

# ANALYSIS OF COOPERATION IN THE PUBLIC GOOD SETTING

An experimental study aimed to analyze group behavior under the possibility to free-ride in the framework of the financing of public goods

## Introduction & objectives

Under-investment of public goods is a concerning threat that almost all economies have to face. The same nature of this kind of goods provides the opportunity to free ride and, for such reason, they are often provided by governments. However, the truth is that most of the time the maintenance of public goods still relies on the willingness of individuals to cooperate. Therefore, the question is: how could cooperation be incentivized and parasitism disincentivized?

## Methodology

To answer this question, a standard "Public Goods Game" experiment with two of its variations has been conducted. In the first one, punishment opportunities were allowed and, in the second variation, rewarding opportunities were present. This method has allowed the comparison of both incentives against each other and against the standard PGG, revealing both their weaknesses and advantages and providing some insight regarding which incentive is better overall.

## Results of the experiment

A total of 68 individuals participated in this study. They were divided into groups of four and played each variation of the "game" for a number of ten rounds. The data gathered through these experiments is summarized below.

### A Standard PGG

Cooperation declines as the game progresses to its final rounds. As a consequence, individual payoffs decrease as well and players receive a lower fraction of the maximum possible payoff in each round.

### B Peer punishment

Mean contribution of individuals is extraordinarily stable throughout the whole experiment. However, mean payoff and the fraction of maximum payoff decay with repetition due to the increasing use of punishment.

### C Peer reward

Cooperation remains stable throughout the course of the game and so does the mean payoff. The usage of reward does not harm payoff and, as a result, players are able to achieve higher fractions of the maximum possible payoff.

## Analysis

In line with former research, results have verified that individuals, on average, provide levels of contributions halfway the free-riding and the full provision scenario. Regarding the use of incentives, **Figure 1** shows how both punishment and reward succeeded to prevent the decline of cooperation observed in the standard game. In this respect, while punishment has been more effective at incentivizing higher contribution levels, in **Figure 2** we clearly see how reward has been far more effective at prompting higher payoffs. As shown in **Figure 3**, this can be the result of the use of punishment, which entails a cost for both the player that assigns the penalty and the punished one.

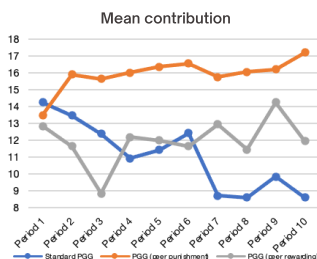


Figure 1 - Mean contribution in each variation of the PGG

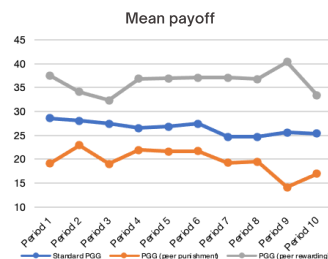


Figure 2 - Mean payoff in each variation of the PGG

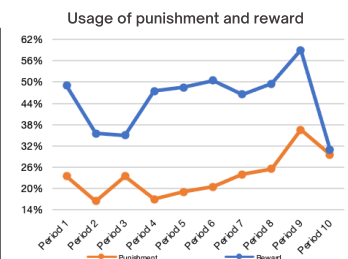


Figure 3 - Usage of reward and punishment

## Conclusion

This study provides evidence that both punishment and reward can succeed at sustaining cooperation in the PGG setting; punishment delivers higher levels of cooperation but harms social welfare while reward prompts higher payoffs. Once analyzed strengths and downsides of each incentive, it has become palpable that deciding which incentive is better overall is far from easy. However, taking as a given that we do not pursue cooperation for the sake of cooperation itself but for the larger payoffs it renders, I have concluded that reward can be the optimal incentive scheme. Therefore, future research should reconsider the hegemony of punishment and test the validity of rewarding schemes.

### Related literature

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