ioannou et al. (2012) find that positive reciprocity is mainly dependent on the amount the first mover extends to the second and not on the identity of the first mover. It is to be noted, however, that their results lack comparativeness since they analyze econometrically generated weights on the first mover's payoff instead of actual responses in terms of experimental currency. Consequently, we will not take their results into consideration.

2009).[11] Secondly, relying on a between-subject design and a comparable game setting Currarini and Mengel (2012) report a 34 percent higher positive reciprocity in in-group matching. Since positive reciprocity is the theoretical foundation for conditional cooperation, we similarly expect social identity to impact on subjects' preferences for conditional cooperation in public goods provision by increasing the amounts individuals reciprocate to the rest of the group given their alternative average contributions.

At the moment, however, there are only two studies focusing on how social identity impacts on public goods provision (Solow and Kirkwood, 2002; Eckel and Grossman, 2005). Yet, neither of them specifically allows drawing conclusion on its impact on cooperation preferences. Most insights can be gained from Eckel and Grossman (2005), who employ different treatments designed to induce increasing strengths of identity. The authors find that enhanced team identification yields consistently higher cooperation levels indicating less free-riding in general. Unfortunately, the authors analyze aggregate data only making it impossible to elicit whether increased contributions are due to differences in conditional cooperation or for instance because free-riders adjust their behavior.

2.2 Research Hypotheses

Based on the current state of literature we formulate the following research hypothesis. Drawing on Chen and Li (2009), subjects exhibit the preference for higher degrees of positive reciprocity in in- than in out-group matching. Consequently, we expect in-group matches to reciprocate others' average contributions to a higher degree than out-group matches.

HYPOTHESIS 1A: *When matched with in-group members, subjects reveal the preference for higher levels of conditional cooperation than in out-group matching.*

A matching of subjects at random, without identity influence, nevertheless creates a general feeling of belonging together, since individuals interact with others that are perceived as "group members". This feeling might be less strong than between in-group matches where subjects saliently belong to their own identity. Yet, it might be stronger than in out-group matching, because here subjects prominently belong to different identities (cf. Chen and Chen 2011), which often leads to out-group discrimination (see Section 2.1). Therefore:

HYPOTHESIS 1B: *When subjects are matched randomly, they will reveal the preference for less conditional cooperation than when matched with in-group members.*

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[11] Additionally, subjects are significantly more forgiving for "bad behavior", i.e. they exhibit less negative reciprocity Chen and Li (2009).

HYPOTHESIS 1C: *When subjects are matched randomly, they will reveal the preference for more conditional cooperation than when matched with out-group members.*

Depending on the strength of the identity effect on conditional cooperation individuals might exhibit different propensities to be a certain cooperation type. Therefore:

HYPOTHESIS 2A: *When matched with in-group members, subjects show a higher propensity to be a conditional cooperator and a lower propensity to be a free-rider then in out-group matching.*

HYPOTHESIS 2B: *In-group matching yields a higher relative share of conditional cooperators than out-group matching. Similarly, there will be less free-riders in in- than in out-group matching.*

3   Experimental Design

Our experiment follows a within-subject design and is based on a public good game in strategy method (cf. Fischbacher et al. 2001). Generally, groups comprised three subjects each possessing 20 points that could be invested either in their private account $(20 - g_i)$ or into a *project*, symbolizing the public good. The payoffs associated with this decision were given by the following formula:

$$\pi_i = (20 - g_i) + 0.4 \sum_{j=1}^{3} g_j$$

Accordingly, it is individually more beneficial to invest into the private account, because it returns 1 point for each point invested instead of 0.4 points returned by the project. Basically, subjects had to make two decisions, an *unconditional* and a *conditional contribution* to the public good. Their unconditional contribution was simply the decision of how many of their 20 points they would like to invest in the public good. Here, they were asked to state what they expect the remaining group members will invest unconditionally, as well. For their conditional contribution subjects were asked to fill out a contribution table consisting of 21 entries for which they had to decide how much they *would* invest if their group members invested on average (round to the next higher integer value) 0-20 points in the public good. After both decisions were taken, a random mechanism[12] chose one group member that was to contribute according to her conditional contribution decision. The remaining two group members contributed according to their unconditional contributions.

The experimental design consisted of four stages in which subjects played the public good game in three different matching protocols (see Table 1). Please note that in each matching the game was

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[12] A dice was thrown by one participant in a session that determined the respective group member.

played only once in order to directly conclude on subjects' cooperation preferences, ruling out any strategic or reputational motivations.[13]

Stage	Identity (ID) Treatments		Control Treatments
1	Random Matching		Random Matching
2	Group Identity Task		-
3	In-Group Matching	Out-Group Matching	Random Matching
4	Out-Group Matching	In-Group Matching	Random Matching

Table 1 – Experimental Design

In stage 1 the public good game was played with subjects who were assign allocated to different groups at random (random matching). In stage 2 we induced a strong form of social identity based on insights of Eckel and Grossman (2005) and Chen and Li (2009) using a design pioneered by Ibañez and Schaffland (2012). We randomly assigned subjects to different groups with each group having been given a different color. These groups were then given a joint problem solving task in order to create a positive group experience (Eckel and Grossman, 2005). Given 10 minutes time, subjects had to jointly find hidden objects in a picture and report coordinates of their location (row and column).[14] To this purpose, subjects could discuss solutions with their group members via an online chat tool. In order to elevate subjects' propensity to coordinate and to render this task a true group exercise, our instructions explicitly stated that answers would only count as correct should each group member enter them correctly. The task was played as a tournament in which the group with the highest number of objects found won. In order to prevent negative associations from not winning this task, only the winning team received a congratulation message at the end of the experimental session. The remaining teams were not provided with information about their results and position relative to the other groups. Lastly, there were no monetary incentives for winning this game avoiding any income effects.

In the following two stages (3 and 4) subjects were matched with individuals belonging to the same group that solved the identity task (in-group matching, stage 3 or 4) as well as with subjects belonging to different identities (out-group matching, stage 4 or 3). The individuals' identities were

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[13] Fehr and Fischbacher (2002) for instance argue that reciprocity arises even if there is no expectation of future material benefits as it would be the case in repeated interactions with stable group composition. It is thus recommendable to follow a design with one-shot games.

[14] The instructions and the picture used in the experiment are available for download: [to the editors: pls. insert the relevant link here]

made salient by indicating the color of their group. In out-group matching for instance subjects thus saw that they interacted with two individuals of different color groups (such as blue, red and green). We switched the order of playing in-group and out-group matching to control for possible sequence effects. In order to compare in- and out-group with random matching accounting for the stages when decisions are made, we carried out control treatment, in which subjects played three times the one-shot public good game in random matching.

Since the instructions were handed in successively, subjects learned the matching procedure only during the experiment. Additionally, any information on payoffs was only revealed after the experiment's last stage. In case of the ID-treatments random matching was always played in stage 1 followed by the induction of social identity. Its main purpose is to identify player types without any identity influence, as done by Fischbacher et al. (2001), for instance, and to analyze their behavior in our ID-treatments. Please note that due to the different time stages our design does not allow a coherent comparison of decisions taken in in- or out-group matching with random matching of the ID-treatments. To this purpose we ran the control treatments.

The experiment was carried out in the Göttingen Laboratory of Experimental Economics (GLOBE) at the University of Göttingen from October 2011 to January 2012 using the software z-Tree (Fischbacher, 2007). We observed decisions of 135 subjects in ID-treatments and 42 subjects in control treatments. The sessions took approximately 1.5 hours and the subjects earned 14€ on average including a show-up fee of 2.50 €.

4 Results

4.1 Effectiveness of the Identity Induction

In order to ascertain that the effects we observe in this study are attributable to social identity triggered by the group identity task (in stage 2), we start by reporting supporting evidence for the effectiveness of the identity induction (see Table 2). Social identity is successfully induced if subjects identify more with group members of their own identity than with out-group members and thus show a higher degree of group attachment. Accordingly, we included two questions on self-reported group attachment in the post-experimental questionnaire.[15] Specifically, we asked subjects how much they felt attached to their in-group (individuals of the same color) as well as to their group comprised of out-group matches (individuals with a different color). Answers to both questions were

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[15] The full questionnaire is available upon request.

made on a 7 point Likert-Scale (1 = not at all, 7 = very strongly). Additionally, subjects could indicate "I don't care" in order to capture a possible indifference to the question.[16]

Looking at the results, we consistently find that subjects report a significantly higher attachment to the in-group compared to the out-group regardless of the sequence of the treatments. Consequently, we assume that the group identity task induced social identity effectively.

	In-Group	Out-Group	H_0: In-Group=Out-Group
Pooled Treatment Sequences	3.892 (1.664)	2.234 (1.335)	p=0.000
Sequence Variation in Stage 3 and 4			
In-Group followed by Out-Group Matching	3.855 (1.660)	2.073 (1.372)	p=0.000
Out-Group followed by In-Group Matching	3.929 (1.683)	2.393 (1.289)	p=0.000

Table 2 – Mean Self-Reported Group Attachment

Notes: We used a binominal sign-test. Subjects who indicated their indifference to the question are excluded from the analyses. Standard deviations are reported in parentheses.

RESULT 1: *The identity induction was successful. Subjects felt significantly more attached to their in-group than to the group comprised of out-group matches.*

4.2 Social Identity and Level of Conditional Cooperation

4.2.1 Conditional Cooperation in In-Group and Out-Group Matching

Containing the core result of our analysis, Figure 1 depicts the comparison of the average conditional cooperation in in-group and out-group matching. In line with recent literature, using a within-subject analysis we find that across the whole range of others' contribution (0-20) subjects in in-group matching are willing to contribute on average approximately 0.5 points more to the public good than in out-group matching. This difference is highly significant (Wilcoxon signed-rank test, p=0.000) and robust to the order of the ID-treatments in stage 3 and 4 (Wilcoxon signed-rank test, p=0.000 for both treatment sequences). Accordingly, when subjects are matched with individuals of their own identity, they show the preference for reciprocating their group members' contribution by higher own contributions. Conversely, interacting with individuals of different identities triggers preferences for lower levels of conditional cooperation.

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[16] We are aware that the answers to these questions may be biased by subjects having learned their earnings in in- and out-group matching at the end of the experiment prior to the questionnaire. Yet, profits realized in both matching protocols are very similar (Wilcoxon signed-ranks test, p= 0.7879) so that the results on self-reported group attachment are to be attributed to the group identity task in stage 2.
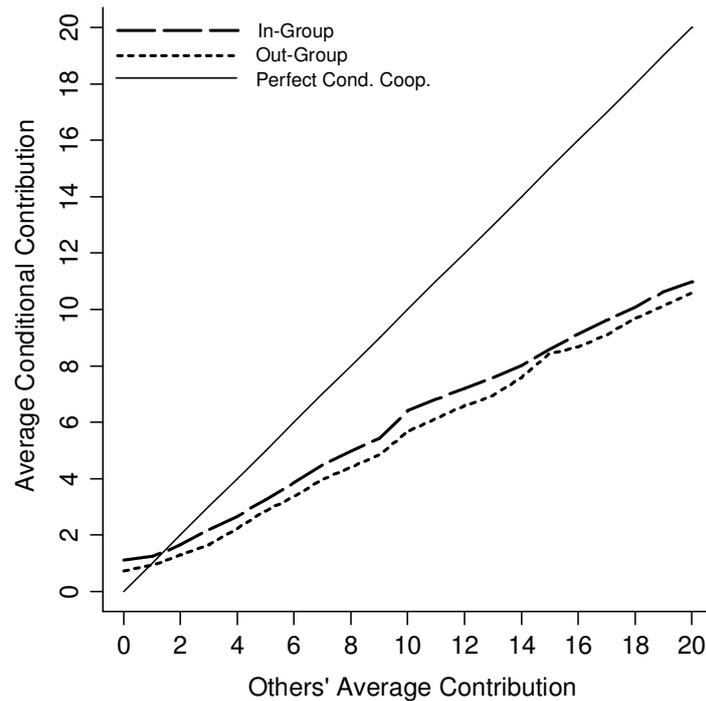
Figure 1 – Degree of Conditional Cooperation in In- and Out-Group Matching (all subjects)

RESULT 2:   *The level of conditional cooperation is consistently and significantly higher when subjects interact with members of their own identity than with individuals perceived to belong to different identities.*

Possible differences in cooperation preferences by in-group and out-group matches are not only identifiable when looking at the behavior of all subjects, but also when scrutinizing preference changes of certain cooperation types. To this purpose, we used the contribution table entries of stage 1 (free of social identity influences) to classify subjects as conditional cooperators and free-riders[17] and observed their behavior in the ID-treatments. As to be seen in Figure 2, in both ID-treatments free-riders on average depart from full free-riding. When matched with out-group members, the average own contribution always remains below 1 point. Free-riders in in-group matching, however, reciprocate their group members cooperation pattern to a significantly higher degree (Wilcoxon signed-rank test, p=0.000), which is increasing with the level of others' cooperativeness up to approximately 2 points on average. Consequently, even those subjects that exhibit purely selfish preferences turn to be more cooperative when interacting with individuals of their own identity than in out-group matching. Similarly, conditional cooperators reciprocate their in-

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[17] We defined conditional cooperators as subjects who exhibit a positive significant Spearman rank correlation coefficient (p<0.01) between own conditional contributions and others' average contributions. Subjects were classified as free-riders if they contributed nothing to the public good in any case.

group members' contribution to a significantly higher degree than when matched with out-group members. This pattern holds for all levels of group members' contribution and amounts to between 0.5 and 1 point on average (Wilcoxon signed-rank test, p=0.000).
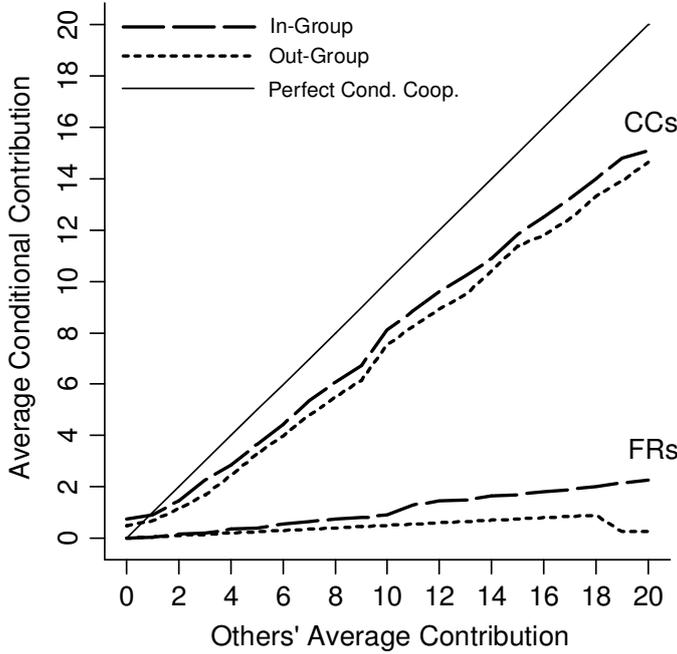

Figure 2 – Degree of Conditional Cooperation of Free-Riders (FRs) and Conditional Cooperators (CCs) in In- and Out-Group Matching

RESULT 3:   *Free-riders and conditional cooperators are prone to show a preference for higher levels of conditional cooperation in in-group than in out-group matching.*

All in all, we conclude that research hypothesis 1A cannot be rejected. Our results clearly indicate that when matched with individuals of a common identity, subjects across the board reveal the preference for stronger forms of conditional cooperation and consequently less self-serving bias than when matched with individuals of saliently different identities. These individuals will thus contribute more to the public good at each given level of (expected) contributions of their group members, leading to a higher social welfare.[18] Accordingly, social identity is a determining factor for cooperation in public goods, since it influences subjects' preferences for conditional cooperation.

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[18] This is supported by our findings on the level of unconditional contributions to the public goods. In in-group matching subjects contribute significantly more points to the public good than in out-group matching (6.92 and 6.07, respectively, p= 0.0476, Wilcoxon signed-rank test).

4.2.2 Conditional Cooperation in ID-Matchings and in Random Matching of the Control Treatments

For comparing cooperation preferences in both ID-matching protocols with random matching, we revert to the stages when decisions are taken, separately.[19] This necessitates switching from within- to across-subject analyses using the random matching decisions of the control treatments in stages 3 and 4. Yet, in order to keep as much within-information as possible, we analyze how subjects – in their relative treatments – adjusted their conditional cooperation strategy compared to the preceding stage that contained a public goods game (stage 1 and 3, respectively). Comparing these changes allows drawing conclusion regarding differences in conditional cooperation between the treatments. The following two graphs depict how subjects adjusted their cooperation strategy in stage 3 as opposed to stage 1 (Figure 3) and in stage 4 compared to stage 3 (Figure 4).

In both decision stages we find that when subjects are matched with in-group members, they consistently exhibit higher changes in conditional cooperation compared to the benchmark stage than when randomly matched. The differences between both treatments are more pronounced in stage 3, with approximately 1 point on average, than in stage 4. Yet, in both stages they are highly significant (Wilcoxon rank-sum test, $p=0.000$, for changes in stage 3 and 4). We thus conclude that hypothesis 1B cannot be rejected. Individuals, who interact with group members sharing the same identity, show preferences for higher levels of conditional contributions than in case of random matching.

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[19] When analyzing subjects behavior in the control treatments, we find consistently falling conditional contributions in each decision stages (Wilcoxon signed-rank test, $p_{1-3}=0.000$, $p_{1-4}=0.000$, $p_{3-4}=0.000$, subscripts denote decision stages). This highlights that in- and out-group matching may only be meaningfully compared with random matching if it takes place in identical decision stages. We thus use the random matching decisions of the control treatments in stage 3 and 4, to compare these with in- and out-group matching.
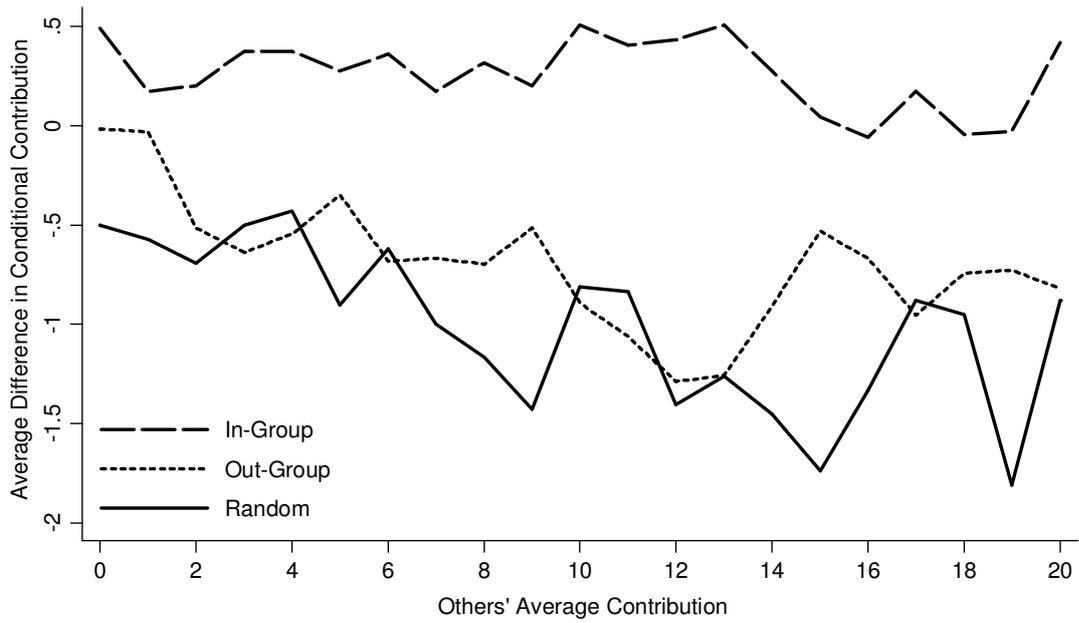
Figure 3 – Average Change in Conditional Contribution for each Treatment of Stage 3 compared to Stage 1
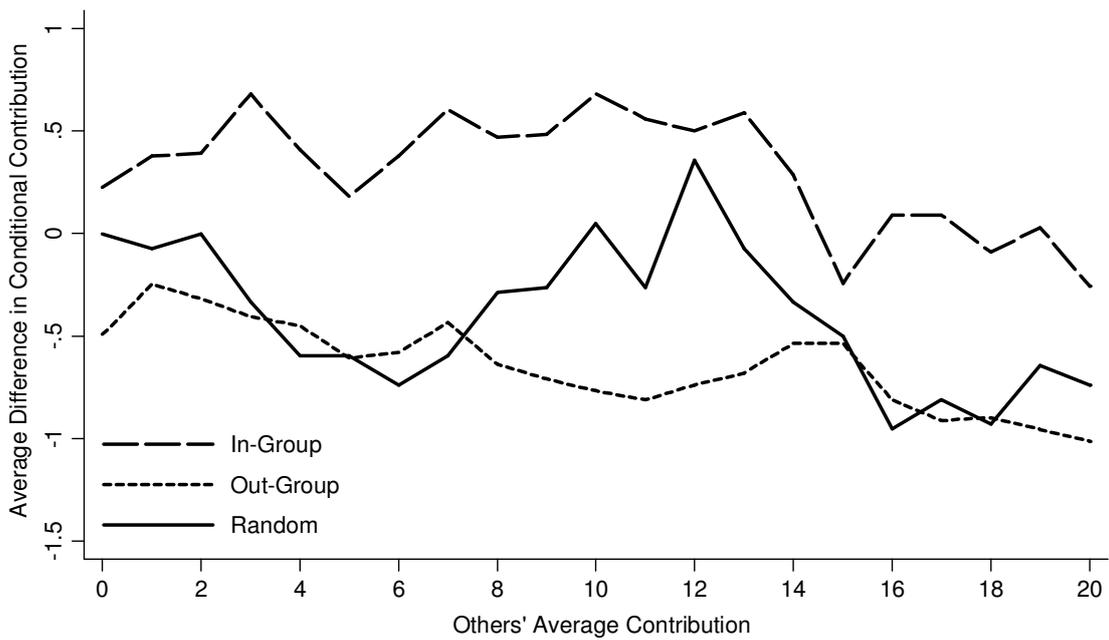

Figure 4 – Average Change in Conditional Contribution for each Treatment of Stage 4 compared to Stage 3

RESULT 4: *When matched with in-group members, subjects consistently show a preference for higher levels of conditional cooperation than in random matching.*

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Comparing out-group with random matching yields somewhat mixed results. In stage 3, the average changes in random matching conditional cooperation (compared to stage 1) are lower than in out-group matching for most of the range of group members' contributions (Wilcoxon rank-sum test, p=0.0006). In stage 4 (compared to stage 3), however, they are mostly higher. Yet, this difference is not significant (Wilcoxon rank-sum test, p=0.7995). Taking a conservative stance, we thus conclude that there is no consistent difference between preferences for conditional cooperation in random and out-group matching. Consequently, we reject hypothesis 1C, which derives that the level of conditional cooperation should be consistently lower in out-group than in random matching.

RESULT 5: *The level of conditional cooperation in out-group and random matching is not consistently different.*

Lastly, this analysis reveals significantly higher changes in conditional cooperation in case of in-group compared to out-group matching for both decision stages (Wilcoxon rank-sum test, $p_3=0.000$, $p_4=0.000$). This effectively reinforces the results of the previous section.

RESULT 6: *The difference in cooperation preferences between subjects matched with in-group and out-group members is consistently identifiable across subjects, as well.*

4.3   Social Identity and Cooperation Types

In order to deepen our knowledge about cooperation type stability, we analyze whether and how subjects switched cooperation type when matched with in- and out-group members. Overall, the relative share of conditional cooperators, free-riders and others[20] in random matching of stage 1, in-group and out-group matching is in line with the literature. Conditional cooperators form the most common type (63 percent), followed by free-riders (approximately 19 percent) and others (approximately 18 percent) and no significant treatment effects on type distribution can be found.[21] Consequently, we have to reject hypothesis 2B, which derives that in-group matching ought to yield higher shares of conditional cooperators and lower shares of free-riders. Thus, social identity as we have induced in the experiment does not affect the aggregate distribution of cooperation types.

RESULT 7: *The distribution of cooperation types is relatively stable across all treatments.*

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[20] The category "others" subsumes all subjects of which there were too few to be included as a separate category, such as hump-shaped and unconditional cooperators.

[21] We tested for statistical differences using a chi-square test. Usually, it is only applicable for dependent observations, which is why we simulated a test statistic distribution using the relative share of cooperation types observed in the control treatments. This non-significant result is robust to various ways of testing, for instance analyzing treatment sequences independently or comparing the ID-treatments with control treatments.

Looking at the changes in cooperation types at individual level, Table 3 contains the nine possible combinations, which are expressed in actual frequencies (upper number) and frequencies that are expected to occur by chance alone (lower number). Both numbers represent the shares of total participants taking part in the ID-treatments (135).[22] In terms of actual frequencies there is a rather high stability of cooperation types. 88.2 percent of all subjects did not change their cooperation type in response to whom they were matched with – in both treatments 58.5 percent were conditional cooperators, 15.6 percent remained to be free-riders and 14.1 percent stayed in the "other" category. Using Cohen's Kappa as a measure of stability, automatically correcting for frequencies that are expected to occur by chance alone, we confirm that there is a very high overall stability of cooperation types, no matter how subjects are matched.[23] Nevertheless, the kappa score is statistically different from perfect agreement ($\varkappa=1$), so that we cannot rule out completely that shifts take place. Indeed, 5.2 percent of subjects switched from being in-group conditional cooperators to free-riders in out-group matching. In comparison, only 0.7 percent of subjects switched from out-group conditional cooperator status to being a free-rider in in-group matching. Though merely weakly significant (p=0.0730) a sign test for matched pairs confirms that when matched with individuals that do not belong to their own identity, subjects are more likely to choose to free-ride on the contributions of others.[24] In contrast, we do not find an even marginally significant difference in the propensity to be a conditional cooperator in the different treatments. Hence, we have to partially reject hypothesis 2A according to which subjects show a higher propensity to be a conditional cooperator in in-group than in out-group matching, as well.

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[22] Please note that we deliberately did not include random matching of stage 1 into this analysis, firstly because we are mainly interested in type shifts between the ID-treatments, yet also since random and ID matching never take place in identical decision stages.

[23] $\varkappa_{in,out}$ = 0.779 (se= 0.0635, p=0.0000). See Landis and Koch (1977) for guidelines on the interpretation of Cohen's Kappa.

[24] As a robustness check we ran a fixed effects conditional logit regression on the probability to be a free-rider in the different matching settings (standard errors clustered around n). Here we similarly find that there is an increased likelihood to become a free-rider when matched with out-group members, which is borderline significant (t = 0.103).

		Out-Group		
		CC	FR	OT
In-Group	CC	**58.5** **(39.6)**	5.2 (14.1)	0.0 (9.9)
	FR	0.7 (11.0)	**15.6** **(3.9)**	1.5 (2.7)
	OT	3.0 (11.6)	1.5 (4.1)	**14.1** **(2.9)**

Table 3 – Combinations of Cooperation Types in In- and Out-Group Matching as Share of Total Sample Size (135). Upper (Lower) Numbers Denote the Observed (Expected) Frequency of Being Conditional Cooperator (CC), Free-Rider (FR), Other (OT)

RESULT 8: *While the individual propensity to be a conditional cooperator is stable no matter how subjects are matched, there is a marginally increased probability to be a free-rider when subjects are matched with out-group members compared to in-group matching.*

Summing up, although there is an increased propensity to be a free-rider when matched with individuals of a different identity, we do not find strong evidence that social identity significantly impacts on cooperation types in global. Yet, this is not totally surprising, since the common definition of conditional cooperators subsumes many different forms of contribution strategies. Hence, even if subjects' degree of conditional cooperation drops considerably when going from in-group to out-group matching, they may still be classified as conditional cooperators. Consequently, an analysis of types may only be secondary to finer grained analyses of the quality of conditional cooperation as demonstrated by the previous section.

5 Conclusion and Policy Implications

Positive economic theory traditionally assumes that individuals' preferences are stable. This article contributes to the understanding of cooperation preferences in the provision of public goods by empirically analyzing whether these are indeed stable in decision situations involving salient identities of the subjects one interacts with. Our results indicate that this is clearly not the case. Cooperation preferences are greatly dependent on the social environment. Specifically, when matched with individuals of a common identity, subjects across the board exhibit significantly higher levels of conditional cooperation and thus less self-serving bias than when matched with individuals of different identities. At each given level of (expected) contributions of their group members, subjects in in-group matching will therefore contribute more to the public good than in out-group matching. Consequently, social identity seems to be a determining factor which impacts on social welfare by altering subjects' preference for conditional cooperation.

From a policy perspective these results are of crucial importance. By means of positive belief management, economic policy already tries to exploit that most people are willing to cooperate if

others do so, as well. Yet, this mainly addresses conditional cooperators. Still not having any indication how purely selfish people react to this institution we provide evidence that not only conditional cooperators´ but also free-riders´ affinity for cooperation can be systematically increased simply by mitigating one´s perceived feeling of belonging to the group one interacts with. In order to enhance the provision of public goods, social identity thus seems to be an effective tool, in addition to the instruments of belief management, for improving social welfare.

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