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Discrimination via Exclusion: An Experiment on Group Identity and Club Goods*

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Abstract

We study, using laboratory experiments, the impact on cooperation of allowing individuals to invest in group-specific, excludable public goods. We find that allowing different social groups to voluntarily contribute to such goods increases the total contributions. However, a significant proportion of that contribution goes towards the group-specific good, rather than the universal public good, even when the latter has higher financial returns to cooperation. We find that this behaviour is consistent by social identity preferences, as expressed by a concern for the welfare of people of the same social group, and cannot be explained by unconditional inequality aversion or reciprocity.

Keywords: club goods, social identity, experiment.

JEL classification numbers: C92, D02, D03, H41

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1 Introduction

Individuals often form voluntary groups designed to produce particular goods with a view to derive mutual benefit from producing and/or consuming those goods, as well as to exclude these benefits to non-members. Such goods are denoted as club goods. Many club goods are institutional expressions of various forms of group identity, in that membership of those groups is drawn often along ethnic, gender or religious lines. As such, those not sharing that identity are excluded from accessing such clubs' services or goods. Examples range from some private member clubs, whose externalities are the business networks membership provides to faith schools.[1]

One theoretical justification for this phenomenon lies in Social Identity Theory, which argues that membership of social groups shapes individual preferences. This may be because group membership instills particular norms of behaviour (Akerlof and Kranton, 2000); or because it leads individuals to have a concern for the status of the group to which they belong (Shayo, 2009); or even because individuals may have greater concerns for the welfare of members of their group than for outsiders (Tajfel et al. 1971; Chen and Li, 2009). Such preferences may lead individuals to seek to restrict the access to certain privately-provided public goods to members of their own constituency.

As societies become more diverse, people increasingly rely on their communities to provided certain club goods in order to maintain their distinct identity. As a result, we observe services such as schools, and religious and cultural centres being provided by different social groups, with a view to be used by these specific constituencies. Club goods are typically close substitutes for public goods and this can have important implications regarding both financing of public goods and utility derived from these public goods. This raises important questions: For instance, does the ability of one or more social groups to privately provide an group-specific excludable public good lead to a general decline in public good provision? Furthermore, is this counterbalanced by an equivalent increase in club good contributions, or does the availability of club goods lead to a generalised fall in cooperation?

In this paper we study the effect on behaviour in a contribution game when people have the option to contribute towards a social group-specific excludable public good in addition to a pure public good, relative to the case when only the pure public good is available. In particular, we wish

[1] For a discussion of the role of private member clubs and their increasing relevance in society, see Economist (2012). Faith schools are learning institutions which are typically operated and or financed by members of a particular faith and community for the children from the same faith or community.There are 20,000 maintained or government-supported schools in England, of which 7,000 are faith schools (Department of Education, UK, 2010).

to understand whether or not total contributions change as a function of the presence of the club good, and to what extent these changes are driven by social identity preferences. That is, does the membership to a social group affect the way individuals contribute to public goods? Furthermore, are contributions to the club good work as punishments to non-cooperative out-group members, or do they function as rewards to in-group cooperators?

In the first part of our experiment, subjects self-select into one of two social groups depending on their choices in a task which is completely unrelated to the main experiment. In other words, we use a very weak form of group membership, in the tradition of the minimal group paradigm (Tajfel et al., 1971). In the second part of the experiment, subjects played a six-player cooperation game in which three subjects belonged to one social group and the other three belonged to the other group. Subjects received an endowment, which they could keep to themselves, or invest in a public account, the public good, whose returns were divided equally between the six players, or invest in a group-specific account, the club good, whose returns would be divided equally between the three players from their group.

We implemented two treatments: one where the marginal per capita return (MPCR) of the public good was equal to that of the club good and another where the MPCR of the club good was twice that of the public good. In the first treatment, the benefits from cooperation are higher in the public good, since the MPCRs are the same, but there are more people contributing to the public good. In the latter, the financial returns to cooperation both club and public good are the same, as the MPCR of the club good is normalised to the number of contributors.

Public good contribution and various related aspects have been analysed extensively in the past decade in experimental economics, but experimental studies on club goods are rare. The focus of experiments in this area has been on the role of exclusion or ostracism as a sanctioning device for non-cooperation and testing its effectiveness on mitigating free-riding, rather than on the effect of multiple public goods, some of which may be excludable.

Cinyabuguma et al. (2005) studied a 16-player linear public good, in which after each round players could indicate at a cost of a fraction of their endowment, any number of other subjects to be expelled. Any subject who received more than 50% of expulsion "votes" was moved to a separate group in the following period, and played a public good game with members of that group. The public goods game played by expelled subjects had a smaller individual endowment than the main public good game and there was no chance of further expulsion. Maier-Rigaud et al. (2010) report data from a six-player linear public good game. In their experiment, at the end of each period, subjects could vote on one person to be excluded from the group. Any player receiving more than 50% of votes was expelled. Expelled subjects received a fixed payment for the remainder of the experiment. In both papers, low contributors were more likely to be expelled from the initial group, and contribution levels by non-expelled subjects were higher than the expelled subjects.

A different strand of literature looks at exclusion from enjoying the benefits of group production. Swope (2002) introduces exclusion in a four-player linear public good by enforcing an exogenous rule in which subjects who contribute less than a minimal amount in a given period do not get any return from the public good in that period. Kocher et al. (2005) set up a three-player public good game in which in every period two players are insiders, who set up a threshold contribution level. The final player, the outsider, will only receive his share of the public good if his contribution exceeds the threshold determined by the insiders. In both papers, the imposition of a threshold contribution level leads to significant increases in contributions.

Croson et al. (2007) study a different type of exclusion technology in linear public good, minimum-effort and maximum-effort games. Across the three types of games, they introduce a rule in which the lowest contributor would not receive any payoff resulting from the public good. They consider a further treatment in which the payoff share of any excluded subjects is redistributed among the remaining subjects. Once again, the ability to exclude leads to higher cooperation levels.

Our analysis differs from the previous studies of excludability in public good contribution games in two ways. We introduce excludability, not through the ability of excluding someone from a common good, but by generating two groups and giving subjects the option to contribute either to a public good or to a group-specific good. As such, we are able to study both the potential of exclusion as a punishment device, as well as the role group-specific club goods play in heterogeneous societies.

In this sense, our paper is closely related to Blackwell and McKee (2003), who studied the impact of introducing three group-specific, excludable public goods in a group of 12 people. The authors report on data from four sessions; in each session 12 subjects were randomly allocated to one of three groups, identified by a colour. In each of 10 rounds, participants had to decide how much of their endowment to allocate to a 12-player public good, or to their four-player club good. In all four sessions, the MPCR to the club good was equal to 0.3, but the MPCR to the global public good was different for each session, taking the values of 0.1, 0.15, 0.2 and 0.3. Total contributions to the global public good increase as the global public good MPCR increases. In particular, the authors find that financial motives drive the choice by subjects on which type of good to contribute. As soon as the global good's return to cooperation is as good as that of the club good, subjects contribute more of their endowment to the global good. Furthermore, the authors find no trade-off between club and public goods. Instead they find contributions decline as experiment progresses, but the ratio of club to global public good contributions stays constant. The authors argue this is due to the large number of groups within each session.

Our experiment differs from Blackwell and McKee (2003) in two important ways. Firstly, we generate two groups in our experiment, as opposed to three. This makes group membership much more salient than in Blackwell and McKee (2003), which should maximise positive in-group and negative out-group biases. Secondly, while Blackwell and McKee (2003) randomly assign subjects to groups, we make group selection endogenous, and we follow that by a short group task which ought to lead to a higher degree of affiliation to the group in our design.

Like the existing literature on exclusion, we find that the introduction of a club good leads to a rise in total contributions (public plus club good), significantly so when the MPCRs of the club good is normalised to group size. However, we find evidence that contributions to the club good are not mainly driven as punishment to non-contributors to the public good. Rather, we find significant evidence of in-group biases, which are manifested by positive in-group reciprocity. Even when club good contributions are dominated by contributions to the club good, we find positive levels of contributions to the club good, as well as evidence that these positive contributions are, on average, reacting to past levels of contribution by other in-group members. That is, we uncover a hitherto unexplored mechanism of excludable public goods: they are institutions which allow subjects to display their preferences for interaction with their in-group members, and as means to engage in positive in-group reciprocity. Unlike Blackwell and McKee (2003), we also find evidence that subjects exploit the substitutability between club good and public good contributions, such that club goods function as punishment devices. However, this punishment device seems to be limited to out-group members, and only when it is financially attractive.

The remainder of the paper is organised as follows. Section 2 outlines a simple model of social preferences and applies these preferences to the linear public good game, and analyses the impact of excludability along group lines. Section 3 describes the experimental design. Section 4 presents the results, and Section 5 discusses the main findings of the paper. Section 6 concludes.

2 Theory

In this section we will introduce a simple model of in-group/out-group biases in the context of an inequality aversion preferences. We then apply it to a contribution game with a pure public good and an group-specific, excludable public good. The model forms the basis of the hypotheses of the experiment.

2.1 Social Preferences

We draw up on two strands of literature: firstly from social sciences, we use Allport (1954) to develop inter-group and within-group preferences. Secondly, inequality aversion preferences preferences are adapted from McLeish and Oxoby (2007), where an individual's utility is a weighted average of his own monetary payoff and the monetary payoff of others. The utility of player i is given by

$$u_i(\pi_i, \overline{\pi}^I_{-i}, \overline{\pi}^O_{-i}) = \left(1 - \alpha^I_i - \alpha^O_i\right) \pi_i + \alpha^I_i \overline{\pi}^I_{-i} + \alpha^O_i \overline{\pi}^O_{-i} \tag{1}$$

where $\pi_i(x)$ is the monetary payoff, $\overline{\pi}^I_{-i}$ and $\overline{\pi}^O_{-i}$ are the average monetary payoff of the in-group and out-group members relative to player i, x is the strategy played by i, and α^I_i and α^O_i are the weights player i puts on the average payoff of in-group and out-group members, respectively. We assume $\alpha^I_i > \alpha^O_i$, $\alpha^I_i, \alpha^O_i \in [-1, 1]$ (see Chen and Li (2009)) and $\alpha^I_i + \alpha^O_i < 1$. The last assumption ensures that players do not burn money. We define another variable, $\overline{\alpha}_i$ which is the weight an agent puts on the average payoff in case the agent is in a non-identity primed group or when agents do not belong to any in-group or out-group. Chakravarty and Fonseca (2012) find evidence consistent with $\alpha^I_i > \overline{\alpha}_i > \alpha^O_i$. We make the same restriction in this paper.[2]

2.2 Model

There are n players, who participate in a linear contribution game, where players can contribute to a public good and/or to a club good. The club good is enjoyed only by in-group members. Let the player i's contribution for the public good be x^p_i and his contribution to the club good be x^c_i. Player i receives a monetary payoff π_i given by:

$$\pi_i := y - x^p_i - x^c_i + a \sum_{j=1}^{n} x^p_j + b \sum_{j=1}^{k} x^c_j, \tag{2}$$

where y is the initial endowment and $0 < a < 1 < na$ is the marginal per capita return from the public good, and $0 < b < 1 < kb$ is marginal per capita return from the club good. There are

[2]Chakravarty and Fonseca (2012) develop a model where α^I_i and α^O_i vary with the relative in/out-group size.

two distinct sub-groups in the n player group, both with $k = n/2$ members. Combining the utility function with the payoff function, we get:

$$u_i(x_i, \overline{x}^I_{-i}, \overline{x}^O_{-i}) = y - x^p_i - x^c_i + a\sum_{j=1}^{n} x^p_j + b\sum_{j=1}^{k} x^c_j + \alpha^I_i(x^p_i + x^c_i - \overline{x}^{I,p}_{-i} - \overline{x}^{I,c}_{-i}) + \alpha^O_i(x^p_i - \overline{x}^{O,p}_{-i} - \overline{x}^{O,c}_{-i}) \quad (3)$$

From the above we get the marginal benefit from contributing to the club good as $(b-1)+\alpha^I_i$, while the marginal benefit from contributing to the public good is $(a-1) + \alpha^I_i + \alpha^O_i$. So if the marginal benefit is greater when contributing to the club good than the public good then the player will contribute to the club good.

We are interested in the behaviour of players when the group is completely homogenous and when players belongs to either of two equally sized sub-groups. It is in the latter case when the player can choose to contribute to the public good, or club good or both and when biases regarding in-group and out-group can influence these contributions. When there are two equally sized sub-groups we can expect bias for players of one's own kind, α^I_i, to be highest and the negative bias against the players of different kind, α^O_i, to be highest.[3] In this game where players can contribute to either a public good or a club good, we analyse the absolute and relative contribution to the two goods when the only one group exists and compare it to the case when two groups exist. In either case, this game has an equilibrium with positive contributions in public goods or club goods, or both. (see Appendix.)

Given the preferences described above we expect that total contributions are highest when club goods are present and their financial return is equivalent to that of the public good. If we set the financial reward from cooperation equal in both public and club goods, then it is only the degree to which people dislike out-group members which will influence the decision to contribute to the public or the club good. One would then expect that the club good contributions dominate pure public good contributions in the socially fragmented group compared to the homogenous groups. This is derived from the following; the financial benefit from the public good is $a\sum_{j=1}^{n} x^p_j$ and the financial benefit from the club good is $b\sum_{j=1}^{k} x^c_j$. Given n, k, if a,and b are such that the financial benefit from the club good and the public good are same then for the agents the marginal contribution to club goods will dominate the marginal contribution to the public goods if $\left[\alpha^I_i + \alpha^O_i\right] < \alpha^I_i$. With two equal sub-groups and highest level of biases the positive bias for in-group players will dominate and correspondingly the club good contributions dominate if it is such that financial benefit is the same from the club good and public good.

[3]For a discussion on how biases change as relative sub-group size changes see Chakravarty and Fonseca (2012).

When the financial returns to contribution to the public good exceed that of the club good, the net effect is ambiguous. Total contributions will be higher than the public good only case if the out-group bias is sufficiently high to counter the financial benefit from cooperating with out-group members.

Based on the discussion above we develop our two main hypotheses, which are concerned with how contributions change when there are two sub-groups and individuals can contribute to club goods.

Hypothesis 1: If the marginal per capita returns of the public and the club good are the same, that is, the public good is financially more attractive, individuals will contribute more to the public good.

Note that for the financial return from the club good contributions to be the same as public good good contributions the marginal per capita return (MPCR) from club goods has to be higher, since fewer agents contribute to the club good by definition. If MPCR is same for both goods then the public good is financially more attractive compared to the club good. If the financial motives dominate the in-group bias then we have the above hypothesis. If the financial returns are the same in public and club goods then given the biases discussed above we formulate the next hypothesis:

Hypothesis 2: If the financial return to cooperation is the same in both club and public goods, club good contributions will dominate public good contributions.

Our final hypothesis is:

Hypothesis 3: Total contributions will be higher when both club and public goods are available relative to when only public good contributions can be made.

Here we expect that the total contributions made will go up if the players have an option to contribute to club goods and public goods. The main reason is that players, due to their high in-group biases, will benefit from contributing to the club good, while due to free-riding and negative out-group biases, the benefit from contributing to the public good may not be positive or significant. We expect this will lead to higher total contributions and therefore less free riding.

3 Experimental design and procedures

In this paper we induce identity in participants artificially. Participants choose identity through their selection of their favoured painters, following the minimal group paradigm of Tajfel et al. (1971). This task of choosing paintings in order to belong to an identity is completely unrelated to the main focus of the experiment. Inducing artificial identity allows us to control number of factors regarding the decision making. We can cleanly study the effect of the identity we induce rather than other multiple identities a participant may find relevant. And we abstract away from any history of interaction.

By combining an artificial identity with strict anonymity in choices, we can ensure that this is the only salient factor which influences choices. We can then study the effect of identity while teasing out repeated interaction effects. While studying the effect of particular types of identity such as gender or race is very important, we feel that working with a generic identity fits the purpose of this study best.

Our experimental design encompasses three stages. Stage 1 assigns participants to two different groups by eliciting their preferences over two artists' paintings. Stage 2 is a problem solving task designed to reinforce participants' sense of affiliation to their group. Stage 3 is the actual contribution game. We elaborate on each stage below.

<u>Stage 1: Group Formation and Assignment.</u> We induced social identity by employing a similar design to Chen and Li (2009). Before each session, participants were shown five pairs of paintings; in each pair, one painting was done by Gustav Klee and the other by Wassily Kandisnky.[4] Each participant stated their preference for one of the paintings in each pair and if participants preferred three or more Klee paintings, they were assigned to the Klee group. Otherwise they would be assigned to the Kandinsky group. This meant that our groups were endogenously determined and also we could not guarantee how big each group (Klee or Kandinsky) would be in each session. The variation in group size across sessions was quite small.[5]

<u>Stage 2: Identity Reinforcement.</u> After the groups, Klee and Kandinsky, are formed, subjects participate in the following activity. They are given two paintings and they have to identify their authorship, one of which was painted by Klee and the other by Kandinsky. Participants were allowed to communicate through a chat box for ten minutes with their fellow group members, Klee or Kandinsky. Members of the Klee group could only see their own fellow group members comments and vice-versa. Participants received an individual payment for each painting they correctly identified. This stage was introduced to reinforce the participants' sense of identity.

<u>Stage 3: Contribution Game.</u> Following the identity reinforcement stage, subjects were ran-

[4]Our choice of the painters were to be in line with the existing literature on Minimal Groups.

[5]Due to this the number of observations which we have collected do not match in all treatments. This does not affect our statistical analysis.

domly allocated to groups of six. Subjects knew the composition of their own group, but they were not aware of the composition of the other groups in the session.

All groups played a standard linear public goods game over twenty rounds with fixed matching. In practise, ethnic or social groups have, to some extent, the ability to exclude outsiders from enjoying a particular public good. A case in point are state schools in Belgium, which are typically divided along linguistic lines: students in the Flemish half of the country cannot take classes in French and vice versa. So to capture this aspect participants can contribute to a public good which is non-excludable, a club good which is excludable and the remaining option available is not to contribute. Therefore, participants could choose between contributing to a non-excludable public good whose beneficiaries were all six players, or to a club good whose only beneficiaries were their fellow group members (players could also free-ride by not contributing to either good.) In other words, we are giving the opportunity to our subjects to discriminate against out-group members via exclusion.

Subjects had twenty tokens that they had to allocate between a private and a public account. Payoffs were determined by the following equation, following Fehr and Gaechter (2000).

$$\pi_i := 20 - x_i^p - x_i^c + 0.4 \sum_{j=1}^{n} x_j^p + b \sum_{j=1}^{k} x_j^c \tag{4}$$

However, having two public goods with different group sizes introduces a further complication. If both goods have the same marginal per capita return (MPCR), then the financial return to cooperation will be higher for the good with the largest number of contributors. Therefore, if both public good and club good have the same MPCR, the public good will be financially more attractive. In this case, subjects face a trade-off between the higher financial reward from contributing to the public good and the higher identity utility from contributing to a club good.

The MPCR of the club good, b, is the main treatment variable. In CG+PG Equal, the MPCR of both public and club goods is equal to 0.4. In CG+PG Diff, the MPCR of the club good is equal to 0.8, while the MPRC of the public good is equal to 0.4. Finally, PG is a control treatment where subjects from either group can only contribute to a public good.[6] Table 1 outlines the different treatments and number of independent observations.

[6]The data from this treatment is taken from a companion paper, Chakravarty and Fonseca (2012), which reports a set of related experiments on group fragmentation and public provision. The experimental design of that paper is similar to the present paper and it was conducted by the same team of experimenters. As such, we feel this is an appropriate control treatment.

Table 1: Experimental design

Treatment	*PG*	*CG+PG - Equal*	*CG+PG - Diff*
# of obs.	8	5	5

Table 2: Average public and club good contribution levels by treatment

	CG	PG	Total
PG+CG - Equal	2.85	5.30	8.14
	(0.93)	(2.16)	(2.62)
PG+CG - Diff	9.09	2.40	11.49
	(3.31)	(1.04)	(2.32)
PG	-	-	7.60
			(1.17)

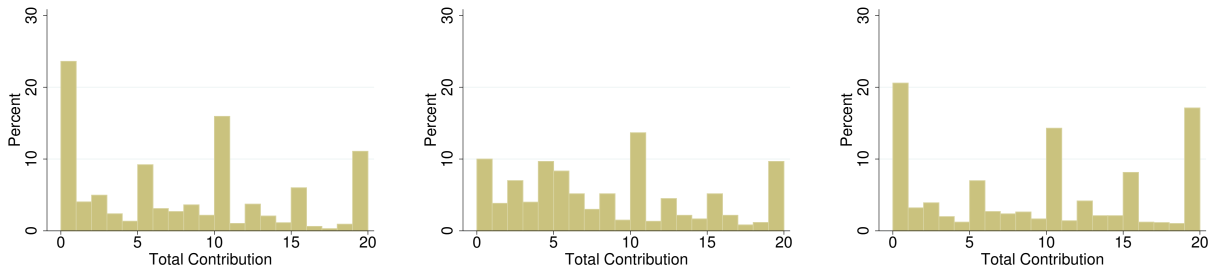
Standard deviations in parenthesis

At the end of each round, a screen informed subjects of the individual contributions by each of the other five subjects in their group, as well as his identity (Klee or Kandinsky.) To mitigate individual reputation effects, the software randomised the display order of individual contributions from round to round, and this was common information. Each session consisted of eighteen participants and lasted between 60 and 90 minutes. At the end of the experiment, subjects were paid individually in cash. Sessions took place in the Fall of 2010. The experiment was conducted using z-Tree Fischbacher, 2007). A total of 108 undergraduate students participated in the experiment, who received on average £8.27. The instruction set is available in the Appendix.

4 Results

We analyse the data from the treatment where subjects can exclude out-group members by contributing to a club good, whose MPCR can take one of two values, depending on the condition. We compare behaviour in those two conditions to the case where club good option is absent, which corresponds to the *3-3* Public treatment in Chakravarty and Fonseca (2012), who study the effect of identity in standard public goods games using the same experimental protocol as the present experiment.

We begin by looking at the average contribution levels across the different conditions, summarised in Table 2. The average contributions to public and club goods are positive across all treatments. In the *Equal* condition, contributions to the public good are higher than contributions to the club good (Wilcoxon Sign Rank test for paired samples (WSR), $p = 0.08$). When we adjust



(a) PG   (b) PG+CG - Equal   (c) PG+CG - Diff

Figure 1: Histograms of total contributions by treatment.

the club good's MPCR to in-group size (the *Diff* condition), the average contribution to the club good is higher than the average contribution to the public good (WSR, $p = 0.08$).

This suggests that the effect of group identity is sufficiently strong such that subjects will contribute to the club good, even when doing so is dominated by the non-excludable public good. When the two goods have equivalent financial returns, the rate of contribution to the club good clearly exceeds that of the public good.

Result 1a: Contributions to the club good are positive, even when the financial returns to the club good are lower than the pure public good.

Result 1b: When the financial returns to both public and club goods are equivalent, contributions to the club good exceed those to the public good.

What are the consequences of the presence of a club good on free-riding? A simple but effective way to compare the effect of the introduction of the club good on behaviour is to compare the amount of endowment subjects keep to themselves in the different treatments. There is a small though not significant difference in average total contribution when we compare *PG* to the *PG+CG-Equal* (Mann-Whitney test for independent samples (MWU), $p = 0.66$), and a large and significant difference when comparing *PG* to *PG+CG-Diff* (MWU, $p = 0.01$).

Figure 1 shows histograms of total contribution for all treatments. There are two points in the support of the distribution of contributions that merit particular interest: no contributions (0) and full contributions (20). In the control condition, *PG*, the modal observation is indeed no contribution, with other spikes at 10 and 20. Introducing a club good leads to a significant fall in the share of full-free riders. The share of observations recording free-riding drops from 23 percent in *PG* to 10 percent in *PG+CG-Equal* (2-sided Chi-sq test, $p < 0.01$) and to 17 percent in *PG+CG-Diff* (2-sided Chi-sq test, $p < 0.01$). When we look at the fraction of full contributors, we see almost no difference between *PG* and *PG+CG-Equal* (11 percent and 9 percent, respectively; $z = 0.76, p = 0.45$), but a large difference between *PG* and *PG+CG-Diff* (11 percent and 26 percent, respectively; $z = -7.87, p < 0.01$).

RESULT 2: The introduction of a club good leads to a drop in free-riding, especially when the financial return to both types of goods are equivalent.

We conclude the data analysis by studying the determinants of public and club good contributions. Are club good contributions driven by positive in-group reciprocity or by negative out-group reciprocity? In other words, do subjects use club good contributions as a form of retaliation against free-riding by out-group members, or purely as a mechanism to only interact with in-group members? To answer this question, we constructed two variables, FreeRide, which takes the value of 1 if total contributions by player i in period t equal zero, and 0 otherwise; and *FracCG* which is equal to the share of contributions to the club good as a fraction of all contributions by a subject in a given period ($FracCG_{i,t} = \frac{CG_{i,t}}{CG_{i,t}+PG_{i,t}}$).

We first report on the determinants of free-riding. To do so, we conducted random-effect probit regressions using the lagged total contributions to public and club good by in-group members, the lagged total contributions to the public good by out-group members, and a time dummy. We report results from the PG+CG - Equal and PG+CG - Diff treatments separately. To test for treatment differences, we ran an estimation with pooled data with treatment and interaction dummy variables. The result of this regressions are in the Appendix.

In PG+CG - Equal, we see a positive and significant coefficient on In-group Club (t-1): the larger the total contribution from in-group members to the club good in the previous period, the more likely subjects are to free-ride. This could be a reflection of the fact that the club good has a low MPCR in this condition, which makes cooperation relatively less appealing. Contributions by in-group and out-group members to the public good in the previous period has no effect on free riding this period. We also find a small and marginally significant time trend. In PG+CG - DIff, the only significant coefficient is on the constant. Therefore, we find that the behaviour of both in-group and out-group players in the previous period has no effect on the likelihood of free-riding in the current period.

We now turn to behaviour conditional on positive total contributions. Table 4 displays the

Table 3: Random-effects probit estimates on the decision to free-ride

	PG+CG - Equal		PG+CG - Diff	
Out-group Public (t-1)	0.002	(0.019)	0.008	(0.027)
In-group Public (t-1)	-0.002	(0.012)	0.0002	(0.012)
In-group Club (t-1)	0.041**	(0.012)	-0.008	(0.006)
Period	-0.044*	(0.025)	0.056	(0.009)
Constant	0.735	(0.478)	-1.589***	(0.255)
ρ	$0.168^{\dagger}$		$0.105^{\dagger}$	
Obs; Groups	570, 5		570, 5	

***, **, *: coefficient significant at 1%, 5% and 10% level.

†: coefficient significantly different than zero at 1% level using LR test.

Group-level bootstrapped standard errors in parenthesis.

Table 4: Random-effects tobit estimates on the fraction of contributions allocated to the club good by non-free riders.

	PG+CG - Equal		PG+CG - Diff	
Out-group Public (t-1)	-0.001	(0.003)	-0.006***	(0.002)
In-group Public (t-1)	-0.002	(0.002)	0.001	(0.001)
In-group Club (t-1)	0.015***	(0.004)	0.005***	(0.002)
Own Contribution (t)	0.002	(0.005)	0.008***	(0.002)
Period	-0.007***	(0.002)	0.009*	(0.005)
Constant	0.350***	(0.072)	0.538	(0.057)
Wald χ^2	236.56		648.58	
Obs; Groups	510, 5		471, 5	

***, **, *: coefficient significant at 1%, 5% and 10% level.

Group-level bootstrapped standard errors in parenthesis.

results from random effects tobit regressions on the fraction of contributions assigned to the club good. We use as regressors the total contribution by out-group members to the public good in the previous period (Out-group Public (t-1)), the total contribution by in-group members to the public good in the previous period (In-group public (t-1)), the total contribution by in-group members to the club good in the previous period (In-group club(t-1)), the subject's total contribution to both goods in that period (Own Contribution (t)), and a time trend (Period).

In the PG+CG - Equal condition, higher contributions by in-group members to the club good in the previous period are correlated with a higher fraction of contributions in the present period. However, we find no relationship between the total amount contributed and the fraction of that total allocated to the club good. In the PG+CG - Diff condition, we find a negative correlation between total contributions to the public good in the previous period and the fraction of contributions assigned to the club good this period. We do not find a significant coefficient on the variable measuring total public good contributions by in-group members in the previous period, but we do find a positive and significant coefficient on the variable measuring total contributions by in-group members to the club good in the previous period.

Result 3: Contributions to the club good in period t are positively correlated with in-group club good contributions in period $t-1$ in both treatments, and negatively correlated with out-group public good contributions in period $t-1$, but only in the *PG+CG - Diff* treatment.

5 Discussion

The introduction of a club good leads to higher total contributions, partly through lower free-riding and partly at the expense of contributions to the six-player public good. However, when looking at the determinants of that change in contributions, the evidence from Tables 3 and 4 paint a nuanced picture of behaviour in our experiment, and how subjects use the club good. When the MPRC or the public good equals that of the club good, we observe a bifurcation of behaviour: higher club good contributions in the previous period lead to a higher frequency of free-riding; this is likely due to self-interest, as the returns to cooperation are too low due to the low MPCR relative to number of potential contributors. However, those who do not free-ride respond by allocating a higher share of their contributions to the club good. In other words, we find evidence of some positive in-group reciprocity, even when the return to club good – the reward from reciprocity – is quite low. Importantly, contributions to the public good in the previous period by either in-group or out-group members do not affect either the likelihood of free-riding, or the way in which subjects allocate their contributions.

When the MPCR of the club good is normalised to group size, such that the financial return from each dollar spent on the club good is the same as an dollar spent on the public good, we observe markedly different behaviour. The likelihood of free-riding is no longer correlated with in-group contributions to the club good. In fact, the decision to free-ride seems to be independent of decisions by other players in the game in the previous period.

When we focus on cases with positive contribution levels, we find evidence of out-group reciprocity: the more out-group members contribute to the public good, the lower the share of own contributions subjects allocate to their club good. We also continue to observe in-group reciprocity as in *PG+CG - Equal*. Furthermore, we observe that the fraction of contributions allocated to the club good is correlated to the total amount contributed: high contributors allocate a higher share of those contributions on the club than low contributors.

This evidence suggests that the role of in-group preferences is critical when determining behaviour in the experiment. The ratio of club good-MPCR to public good MPCR works as a price of reciprocity, both towards in-group members and out-group members. When that ratio equals one, it is very costly to reciprocate contributions to the club good by fellow in-group members or to reciprocate against out-group members who free-ride on the public good by switching contributions to the club good. We see some evidence of the former (in-group reciprocity), but no evidence of the latter.

When the ratio of MPCRs is equal to two, and the financial returns to cooperation in either good are equivalent (remember that the number of beneficiaries of the club good is half of that to the public good), punishing free-riders to the public good by contributing to the club good is now relatively inexpensive, and we see significant evidence of that in the data, but only towards out-group members. Furthermore, we continue to see evidence of positive in-group reciprocity; however, that in-group reciprocity is restricted to club good contributions, not to public good contributions.

This indicates that subjects treat the club good as primarily as an avenue of cooperation within their own social group. This is reinforced by evidence correlating club good contributions to total contributions – those highly motivated to cooperate, do so to a higher extent exclusively with fellow in-group members. However, whenever financially feasible, the club good can also work as a disciplining device to punish out-group free-riders.

This evidence is contrast with previous work on experiments in which subjects can contribute to both pure public good and club good. Unlike Blackwell and McKee (2003), in our experiment, subjects contribute more to club good than to the public good when the returns from cooperation are equivalent. Furthermore, we find our subjects use the club good as a punishment device to out-group members. It is likely that differences in behaviour in the two studies are caused by the higher saliency of group membership in our experiment. Firstly, our groups are more salient: we use two groups as opposed to three in Blackwell and McKee's study. Secondly, our subjects choose the group to which they belong, and engage in pre-game identity reinforcement activities, which further enhance the saliency of the identity. Finally, we consider six-player games, as opposed to 18-player games. These three factors combined may have led to the significant qualitative differences in behaviour across the two data sets.

6 Conclusion

With increasing ethnic and social fragmentation, there has been a debate if such increasing fragmentation is beneficial. One aspect of social welfare can be estimated through the production and provision of goods such as education or health. While these goods are typically public goods in nature, it is possible that they can also be produced as club goods for and by ethnic, religious or social groups. While a sense of group affiliation and biases may lead to fall in public good provision there may be an increase in club good provision. In our paper here we attempt to quantify these effects. Firstly, does the introduction of club goods leads to a decrease in the provision of substitute public goods? Secondly, to what extent club goods are provided, if at all? Furthermore, we seek to understand to what extent can such behaviour be driven by social identity preferences.

We find that the introduction of group-specific, excludable public goods leads to a higher level of cooperation relative to the case where the public good is the only option, at least as measured by total contribution levels. This increase comes partly at the expense of contributions to the public good. We find that club goods fulfil two functions: on one hand they work as mechanisms to express one's affiliation to one's social group via in-group reciprocity; on the other hand, they can act as punishment mechanism for out-group members who free-ride on the public good. Through experimental manipulations, we find that the former effect is stronger than the latter, in that when the financial returns to contributing to the club good are lower than the public good, we observe positive club good contributions, and we also observe evidence of subjects raising club contributions in response to higher club contributions by their fellow in-group members.

This suggests that social identity preferences can play an important role in determining behaviour even in minimal group settings, where the strength of affiliation to arbitrary groups is quite small. In reality, where affiliation to an ethnic or religious group is far more salient, particularly among immigrant communities, one would expect such effects to be more salient. Our results, in that light are encouraging. At face value, they suggest that diverse societies will have higher private investment in public goods, even if they are targeted at specific groups.

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A Experimental Instructions

Instruction Set

Welcome to our experiment. Please remain silent during the course of the experiment. If you have any questions, please raise your hand. You will now take part in a decision-making experiment. The amount you will receive for participating will depend on your decisions and the decisions of other participants. There will be 2 parts to this experiment. Before each part of the experiment begins, you will receive a set of instructions explaining the details of that particular part.

Once you complete all the decisions in a given part, we will move to the next part of the experiment. You will only receive information about the outcome of your choices at the end of the experiment. To keep track of your choices, we will provide you with a decision form. Your payoff in this experiment will be equal to the sum of payoffs in each of the individual parts. The payoffs throughout the experiment will be denominated in Experimental Currency Units (ECU); 1 ECU is worth 20 cents. Once the experiment ends, your payoff will be calculated and you will receive your payment in cash.

Part 1 (All Treatments)

In this part we will show you five pairs of paintings by two artists. For each pair of paintings, you must choose the one you prefer. Once everyone makes their five choices, we will divide participants into two groups according to which artist they preferred.

Once you have been allocated to one of the groups, we will show you a further two paintings. Your task will be to identify which artist painted which painting. You will be allowed to confer with your fellow group members in order to determine the answer to the two questions. To this effect, you will have access to a chat programme, through which you can offer help or get help from your fellow group members.

Messages you post in the chat box will only be visible to members of your own group. You will not be able to see the messages posted by members of the other group and vice-versa. You will be able to communicate with your fellow group members for 10 minutes before submitting your answers. You are free to post how many messages you like. There are only two restrictions on messages: you may not post messages which identify yourself (e.g. age, gender, location etc.) and you may not use offensive language. For each correct answer you will earn 10 ECU. Once everyone submits their answers, the experiment will move to the second part. You will only be informed of your payoff in this part of the experiment at the very end of the session.

Part 2 (PG Treatment) – only seen after the end of Part 1

In this part of the experiment you will be matched with five other participants. You will be interacting with the same five participants until the end of the experiment.

There will be 20 rounds in this part of the experiment. At the beginning of each round, each participant will receive 20 ECUs. We will call this your endowment. Your task in each round is to decide how to use your endowment. You must decide how many ECUs you want to contribute to a project and how many you want to keep for yourself. The consequences of your decision are explained in detail below. Your payoff is given by the following formula:

Your Payoff = (20 ECU - Your Contribution) + (0.4*Total Contribution)

This formula implies that your payoff in every round is based on two parts:

1. The ECUs you kept for yourself: (20 ECU - Your contribution.)
2. The income from the project, which is 40% of the total contribution from you and from the other five participants.

The payoff of each of the six participants is calculated in the same way. This means that the income from the project is the same for everyone.

To fix ideas, let's consider a few numerical examples. Suppose that the total contribution to the project is 60 ECU. In this case, each of the six participants receives an income from the project of 0.4*60=24 ECU. If instead the total contribution to the project is 9 ECU, then each of the six participants will receive an income of 0.4*9=3.6 ECU from the project.

Each ECU you keep to yourself raises your payoff by 1 ECU. Each ECU you contribute to the project raises the total contribution to the project by 1 ECU and causes your income from the project to rise by 0.4*1=0.4 ECU. The income of the other five participants will also rise by 0.4 ECU, so that the total income of the six participants from the project will go up by 2.4 ECU. Your contribution to the project therefore also raises the income of the other participants. Conversely, contributions to the project by other participants also raise your income; for each ECU contributed by another participant, you earn 0.4*1=0.4 ECU.

Remember that ECUs earned in one round do NOT carry over to subsequent rounds. You will start every round with the same endowment of 20 ECUs.

Once all participants have made their decisions, you will be informed about your decision, the decision of each participant, the total amount of ECUs contributed to the project and your payoff. You will also know whether each person with whom you are playing belongs to either the Kandinsky or the Klee group, but not their exact identity. To this effect, the computer will scramble the order in which the other participants are listed when individual contributions are shown at the end of every round.

Once the 20th round is over, the experiment will be over. The computer will select two rounds at random. Your payoff in those two rounds plus the payoff from part 1 will determine your total earnings in the session.

Part 2 (*PG+CG: 3-3* Treatment) – only seen after the end of Part 1

In this part of the experiment you will be matched with five other participants. You will be interacting with the same five participants until the end of the experiment. There will be 20 rounds in this part of the experiment. At the beginning of each round, each participant will receive 20 ECUs. We will call this your endowment. Your task in each round is to decide how to use your endowment.

You must decide how many ECUs you want to contribute to a public project, which is available to all six participants, how much to contribute to a project which is only available to people of your own group (Klee only if you are a member of the Klee group; Kandinsky only if you are a member of the Kandinsky group) and how many ECU you want to keep for yourself. The consequences of your decision are explained in detail below. Your payoff is given by the following formula:

Your Payoff = 20 ECU + (0.4*Total Contribution to the Public Project - Your Contribution to the Public Project) + (0.8*Total Contribution to the Group Project - Your Contribution to the Group Project)

This formula implies that your payoff in every round is based on three parts:

1. The ECUs you kept for yourself: (20 ECU - Your contribution).
2. The income from the public project, which is 40% of the total contribution from you and from the other five participants.
3. The income from the group project, which is 80% of the total contribution from you and from the other two members of your group (Klee/Kandinsky only).

To fix ideas, let's consider a few numerical examples.

Suppose that each of the six participants contributes 10 ECU to the public project and 0 ECU to their own group's project. This means the total contribution to the public project is 60 ECU and the total contribution to your group project is 0 ECU. In this case, the income from the public project is 0.4*60=24 ECU to each of the six participants, while the income from your group's project (only payable to your group's members) is 0 ECU.

Suppose instead that each of the six participants contributes 0 ECU to the public project and 10 ECU to their own group's project. This means the total contribution to the public project is 0 ECU and the total contribution to your group project is 30 ECU. In this case, the income from the public project is 0 ECU to each of the six participants, while the income from your group's project (only payable to your group's members) is 0.8*30= 24 ECU.

Each ECU you keep to yourself raises your payoff by 1 ECU. Each ECU you contribute to the public project raises the total contribution to the project by 1 ECU and causes your income from the public project to rise by 0.4*1=0.4 ECU. The income of the other five participants will also rise by 0.4 ECU, so that the total income of the six participants from the public project will go up by 2.4 ECU. Your contribution to the project therefore also raises the income of everyone else.

Each ECU you contribute to the group project raises the total contribution to the group project by 1 ECU and causes your income from the project to rise by 0.8*1=0.8 ECU. The income of your other group members will also rise by 0.8 ECU, so that the total income of the three group members from the group project will go up by 2.4 ECU. Your contribution to the group project therefore also raises the income of your fellow group members, but not the income of non-group members.

In other words, 1 ECU invested in the public project yields a total benefit of 2.4 ECU to the six participants. 1 ECU invested in your group project yields a total benefit of 2.4 ECU to the three members of your group only.

Remember that ECUs earned in one round do NOT carry over to subsequent rounds. You will start every round with the same endowment of 20 ECUs.

Once all participants have made their decisions, you will be informed about your decision, the decision of each participant, the total amount of ECUs contributed to the public and group projects and your payoff. You will also know whether each person with whom you are playing belongs to either the Kandinsky or the Klee group, but not their exact identity. To this effect, the computer will scramble the order in which the other participants are listed when individual contributions are shown at the end of every round. Once the 20th round is over, the experiment will be over. The computer will select two rounds at random. Your payoff in those two rounds plus the payoff from part 1 will determine your total earnings in the session.

B Theory

Proposition 1: In the n-player VCM game, where each player i contributes x_i^p towards a public good and x_i^c towards a club good and receives a monetary payoff π_i such that $\pi_i := y - x_i^p - x_i^c + a\sum_{j=1}^n x_j^p + b\sum_{j=1}^k x_j^c$ and has social preferences $u_i(\pi_i, \overline{\pi}_{-i}^I, \overline{\pi}_{-i}^O) = u_i(\pi_i, \overline{\pi}_{-i}^I, \overline{\pi}_{-i}^O) = \left(1 - \alpha_i^I - \alpha_i^O\right)\pi_i + \alpha_i^I \overline{\pi}_{-i}^I + \alpha_i^O \overline{\pi}_{-i}^O$ where α_i^I, α_i^O are biases and $\overline{\pi}_{-i}^I$ and $\overline{\pi}_{-i}^O$ are the average payoff of player i's in-group members and out-group members, for a given degree of social fragmentation, S, it may have an equilibrium with positive contributions, x_i^p and x_i^c.

Proof: Throughout our analysis we will only consider symmetric equilibria, in that all members of the same group behave similarly in equilibrium. Given the utility function $u_i(\pi_i, \overline{\pi}_{-i}^I, \overline{\pi}_{-i}^O)$ and payoff π_i, $u_i(\pi_i, \overline{\pi}_{-i}^I, \overline{\pi}_{-i}^O)$ can be re-writen as

$$\begin{aligned} u_i(x_i, \overline{x}_{-i}^I, \overline{x}_{-i}^O) &= y - x_i^p - x_i^c + a\sum_{j=1}^n x_j^p + b\sum_{j=1}^k x_j^c \\ &\quad + \alpha_i^I(x_i^p + x_i^c - \overline{x}_{-i}^{I,p} - \overline{x}_{-i}^{I,c}) + \alpha_i^O(x_i^p - \overline{x}_{-i}^{O,p} - \overline{x}_{-i}^{O,c}) \end{aligned}$$

So $\frac{\partial u_i}{\partial x_i^p} = a - (1 - \alpha^I - \alpha^O)$ and $\frac{\partial u_i}{\partial x_i^c} = b - (1 - \alpha^I)$. Therefore $\frac{\partial^2 U_i}{\partial x_i^p \partial x_j^p} = \frac{\partial^2 U_i}{\partial x_i^c \partial x_j^c} = 0$. Using Topkis (1998), we know that an equilibrium exists. Further, we know that an equilibrium with positive contributions exists as long as $\frac{\partial u_i}{\partial x_i^p} \geq 0$ and $\frac{\partial u_i}{\partial x_i^c} \geq 0$ which is true as long as $a \geq 1 - \alpha^I(S) - \alpha^O(S)$ and $b \geq (1 - \alpha^I)$. Hence this game will have an equilibrium and at equilibrium the contribution may be a positive.