Journal of Behavioral and Experimental Economics 51 (2014) 57–67

Contents lists available at ScienceDirect

Journal of Behavioral and Experimental Economics

journal homepage: www.elsevier.com/locate/jbee

From the lab to the field: An experimental investigation of the provision of a club good☆

Mohamed Ali Bchir

ENGEES, UMR GESTE, 1, quai Koch 67070, Strasbourg, France

ARTICLE INFO

Article history:
Received 5 February 2013
Received in revised form 21 March 2014
Accepted 21 March 2014
Available online 3 April 2014

JEL classification:
C93
H41
Q18
O13

Keywords:
Public goods
Club goods
Step-level goods
Provision
Farmers
Irrigation system
Field experiment

ABSTRACT

Club goods are an important category of collective goods. However, unlike public goods, very few experiments address the issue of the provision of club goods, and no studies have specifically explored a field case. In this experiment, a membership fee is introduced to improve the successful provision of a threshold collective good. The experiment began in the laboratory with students, and moved progressively through controlled stages to the field with farmers belonging to an association managing an irrigation system. In the laboratory, the experiment reveals that the club good setting significantly increases the successful provision rate of the threshold collective good, and is significantly robust in the intercultural comparison. However, in the field, the club good setting fails to significantly improve the provision of the collective good. The cooperative behavior of farmers explains this difference. In contrast to students, farmers have a high level of cooperation that is sustained over a long period of time.

1. Introduction

Free-riding can entail important efficiency losses and the underprovision of public goods. This behavior is primarily caused by the non-excludability characteristic of public goods. One solution to rule out free-riding issues is to establish an exclusion mechanism. The collective good is transformed from a public good into a club good. Examples of goods that are characterized by non-rivalry and for which excludability may be implemented are numerous, including: associations, parks, museums, clubs, and unions. Sandler and Tschirhart (1997) define club goods as voluntary groups that derive benefits from sharing a collective good characterized by one or more of the following: an excludable benefit, the specificity of the members, or production costs. Club goods are therefore an important category of collective goods. However, unlike public goods, very few investigations experimentally address the issue of the provision of club goods. To the best of our knowledge, only Swope (2002), Boun My and Chalvignac (2010), and Bchir and Willinger (2013) have addressed the issue. Nevertheless, all of these experiments point to a similar conclusion: the club good setting dramatically improves cooperative behavior and the provision of a collective good.

The logical next step is to test the robustness of these results in the field to increase our understanding of these lab findings. It is highly probable that differences between the laboratory and the field might arise because the provision of club goods is related to a pro-social behavior. Previous findings report that students' behavior in pro-social situations differs dramatically from that of the non-standard pool (Burks et al., 2009; Carpenter et al., 2008). More precisely, games in which other-regarding preferences do not play a key role (auctions, guessing games) appear to be more consistent with behavior in the field than games where other-regarding preferences play a critical role in the outcome of the game (public goods, trust games) (Bosch-Domenech et al., 2002; Depositario et al., 2009). Furthermore, moving from the laboratory to the field is not a simple change in subjects; many additional factors are added

☆ This work was financed by the water Savings in IRrigation Systems in MAghreb (SIRMA) project: http://www.eau-sirma.net. I thank Marc Willinger and Mohamed Salah Bachta for their advice and discussions at different stages of this investigation. I also thank the editor and the anonymous referees whose suggestions substantially improved the paper.

E-mail address: mbchir@engees.unistra.fr

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http://dx.doi.org/10.1016/j.socec.2014.03.004

to the experiment. In particular, cooperative norms differ across cultures, and few experiments have been conducted to examine this type of behavior. For example, Kamei (2012) shows that the results of public good experiments may differ among areas within the same country and calls for further replication of intra-country and inter-country experiments. Moreover, several scholars believe that current findings from the laboratory are not extendable to the field when the external validity of cooperative behavior is addressed in a developing country (Cardenas and Carpenter, 2008; Cardenas and Ostrom, 2004; Ehmke and Shogren, 2009). These authors note that in developing countries, education, local institutional context, and wealth differ dramatically from those factors in developed countries.

Hence, the aim of this investigation is to move from the laboratory into the field and to examine the provision of club goods in a different experimental setting. The case-study site selected is Tunisia, a country that encourages self-governance by farmers in irrigation systems. The country is committed to the World Bank recommendation of decentralizing the management of its irrigation systems. Consequently, a growing number of farming communities are facing pressure to create associations. These associations must raise funds that will allow them to maintain and manage their irrigation systems.

More precisely, this study examines the implementation of an exclusion mechanism to foster the successful provision of a threshold good in the field. The exclusion mechanism is a membership fee. Agents who contribute the fee level or higher enjoy the benefits of the collective good, but those who fail to meet the fee cannot enjoy its benefits. In other words, the threshold collective good is transformed from a public good into a club good. In the laboratory, only Bchir and Willinger (2013) address the provision issue of a club good with a threshold mechanism. They conclude that the introduction of a symbolic fee has a surprisingly strong effect when the threshold level remains moderate with respect to a subject's endowment. In the literature, only two experiments have studied the provision of a collective good with a step-level mechanism in a developing country (Karlan, 2005; Carlsson et al., 2011), and no studies have addressed a club good setting.

For this purpose, an experimental protocol was designed that began in the laboratory with students, followed by a progressive and controlled move to the field with farmers. During the first stage, the provision of a threshold public good was compared to the provision of a threshold club good. This first comparison was conducted in the laboratory in France. The second step was also conducted in the laboratory, but with a pool of Tunisian students. This second step allowed us to assess whether the club goods provision is robust across cultures before moving to the field with farmers. In the final stage, an artifactual experiment was conducted with Tunisian farmers from different irrigation systems.

In the laboratory, the experiment shows that the results are consistent between subjects from a developed country and those from a developing country. Indeed, the club good setting significantly improves the successful provision rate in the laboratory for both French and Tunisian students. However, in the field, the validity of the laboratory results is challenged; there are no significant differences between the public good provision and the club good provision. This difference may be explained by the specific cooperative behavior of the farmers, who are significantly more cooperative in the field than students in the laboratory. The introduction of the membership fee did not make a difference to significantly foster successful provision.

This paper contains four sections. I first detail the club good game and explain the different stages of the experimental design in the laboratory and in the field. I then present the results, discuss them, and conclude.

2. Experimental design

The baseline treatment is a threshold-public good game. Each subject has an endowment w of 20 tokens that can be allocated between a private account and a collective account. The private account yields a private marginal return $\alpha = 1$ per token invested. The collective account yields a marginal return $\beta = 0.5$ per token invested if group contributions G meet or exceed a threshold T. If group contributions are lower than the threshold ($G < T$), then contributions are lost (no money back guarantee mechanism). The threshold level T is set to 30 tokens and is common knowledge. Above this threshold level, higher levels of contributions yield greater provision of the public good with respect to the marginal return β. The group optimum is achieved whenever all players contribute all of their endowment to the collective good. The threshold public good game admits two Nash equilibria in aggregate contributions: $G = T$ (Pareto-dominant) and $G = 0$. In other words, when a player expects that his contribution cannot complete the contributions of other group members G_{-i}, he is better off if he deviates to the corner solution. Similarly, when the player expects that his contribution needs to be larger than the reward ($g_i > \beta T$) to reach the threshold he is better off if he deviates. Players face a coordination issue.

2.1. The club good game

The club good treatment is the same as the baseline except that subjects must contribute a minimum amount f to enjoy the benefits of the collective good. When a player's contribution g_i is lower than f, the subject is excluded from the benefits of the collective good. If f is set to 0, then the membership fee no longer exists, and the club good game becomes a public good game. Let us assume $u_i(g_i,G)$ is the utility function of the player, and let λ_i account for the exclusion mechanism. The club good game can then be written as follows:

$$u_i(g_i, G) = \alpha_i(w_i - g_i) + \lambda_i \beta G \quad \text{if } G \geq T$$

$$\text{with} \quad \lambda_i = 1 \quad \text{if} \quad g_i \geq f$$

$$\lambda_i = 0 \quad \text{if} \quad g_i < f$$

$$u_i(g_i, G) = \alpha_i(w_i - g_i) \quad \text{if} \quad G < T$$

The two Nash equilibria in aggregate contributions $G = T$ and $G = 0$ remain unchanged when f is introduced. However, whereas the interior equilibrium is only characterized by $\sum_{i=1}^{n} g_i = T$ and $g_i \leq \beta T$ in the public good game, in the club good game, the set of vectors for the interior equilibrium is restricted to the vectors for which the smallest value is equal to the membership fee f, that is, $\sum_{i=1}^{n} g_i = T$, $g_i \leq \beta T$ and $g_i \geq f$.

In this experiment, we set f to the smallest possible experimental unit, one token. Therefore, in the club good game, the interior equilibrium always involves a strictly positive contribution from all players of the group. In contrast, in the public good game, the interior equilibrium can involve free riders ($g_i = 0$). Indeed, 26 contribution vectors involve one free rider, and there is one contribution vector in which exactly two players free ride (15, 15, 0, 0).[1] These types of contribution vectors no longer exist in the club good game.

[1] The contribution vectors (16, 14, 0, 0), (17, 13, 0, 0), (18, 12, 0, 0), (19, 11, 0, 0) and (20, 10, 0, 0) (and their permutations) are not equilibria because player 1 is always better off if he deviates because the earning of the collective good in the interior equilibrium is equal to 15 ($\beta = 0.5$ and $T = 30$).