Selfish-biased conditional cooperation: On the decline of contributions in repeated public goods experiments

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ABSTRACT

In the recent literature, several competing hypotheses have been advanced to explain the stylized fact of declining contributions in repeated public goods experiments. We present results of an experiment that has been designed to evaluate these hypotheses. The experiment elicits individual beliefs about the contributions of the partners in the repeated game and involves between-subjects variation on information feedback. The data favor the hypothesis of selfish-biased conditional cooperation as the source for the declining contributions over the competing hypotheses.

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1. Introduction

It is a well-documented, stylized fact that voluntary contributions in public goods experiments decline with repetition (Ledyard, 1995). Various theories have been advanced which may account for this stylized fact. Some researchers on voluntary provision of public goods are convinced that people are conditionally cooperative;[1] in experiments, participants contribute the more others contribute even if free-riding is a dominant strategy. However, conditional cooperation seems to exhibit a selfish bias, as contributions increase less than fully proportionally with those by others (Fischbacher et al., 2001).

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[1] (C.f. Ockenfels, 1999; Sonnemans, Schram, & Offerman, 1999; Keser & van Winden, 2000; Brandts & Schram, 2001; Fischbacher, Gächter, & Fehr, 2001; Levati & Neugebauer, 2004; Croson, Fatas, & Neugebauer, 2005; Fischbacher & Gächter, 2006; Croson, 2007).

Hence, the selfish bias in conditional cooperation in combination with adaptation of beliefs about the others' contributions cooperation can explain a downward spiral of contributions. Alternative hypotheses that account for the decline of contributions include strategic play in early stages (Andreoni, 1988; Sonnemans et al., 1999) or errors that diminish over time (Andreoni, 1995; Palfrey & Prisbey, 1997).

This article contributes to the investigation into the psychological motives for the contribution decline in repeated public goods experiments. For this purpose we have designed and run experiments in which we vary the information feedback and elicit the individual beliefs about others' contributions. The design, which is described in detail in Section 2, allows a test of the aforementioned competing hypotheses (reviewed in Section 3) under the assumptions that errors in contributions are uncorrelated to the beliefs about others' contributions and that strategic play is impossible if no information is divulged. The data, which we report in Section 4, favor selfish-biased conditional cooperation as the source for the downward spiral of contributions over the competing hypotheses. Section 5 provides concluding remarks.

2. Experimental design

The present study examines behavior in a 10-periods 3-players voluntary contribution mechanism in a partners design. In every period, each subject was given an endowment (50 experimental currency units) which could voluntarily be contributed toward a public good, or be kept to be consumed as a private good. The marginal per-capita return from the public good was one half. Under standard assumptions, thus, free-riding is predicted. Subjects' beliefs about the sum of contributions of their partners were incentive-compatibly elicited in each period.[2] Contributions and guesses (i.e., the elicited beliefs) were submitted simultaneously.

We considered two treatments in a between-subjects setting, information feedback being the treatment variable. In the information treatment (hereafter INFO), subjects received information feedback about the payoffs from the public goods game, broken up to the sum of partners' contributions, and from the guessing task after each period. In the control treatment (hereafter NoINFO), subjects received no information about payoffs and partners' contributions until the end of the experiment.

The experiment, conducted at the ESSE experimental laboratory of the University of Bari, was computerized by Fischbacher's (2007) z-Tree. In total 36 inexperienced subjects participated (i.e., 18 subjects per treatment) who earned on average 18,300 Lire ≈€9 ≈$10.[3] At the beginning, instructions were read and subjects went through four exercises.[4] The experiment did not start until subjects had answered all questions correctly. Thus, we are confident that the game and the incentives were understood.

3. Rationale and research hypotheses

Our experimental design simultaneously elicits contribution levels and beliefs about others' contributions. Hence, we are able to test whether contribution is a function of belief. Some theories in economics and psychology disregard a positive causal relationship between contributions and beliefs in the finitely repeated game. The most basic theory would suggest that contributions are mere random choices which may be influenced by errors (for some recent evidence on errors see Schmidt & Neugebauer, 2007). Though this suggestion seems rather unrealistic, it is an adequate benchmark hypothesis. However, also the standard maximization theories disregard the impact of contributions by others; rational players free ride on the contributions of the others,[5] and purely altruistic players who optimize efficiency contribute their entire endowment. Nevertheless, the existence of a positive relationship between beliefs and contributions is implied by theories of conditional cooperation (Croson, 2007) or strategic play (Kreps, Milgrom, Roberts, & Wilson, 1982). While the theory of conditional cooperation suggests that people contribute the more they expect others to contribute, the theory of strategic play proposes that people are opportunists who account for the possibility that others are conditional cooperators. Since conditional cooperators would react to free riders with decreasing their contributions, strategic players have incentives to cooperate too. Due to the different feedback scenarios in our experimental treatments, INFO and NoINFO, we are able to distinguish conditional cooperation from strategic play,[6] since in the NoINFO treatment a strategic player has no incentive to contribute anything. The 'false consensus' effect in psychology (Kelley & Stahelski, 1970) according to which people believe that others behave in the same way as they do would also predict a positive relationship between beliefs and contributions. In comparison to the conditional cooperation theory, however, it would reverse the order of cause and action; a player would first choose her contribution and only then, based on her own action, form a belief about her partners' contributions. Whether beliefs or actions are first is only testable within our design if we make a

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[2] Our scoring rule, which assumes symmetry of subjective distributions, induced payoffs equal to the square of 100 less the difference between the guess and partners' contribution divided by 400. Thus, payoffs were in the interval [0; 25].

[3] A session took 70 min.

[4] The translated instructions and exercises are provided in Appendix A.

[5] Rational players would interpret positive contributions as erroneous.

[6] The alternative 'strangers' setting where a similar declining pattern was observed in previous experimental research would eliminate strategic play to a good extent. However, since the dynamics in the partners setting are much more studied than those in the strangers setting, we decided to apply this experimental design.