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Public good provision, punishment, and the endowment origin: Experimental evidence

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ABSTRACT

This paper studies contributions and punishments in a linear public good game, where group members have different sources of endowment. We compare the behavior of homogeneous groups, in which subjects are exogenously assigned the same endowments, with that of heterogeneous groups, in which half the group members have to exert effort to earn their endowments (effort subjects) and the other half are endowed with a windfall of equal value (windfall subjects).

If the opportunity to punish is absent, free-riding becomes the ubiquitous form of behavior over time both in homogeneous and in heterogeneous groups. If the opportunity to punish is present, contributions increase over time, although the two groups do not exhibit any differences in either the amount of contributions or the amount of punishment. Furthermore, effort and windfall subjects make similar contributions in heterogeneous groups.

Within the heterogeneous groups, over the entire time interval and conditional on the decision to punish, effort subjects punish (slightly) less severely than those who received windfall endowments.

1. Introduction

When asked to contribute to a public project that is of equal benefit to all members of a homogeneous group, individuals in the group may be expected to make equal monetary contributions, and any positive or negative deviation from the equal-contribution rule may be expected to result in sanctions (e.g., Fehr and Gächter, 2000; Herrmann, Thöni, and Gächter, 2008; Nikiforakis, 2008, 2010).

While the economic literature has mostly concentrated on the cooperation and punishment decisions of agents in homogeneous groups, in everyday situations cooperation in heterogeneous groups is a regular occurrence, rather than an exception. Furthermore, the heterogeneity among interacting agents has been shown to affect both the cooperation and punishment of group members (Nikiforakis, Noussair, and Wilkening, 2012; Reuben and Riedl, 2013). Unlike in homogeneous groups, agents in heterogeneous groups may be guided by diverging contribution rules (i.e., the equal- or equity-contribution rule), giving birth to a normative conflict as "there coexist multiple plausible rules about how one ought to behave in a given situation" (Nikiforakis et al., 2012, p. 798).

In this paper we study whether (all else being equal) differences in the source of group members' endowments affect the cooperation dynamics and the enforcement of distinct contribution rules in a linear public good game. One can imagine scenarios in which individuals who must exert substantial effort to earn their wealth have to cooperate with "privileged" individuals who are exogenously assigned to similar levels of wealth (e.g., by inheritance) in order to provide public goods that are beneficial for all community members. In such a setting, the effort exerted in earning the endowment can trigger strong property rights (Cherry, Frykblom, and Shogren, 2002; Oxoby and Spraggon, 2008), such that the emergence of a normative conflict is plausible. In particular, high-effort individuals may be guided by an equity-contribution rule whereby they believe it is genuinely fair that those who invest little or no effort should make higher contributions (e.g., Winter et al., 2012). Meanwhile, given that individuals may adhere to social norms in a self-serving manner (e.g., Elster, 1989 and references therein; Konow, 2000; Nikiforakis et al., 2012) low-effort individuals may expect everyone to contribute according to the equal-contribution rule. Hence, which contribution rule will emerge (and whether it will emerge at all) during the interaction between low- and high-effort individuals may be contingent on how the

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interested parties enforce that rule over time and how they react to the behavior of others.[2]

To investigate our research question, we use a variant of a linear public good game both with and without a punishment condition, where we manipulate the origins of group members' endowments.

If the opportunity to punish is absent in heterogeneous groups, as in Reuben and Riedl (2013), we observe low and decreasing contribution levels as "there is no a priori reason to assume that general willingness to comply varies with the type of group heterogeneity" (Reuben and Riedl, 2013, p. 128).

Most importantly, if the opportunity to punish is present, the endowment source manipulation fails to generate a normative conflict in heterogeneous groups. First, we document equal contribution levels by effort and windfall subjects in all periods of the game. Second, we find no differences in the contribution levels of homogeneous and heterogeneous groups. Third, in both groups, punishment follows a pattern in the spirit of the equal-contribution rule: an individual is punished if she deviates negatively from the average contribution of her group members.

The rest of the paper is structured as follows. Section 2 presents a brief literature review, Section 3 describes the experimental design, Section 4 discusses the results, and Section 5 concludes, providing possible explanations as to why the asymmetry in the group fails to generate a normative conflict.

2. Review of related studies

Studies that manipulate the endowment source in the public good game with homogeneous groups, such that all group members are of the effort type, have provided evidence of only a modest (if any) effect of effort on individuals' contributions (e.g., Clark, 2002; Cherry, Kroll, and Shogren, 2005; Harrison, 2007). Studies that manipulate the endowment source in a one-shot public good game, such that some of the group members either exert or are framed to exert more effort than the others, have differing findings in terms of the group members' contributions. Muehlbacher and Kirchler (2009) show that contributions are negatively correlated with the effort exerted to obtain the endowment as the group members who were framed to earn their endowments through a greater amount of effort were less cooperative than those group members who were framed to earn the money with relative ease. In contrast, Spraggon and Oxoby (2009) find an "inverse found money effect" in a two-person public good game, where effort subjects contribute more when they are matched with windfall subjects.

Our study differs from the above as we investigate a multi-period public good game, introduce a punishment opportunity into our framework, and study the interplay among contributions, punishment, and the origin of the endowment. Under these circumstances, we can also clarify the connection between the effort exerted to earn the endowment and the propensity to punish, which (to our knowledge) has been understudied, despite the extensive literature on public good games and the punishment of free-riders.

The heterogeneity of the groups' composition, the multi-period horizon of the game, and the opportunity to sanction free-riders relate our work to the research of Nikiforakis et al. (2012) and Reuben and Riedl (2013). Reuben and Riedl (2013) consider three sources of heterogeneity – differences in endowments, differences in endowments interacted with differences in contribution capacity, and differences in marginal benefits from the public good – while Nikiforakis et al. (2012) discuss only the latter and introduce a real-effort tournament, thereby increasing the heterogeneity between the two kinds of group members with the two best performers receiving the highest benefits from the public good.

[2] In the paper, when mentioning equity- or equal-contribution rules of behavior, we are referring to the differences between subject types.

This paper introduces a novel source of heterogeneity: differences in the effort required to earn the endowments. Unlike Nikiforakis et al. (2012), in our setting, all other experimental features being equal, half the group members are effort subjects who receive their endowments conditional on succeeding in a real-effort task, while the other half are windfall subjects who receive their endowments as a gift. Another point of departure between our study and Reuben and Riedl (2013) and Nikiforakis et al. (2012) is that in our framework group members cannot identify each other's type.

3. The experiment

We adopt a 2×2 between-subjects factorial design. We manipulate the endowment source, comparing homogeneous treatments (HOM), in which subjects are exogenously assigned to the same endowments, with heterogeneous ones (HET), in which half the group members are effort subjects and half are windfall subjects. In addition, we either allow punishment opportunity (P) or exclude it (NP). Therefore, we have four treatments: HOM-NP, HOM-P, HET-NP, and HET-P. The rest of the experiment replicates the public good game with partner matching as proposed by Fehr and Gächter (2000).

3.1. Endowment origin

HET treatments consist of two phases – "Contest Task" and "Investment Task" – while HOM treatments consist of only one phase – "Investment Task." The only difference between the HOM and the HET treatments concerns the manipulation of the endowment origin of the group members in the "Contest Task."[3]

At the beginning of the experiment, subjects in the HET treatments are randomly divided into groups of five: three effort subjects and two windfall subjects. While the windfall subjects' participation in the "Investment Task" is assured, for effort subjects the continuation is conditional on succeeding in a real-effort, competitive task in the "Contest Task."[4] In all groups, the subject who obtains the lowest score in the real-effort task has to leave the experiment with the show-up fee of €5. Ties are broken by random choice. After the losers of the "Contest Task" publicly leave the lab, the rest of the group (i.e., two effort and two windfall subjects) continue the experiment and participate in the "Investment Task," which is a linear public good game. We chose a "tournament" type of real-effort task in order to make the differences between the effort subjects and the windfall subjects sufficiently salient. In contrast to windfall subjects, the effort subjects not only have to exert effort to obtain their endowments but they also have to compete in a tense environment in order not to come in last and leave the experiment with only the €5 show-up fee. However, when taking part in the real-effort, competitive task, the subjects are not informed of the content and the rules of

[3] By endowment origin, we are referring to the fact that a subset of group members (effort subjects) had to exert effort in Phase 1 of the experiment ("Contest Task") to obtain the endowment used in the public good game while the remaining group members were exogenously assigned the endowment (windfall subjects). Our approach is comparable to that of Hoffman and Spitzer (1985) and Hoffman et al. (1994), in which the role assigned to the decision maker in the second (known) phase of the experiment depends on her performance in the effort task in the first phase of the experiment. We depart from the original setting in two respects. First, in our setting the content of the second phase of the experiment is not known during the first phase in order to minimize self-selection based on other-regarding preferences, as we use a "tournament" type of a real-effort task (Erkal et al., 2011). Second, within each group, only a subset of members participated in the task to earn the endowment for the public good game, while the others did not.

[4] There is no conventional wisdom on the nature of the task to be used (see Cherry et al., 2005). In this case, the task is a 390-second digit-typing contest divided into three equal stages. In each stage, a different list of 56 10-digit numbers in 2 columns and 28 rows is presented to the subjects. The subjects are required to find a particular number in a row and column and type it into an input field, with a correct input being worth one point.