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Long-lasting effects of temporary incentives in public good games

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Abstract: This paper addresses the question of cooperative behaviours in the long run after the removal of incentives to contribute to a public good game. This question becomes central when looking both at cost-effectiveness of public program and sustainability of the funding institutions. This paper looks at the potential permanence effect of incentives by comparing nonmonetary and monetary, positive and negative, incentives to contribute in public-good game experiments. The results show *first* that both monetary and nonmonetary punishments and rewards significantly increase contributions compared to the baseline but monetary sanctions lead to the highest contributions while nonmonetary sanctions lead to the lowest contributions. *Second*, the four types of incentives do not display long-lasting effects. In every treatment, contributions fall to the level of the initial contributions in the baseline right after the withdrawal of the incentives. *Third*, the results show that there are no change of preferences following the introduction of the incentives since those who free-ride and have been highly sanctioned are those who contribute the less after the removal of the sanctions. *Finally*, one interesting result is the same efficiency of non-monetary and monetary rewards on contribution. These findings underline the importance of looking both at the type of incentives and to better understand the changes in behavior in institutional arrangements between individuals when long-lasting cooperation is sought.

JEL Codes: C92- D04- H41

Keywords: Experiments – Monetary incentives – Non-monetary incentives – Rewards – Punishments – Long-lasting cooperation – Voluntary Contribution Mechanism

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1. Introduction

There is an increasing interest in identifying the long-term effect of short-term public policies. In many areas such as health care, education performance, labor effort, biodiversity conservation, charity giving or energy saving, it has been shown that it is important to go beyond the study of short-term effects in order to understand the effectiveness of incentives and more globally the implications for policy design (Allcott and Rogers, 2014). While a lot of incentive programs have displayed short-term effects, evidence on long-term effects is often much more limited. Yet it is a central question for economists and policy-makers. When we look at how individual decision and behavior evolve in a given horizon, it questions the choices of the incentives and their dynamics through time. Especially it raises the question of the cost-effectiveness of public program as well as the sustainability of the funding institutions. By neglecting the persistent impact that a policy may have in the long-run, we overestimate the social cost of a policy (Costa and Gerard, 2015). In times of economic crises and budgetary constraints, it is all the most important to correctly design and to assess public policies that aim at affecting individual behaviors in the presence of externalities.

The extent to which a short-term policy has persistent effects remains an open question. The theoretical literature largely ignores the long-lasting effects of intervention that aim at changing behaviors. If we assume that individuals rationally choose among their opportunities according to their preferences, one can shape the individual's opportunities by giving incentives for desired behavior but one can also shape the individuals' preferences by increasing their taste for desired behavior (Becker, 1968). Identifying which channel is the driver of change, if any, is a difficult task and there are several reasons why an incentive program could have long-lasting effects. First any policy acts by providing information such that individuals can learn about the pros and cons of changing behavior. So doing they update their information sets and can adopt strategies that lead to higher utility (Bryan et al, 2014; Dupas, 2014). But after a policy intervention, individuals may form new habits and adopt new way of behave (Becker and Murphy, 1988). It may also be that interventions introduce new social norms such that previous behaviors are no more socially accepted (Allcott, 2011). On a more psychological ground, studies show important differences between hot decision-making (short-term) and cold decision-making (long-term). Immediate reactions to an event can largely differ from long-run decisions (Gneezy and List, 2006).

Recent papers have been interested in studying the persistence of the impact of a policy once the policy was suspended. For example, studying the effect of programs of energy

conservation in the US and in Brazil, Allcott and Rogers (2014), Costa and Gerard (2015) respectively, show that even if the initial effect is reduced once the program is stopped, temporary policies tend to lead to a long-lasting reduction in electricity use. On the labor market, Miller (2014) shows that a temporary affirmative action regulation permanently affects the black share of employees. Charness and Gneezy (2009) and Acland and Levy (2015) find that economic incentives can induce habit formation for exercising at gym. On the contrary, one can find recent evidence from environmental studies that tends to show the long-run ineffectiveness of short-term incentives. For example many concrete cases from Payments for Ecosystem Services (PES) programs display the lack of persistence at the end of the agreement. Even after a long-period contract, permanence of actions is rarely observed and sometimes agents can implement management practices that appear to be even worse for the environment (Sattler et al, 2013; Engel et al, 2008; Nsoh and Reid, 2013)[1].

Yet evidence is not limited to monetary incentives. The use of nonmonetary ones (or nudges) is increasing in the private and public areas (Thaler and Sustain, 2008). While in some cases nonmonetary incentives have been shown to be more efficient than monetary ones, especially in case of positive expression of approval (Jin and Huan, 2014), their effects are not predictable nor their long-term effects (Croson and Treich, 2014). Yet it has been shown that the content and timing of given information by behavioral energy conservation programs can impact the short and long-run behaviors (Allcott and Roger, 2014). Particularly Ito et al (2015) find that the effect of moral suasion on energy saving quickly diminished after repeated interventions. Looking at the effect of different norm-based strategies on the long-run patterns of residential water use, Ferraro and Price (2013) find that norm-based messages influence water demand but that the effectiveness of such messages wanes over time. On the contrary, they find that incentive messages based on social comparisons have a lasting impact on water use.

Thus there is no general evidence on long-term effects of incentive programs and the results appear to be limited to specific domains. In this paper, we explore experimentally the long-lasting cooperation when incentives are provided for a temporary period. More specifically, we look at how agents' contributions to a public good evolve along time and especially once the incentive programs are stopped. In a repeated public-good in a fixed partner design, we

[1] There is a vast amount of literature dealing with the long-term effects of incentives. See also Dupas (2014) for health technologies adoption, Giné et al (2010) and for smoking cessation, Fack and Grenet (2015) for education performance, Gneezy and Rustichini (200) and Landry et al (2010) for charitable giving, Reiss and White (2008) for energy conservation.

compare treatments in which monetary and non-monetary incentives are available. We also compare positive (rewards) and negative (punishments) incentives. After a fixed number of periods, these incentives are removed and we compare the long-lasting effect on contributions to the public good. The choice of the incentive mechanisms follows the literature. Previous experiments have documented that introducing monetary incentives, such as formal sanctioning or rewards, increases contributions to a public good and slowdowns the decay observed with repetitions (Fehr and Gächter, 2000, 2002; Sefton et al, 2007). Interestingly it has also been shown that nonmonetary incentives can also sustain cooperation. Masclet et al. (2003), in a similar design to Fehr and Gächter (2000), introduce nonmonetary punishments such as expressions of disapproval. They show that both monetary and nonmonetary sanctions initially increase contributions.

However few experimental studies have tried to assess the long-term effect of temporary incentives and to our knowledge no paper has tried to compare long-lasting effects of monetary and nonmonetary incentives. In a minimum-effort game (team-work framework), Brands and Cooper (2006) and Hamman et al (2007) explore the effect of the introduction of incentives once the groups have converged to an inefficient equilibrium and the effect of a subsequent remove of the incentives. While both papers show the effectiveness of the incentives in improving coordination, Hamman et al (2007) find little long-term persistent effect with the effort going back to its pre-incentive level. On the contrary, Brandts and Cooper (2006) find that reductions in the incentives have little effect on later behavior. In a recent paper Bruttel and Friehe (2014) use a repeated linear public good game to investigate whether providing strong cooperation incentive only for a number of periods spills over to later periods to ensure cooperation in the long run. Their results are similar to Hamman et al (2007), i.e. cooperation rapidly deteriorates once monetary incentives are removed. Moreover cooperation deteriorates to levels that appear to be even smaller than those in their control group (like in the case of environmental degradation when PES stop, see above).

Our results show that monetary and nonmonetary punishments and rewards significantly increase contributions compared to the baseline but do not display long-lasting effects on contribution behaviors. In all four treatments, contributions do not go back to baseline levels directly after the removal of the incentives but they actually fall down to the initial contribution found in the baseline. The end of the incentives acts as a restart effect such that once the end of the incentivized periods, the subjects contribute as if they have not contributed yet under incentives. This is true whatever the type of incentives considered:

positive *vs* negative, rewards *vs* punishments. Thus the incentives do not shape the preferences nor lead to the formation of new habits. Another strong result that confirms previous literature is the effectiveness of nonmonetary incentives and especially rewards.

The next section will describe the experimental design as well as the predictions and procedures. Section 3 will present the results and a last section concludes.

2. Experimental design and procedures

2.1. Design

Our setting consists of a repeated Voluntary Contribution Mechanism (VCM) played by fixed groups of four subjects for 30 periods. At the start of each period, each subject receives an endowment of 20 tokens and has to decide simultaneously and without the possibility of communicating how many tokens she wants to keep for herself and how many tokens she wants to invest into a project. Each investment made into the project yields a payoff of 0.4 tokens to each of the four member of the group. Therefore the earnings of individual *i* who contributes c_i to the project in a period are given by:

$$\pi_i^B = 20 - c_i + 0.4 \sum_{k=1}^{4} c_k$$

Table 1 displays summary design information[2]. We consider four treatment conditions in addition to the *Baseline* that has just been described: *Monetary Punishment (MP), Non-monetary Punishment (NMP), Monetary Reward (MR), Non-monetary Reward (NMR)*. In the four supplementary treatments, each subject participated in two sequences of 15 decision periods.

Table 1: Treatment conditions

	Subjects	Sequence I (Periods 1-15)	Sequence II (Periods 16-30)
Baseline	40	VCM	VCM
Monetary Punishment (MP)	40	VCM + Punishment	VCM
Non-monetary Punishment (NMP)	40	VCM + Punishment	VCM
Monetary Reward (MR)	40	VCM + Reward	VCM
Non-monetary Reward (NMR)	40	VCM + Reward	VCM

[2] Instructions for *MP* are presented in the appendix.

In Periods 1-15, each period consisted of a two-stage game. In stage 1, subjects plays a standard VCM in which they have to decide simultaneously and without the possibility of communicating how to allocate their 20 tokens endowment.

At the beginning of the second stage, subjects are informed of the contribution levels of each of the other members of their group[3]. Individual decisions are not linked to subject identifiers and contributions are presented in ascending order in each period such that subject-specific reputations could not develop across periods. Depending on the treatment condition, subjects can make a second decision in stage 2:

(i) In the *Monetary Punishment (MP)* treatment, they could assign zero to ten punishment points to each of the three other group members. Each point, p_{ij} assigned by subject *i* to subject *j* lowered subject *j*'s income by one token. There was also a cost of 0.25 token for the subject *i* associated with each point allocated[4]. This implies that payoffs at the end of Stage 2 and thus for the given period are given by

$$\Pi_i = \pi_i - \sum_{j \neq i} p_{ji} - 0.25 \sum_{j \neq i} p_{ij}$$

The choice of punishment points is restricted to the actual earnings from the first stage but the earnings at the end of a period can be negative depending on the number of punishments points distributed and received.

(ii) In the *Non-monetary Punishment (NMP)* treatment, the rules were similar to those of *MP*, except that each point awarded to a subject had no effect on her final earnings and was costless to assign. As in *MP*, each subject had the opportunity to assign between 0 and 10 points to each member of the group. In a similar framework to Masclet et al (2003), these points correspond to level of disapproval of the subject's contributions in the first stage. Ten points were to be assigned for the highest level of disapproval and zero points for the lowest level of disapproval.

(iii) In the *Monetary Reward (MR)* treatment, the mechanism was identical to the *MP* treatment, except that instead of assigning points to sanction other group members,

[3] One alternative would have been to present each member's individual income. However Nikiforadis (2010) has shown that giving the individual income instead of the individual contributions reduce the effectiveness of the punishment mechanism.

[4] The effectiveness of the punishment mechanism has been shown to be related to the mix of cost-impact of the punishment. Egas and Riedl (2008) show that a low cost-high impact punishment is the most effective mechanism. We opted for a 1 to 4 ratio.

subjects could use points to rewards other group members. Subjects could assign zero to ten reward points. Each point, p_{ij} assigned by subject i to subject j increased subject j's income by one token. As in *MP*, there was a cost of 0.25 token for the subject assigning the points associated with each point allocated[5]. This implies that payoffs at the end of Stage 2 are given by

$$\Pi_i = \pi_i + \sum_{j \neq i} p_{ji} - 0.25 \sum_{j \neq i} p_{ij}$$

(iv) In the *Non-monetary Reward (NMR)* treatment, the rules were similar to those of *MR*, except that, as in *NMP*, each point awarded to a subject had no effect on her final earnings and was costless to assign. Each subjects had the only opportunity to express her approval of the group's member contributions by assigning 0 to 10 reward points.

In each of these four treatments, after having assigned points (either sanctions or rewards), each subject was informed of their earnings, including any punishment (reward) they imposed or received. Subjects were also informed of the total number of punishment (reward) points they received, but could not identify which of the other subjects imposed the punishment (rewards). Further, subjects were not informed of the number of punishment (reward) points other group members received.

In Periods 16-30 of the four incentivized treatments (*MP, MR, NMP* and *NMR*), each period was identical except that there was no stage 2; that is no more opportunities for rewards or sanctions. Each period consists of a standard VCM as in the *Baseline*. This was clearly stated in the instructions from the very beginning of the experiment and in all treatment conditions. Subjects also know they play a finitely repeated game with a final period.

2.2. Predictions

Assuming that subjects care only for their monetary payoffs, are fully rationale and that is common knowledge, they should not contribute in the *Baseline* and they should also abstain from costly punishment or reward (Fehr and Gachter, 2000; Sutter et al, 2010). Free riding is a dominant strategy. However we know that we can expect positive contributions in the *Baseline* followed by a continuous decay until the last period due to the presence of conditional cooperators (Chaudhuri, 2011). This unstable cooperation has been shown to be

[5] Thus, rewards constituted a pure redistribution of earnings.

fixed by the introduction of sanctions or rewards (Fehr and Gächter, 2000; Masclet et al, 2003; Sefton et al, 2007). This means that one can expect that there are conditional cooperators that are willing to engage in the punishment of free riders as well as in the rewarding of good contributors. Given previous results, punishments should lead to higher contributions than rewards and monetary incentives should lead to higher contributions than non-monetary ones.

Whether we observe positive contributions during period 1-15, predictions for periods 16-30 are not clear-cut. As pointed by Bruttel and Friehe (2014), after the removal of incentives, predictions on contribution level depend on the hypothesis retained. If we assume that the incentives primarily influence contributing behavior, contribution should go down to the *Baseline* as in Hamman et al (2007). If we assume that the incentives improve coordination and may be create trust and self-image, that should influence later interactions, we should not observe much change from what we obtain in periods 1-15 (Brandts and Cooper, 2006). Ariely et al (2009) insist on the image concern as a reason to maintain high average contributions even when strong material incentives have been removed. Finally it might be that the levels of contribution worsen to a level below the *Baseline*. But this would happen mostly with monetary incentives that have been shown to backfire in some cases (Brands and cooper, 2006; Gneezy et al., 2011; Meier, 2007). This means that incentives can have different long-lasting effect depending on their intrinsic nature. One can expect greater persistent effect with rewards and with nonmonetary incentives if they impact self-image more than punishments and monetary incentives. If the effect of all these incentives has been shown to be strong, their long-lasting effect is somewhat unknown.

2.3. Procedures

In total, 200 subjects participated to five sessions (one for each treatment condition). All subjects were recruited from a list of experimental subjects maintained at BETA, University of Strasbourg, France, using the ORSEE software (Greiner, 2004). Subjects had an average age of 20.5 years, and 49% of subjects were female. They were from very different fields but among them 26.5% were studying economics or business management.

The experiment was computerized. Upon arrival, each subject was assigned a computer randomly. The instructions were read aloud by the experimenter and before starting a comprehension questionnaire was administered to check that the rules were well understood. All questions were answered in private. Once the 30 periods were completed, the screens

displayed the total cumulative gains for the experiment and the subjects answered a post-experimental questionnaire. Then, at the end of the session, subjects were paid their earnings in a separate room and in private. There was a conversion rate of 30 tokens to €1. Average earnings were €25.8 (standard deviation = 4.1).

3. Results

In order to assess the possible long-lasting effect of incentives, we first present the contributions to the public good. In a second step we present the individual choices of punishing or rewarding other group members as well as the determinant of being sanctioned or rewarded.

3.1. Contributions

Table 2 presents the average contributions in each treatment by comparing the initial sequence of 15 periods with the last 15 periods. In each sequence, a test of significant difference with the *Baseline* is performed. Table 2 shows that on average the individual contributions are significantly much higher in *MP, NMP, MR* and *NMR* than in the *Baseline* for periods 1-15. These results confirm previous ones on the effectiveness of punishments and rewards in public good games (Fehr and Gachter, 2000; Masclet et al, 2003 and Sefton et al, 2007). Moreover monetary sanctions lead to higher contributions than both non-monetary sanctions (Mann-Whitney rank-sum test, $p<0.005$) and monetary rewards (Mann-Whitney rank-sum test, $p< 0.010$). The effectiveness of non-monetary rewards is noticeable since the average contribution is equal to that in MP. There is no perfect symmetry concerning the effects of punishments and rewards.

Table 2: Mean contribution

	Periods 1-15		Periods 16-30	
	Mean	Std. Dev	Mean	Std. Dev
Baseline	7.3	6.6	3.0	4.5
Monetary Punishment (MP)	15.1***	7.6	8.9***	8.9
Non-monetary Punishment (NMP)	12.9***	7.5	5.1***	6.5
Monetary Reward (MR)	12.8***	7.7	7.5***	8.1
Non-monetary Reward (NMR)	15.1***	5.5	8.2***	7.6

***, **, * stand for significance difference at the 1%, 5% and 10% respectively according to a two-side Mann-Whitney test of difference with the *Baseline* with each individual as a unit of observation.

From period 16 onwards, opportunities to punish or to reward are removed from every treatment. Table 2 shows that during periods 16 to 30 the contributions are still significantly higher, on average, than the *Baseline* for all treatments. Interestingly the contributions in the *NMP* treatment are much lower than in the three other incentivized treatments.

Figures 1 and 2 show the time series of individual contributions by period in the *Punishment* and the *Reward* treatments compared to the *Baseline*[6]. The bold line indicates the *Baseline* contribution. The pattern of contribution in the *Baseline* is consistent with that observed in previous studies (see Ledyard, 1995; Chaudhuri, 2011). Contributions start from about 50% of the endowment and then continuously decrease until period 30. In the *Punishment* and the *Reward* treatments (both *monetary* and *non-monetary*), as noted in Table 2, the contributions are much higher during the 15 first periods. In the four treatments, the contributions are well above the *Baseline* and do not display the same decay; they appear more stable than in the *Baseline*, also in line with previous studies (see i.e. Nikiforakis and Normann, 2008).

In period 16, contributions in the four incentivized treatments do not fall down immediately to the *Baseline* level. However we observe, in all but the NMP treatment, a drop of about 25% along the two periods following the end of the incentives. In the NMP treatment, we observe a large fall later and the contributions quickly catch up the contribution pattern in the Baseline. In the other treatment conditions, the contributions stay higher than in the *Baseline* and the positive difference with the *Baseline* tends to keep constant and significant except for the last periods where we probably observe an end-of-the-game effect (see below).

[6] Contributions at the group levels display similar results and are available upon request.

Figure 1 : Average contribution - Punishment vs Baseline

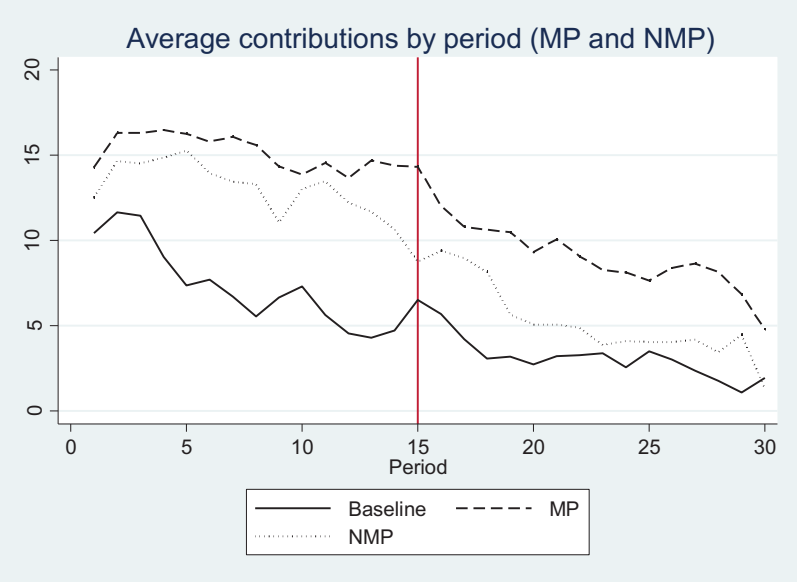
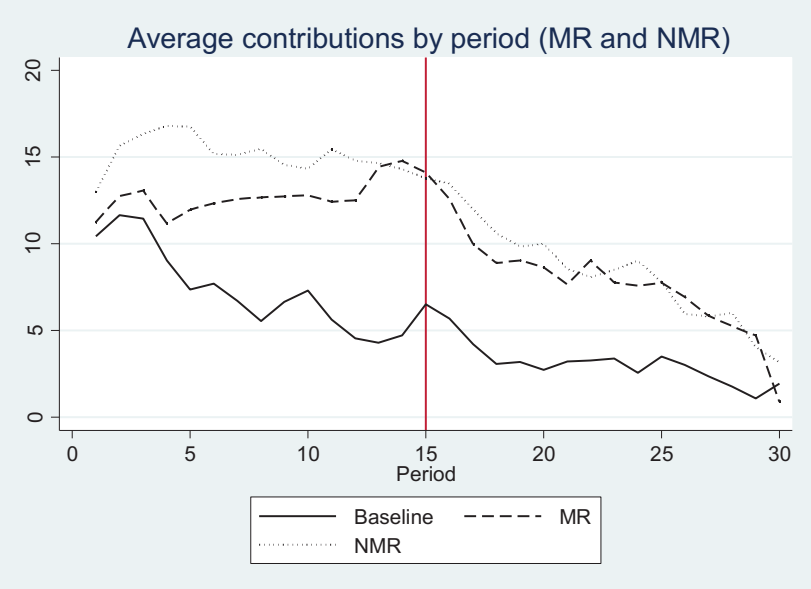


Figure 2 : Average contribution - Reward vs Baseline



The differences between treatments are confirmed by regressions results in Table 3. The first two columns present Tobit estimations for the individual contributions during Periods 1-30 and 1-15. The specification includes control for age, gender and if the subject is a student in economics or management. In addition to treatment variables, we also introduce a period variable as well as the relative contribution to the group in the preceding period. The reference is the *Baseline* treatment. The results confirm the strong effect of our four incentivized treatments on the individual contribution. *Monetary sanctions* have the strongest effect, followed by *Monetary rewards* and *Non-monetary rewards*. *Non-monetary punishments* have a smaller but significant effect on contributions. Those who were positively

far from the group contribution in the preceding period contribute more. Along time we observe a decline in the level of contribution. The third column presents the same estimation as in specification (1) and (2) but for the periods 16-30. The results confirm previous findings. Whereas punishments and rewards can no longer be applied, we still observe significant deviations from the *Baseline* treatment.

Result 1: a) Both monetary and nonmonetary punishments and rewards significantly increase contributions compared to the baseline but b) monetary sanctions and nonmonetary rewards lead to the highest contributions.

Table 3 : Determinants of individual contributions, Tobit estimation

	(1) Periods 1-30	(2) Periods 1-15	(3) Periods 16-30
MP	13.821***	16.139***	6.920**
	(5.022)	(5.305)	(2.997)
MR	9.413**	10.035**	4.904**
	(4.100)	(4.075)	(2.301)
NMP	6.791**	9.540***	2.047*
	(2.726)	(3.440)	(1.196)
NMR	11.313***	12.928***	5.349***
	(2.895)	(2.813)	(1.702)
Relative contribution in t-1	0.391***	0.456***	0.215***
	(0.060)	(0.081)	(0.036)
Period	-0.777***	-0.382***	-0.434***
	(0.085)	(0.115)	(0.069)
Constant	19.991***	14.392*	16.640***
	(6.961)	(7.529)	(4.006)
N	5800	2800	2800

Notes: Standard errors are in parentheses and are clustered by group. All regressions contain a control for the age and a dummy for gender as well as a dummy if the subject studies economics or management. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The main question in our study is the long-lasting effect of the incentives introduced in periods 1-15. The results presented so far tend to show that there exists some kind of long-lasting effects of incentives since apart for the contributions in the NMP treatment, once the initial fall in period 16-17, the contributions stay at a higher level than in the Baseline. In all cases we observe the usual decay of contributions along periods from which we can expect in all cases a zero contribution at some term.

However these results may be misleading. When we compare the contributions in the Baseline for the period 1 to 15 with the contributions in the four treatment conditions for periods 16 to 30, we actually do not observe significant difference except for the NMP treatment (Mann-Whitney rank-sum test, $p<0.05$) for which Table 2 displays lower contributions than in the Baseline. Figure 3 and 4 confirm this result in a clear way. In these

figures, the contributions in the Baseline during the first 15 periods (lower x-axis) are compared to the contributions in the treatment conditions when incentives are removed (upper x-axis). We hardly observe differences between contributions in the treatments. Figure 3 and 4 show that from the period 16, the removal of the incentives acts as a restart effect since the contributions in period 16 are of the same level as in the Baseline in period 1. As for the periods 1 to 15 in the Baseline, we then observe the well-known decay along periods. Saying differently it appears that some of the free riders who were induced to contribute in the first periods, because of the fear of punishments or to obtain rewards, do not contribute anymore in the last ones and we find back the usual situation in which mostly conditional (and unconditional) contributors are contributing to the public good but decrease their contributions along periods.

Figure 3 : Average contributions before period 16 for the Baseline and after period 15 for MP and NMP

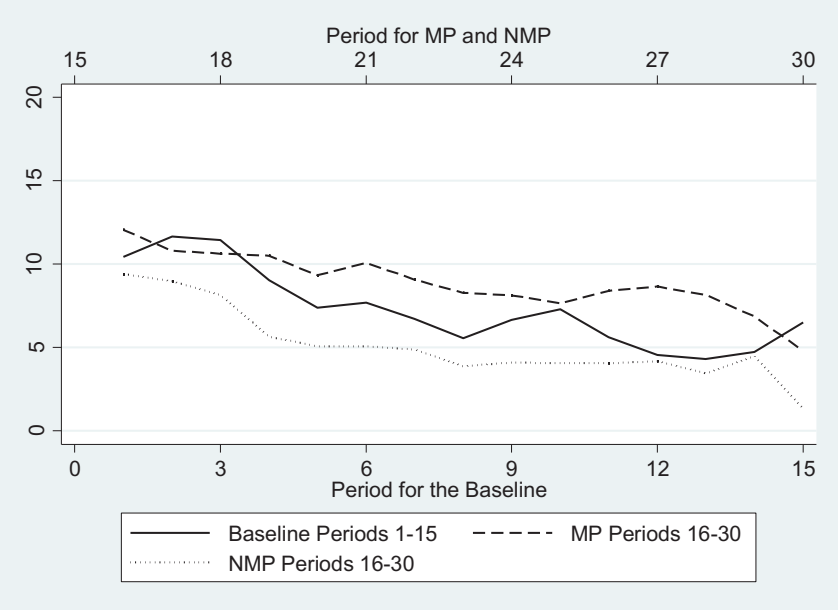
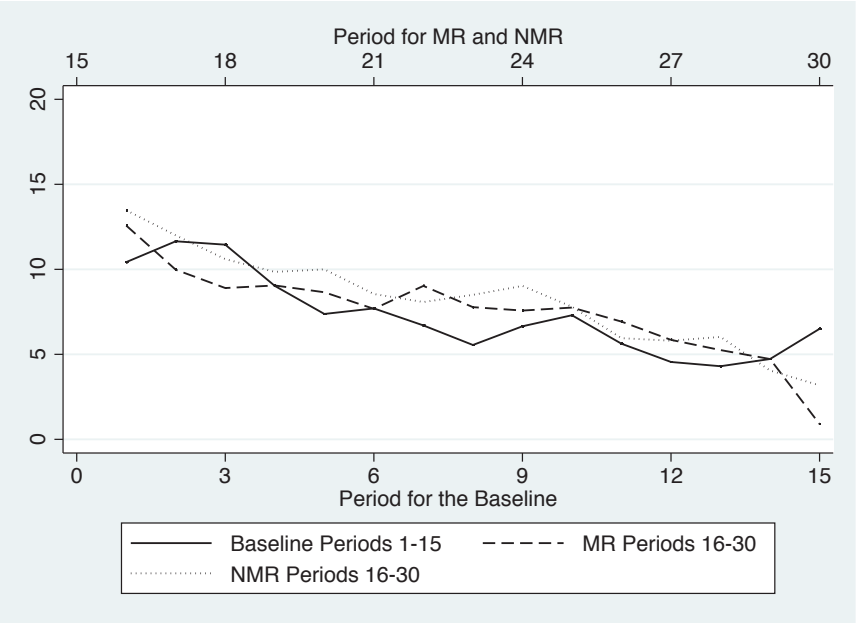


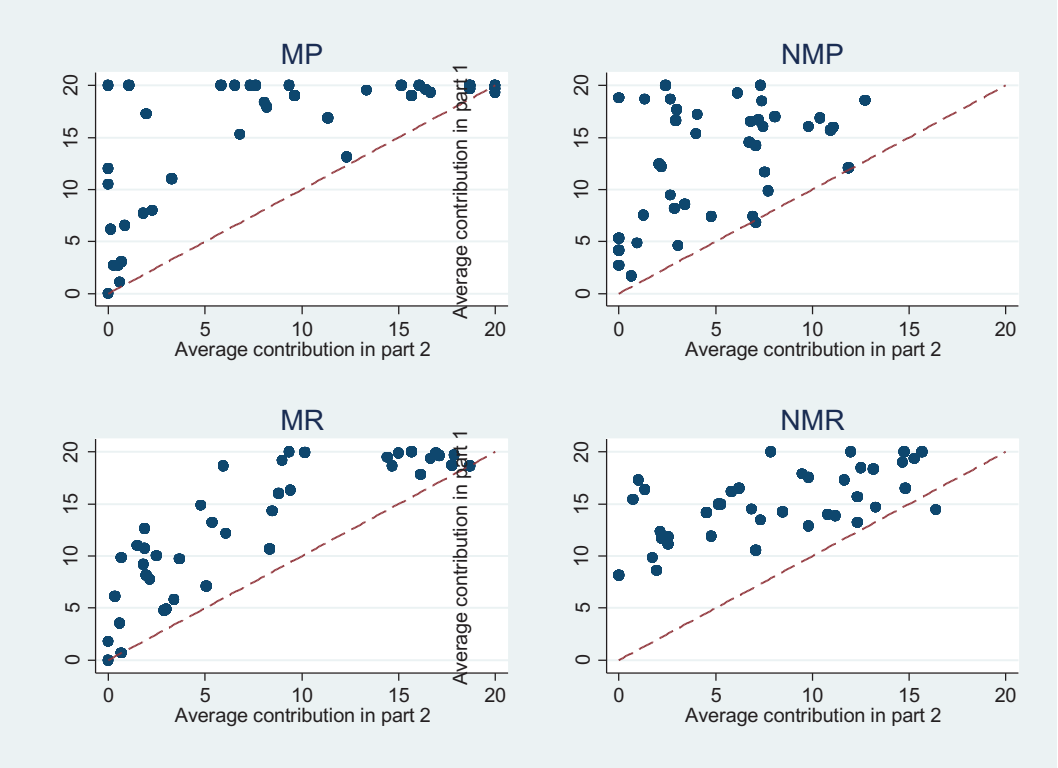
Figure 4 : Average contributions before period 16 for the Baseline and after period 15 for MR and NMR



Result 2: a) MP, NMP, MR and NMR do not display long-lasting effects since contributions go back to initial levels observed in the Baseline directly after the withdrawal of the incentives. b) The removal of the incentives acts as a restart effect.

The figure 5 confirms these results in a different way. When we compare average contributions in the two sequences of the game, we always observe that the contributions decrease once the incentives are removed in all four treatments. Yet almost no average contributions in the second part of the game are higher or equal than those in the first part. We have a concentration of bullet points left to the diagonal on which contributions are equal among sequences which confirms the absence of long-lasting effects.

Figure 5 : Average contributions in part 1 and 2



All these results show that there is no permanence of the effects of the incentives according to which behaviors would be definitely changed in the long-term once the incentives are removed. However it still remains that contributions in periods 16-30 are higher than in the *Baseline* in the four treatments, showing some kind of effectiveness of all types of incentives in the short run after their ending. One cannot talk of long-lasting effects of the incentives since subjects do not keep high level of contributions but it shows that overall in the last 15 periods contributions are still higher for those who have been incentivized because the end of the incentive mechanism acts as a restart effects. Subjects then play as if they have not played yet[7].

These results confirm the absence of long-lasting effects in our setting. They are different from previous evidence found in the empirical studies on energy saving programs (i.e. Costa and Gerard, 2015; Alcott and Rogers, 2014). These results are also different from previous experimental results showing either backfire (Bruttel and Friehe, 2014) or a small permanence of the incentives effects (Brands and Cooper, 2006; Hamman et al, 2007). However their designs are somewhat different since they did not look at temporary incentives but rather at

[7] We also test different treatments in which we have changed the length of the incentive sequence: either 10 or 20 periods (results are available upon request). The results were similar to those presented here and we observed the same restart effect.

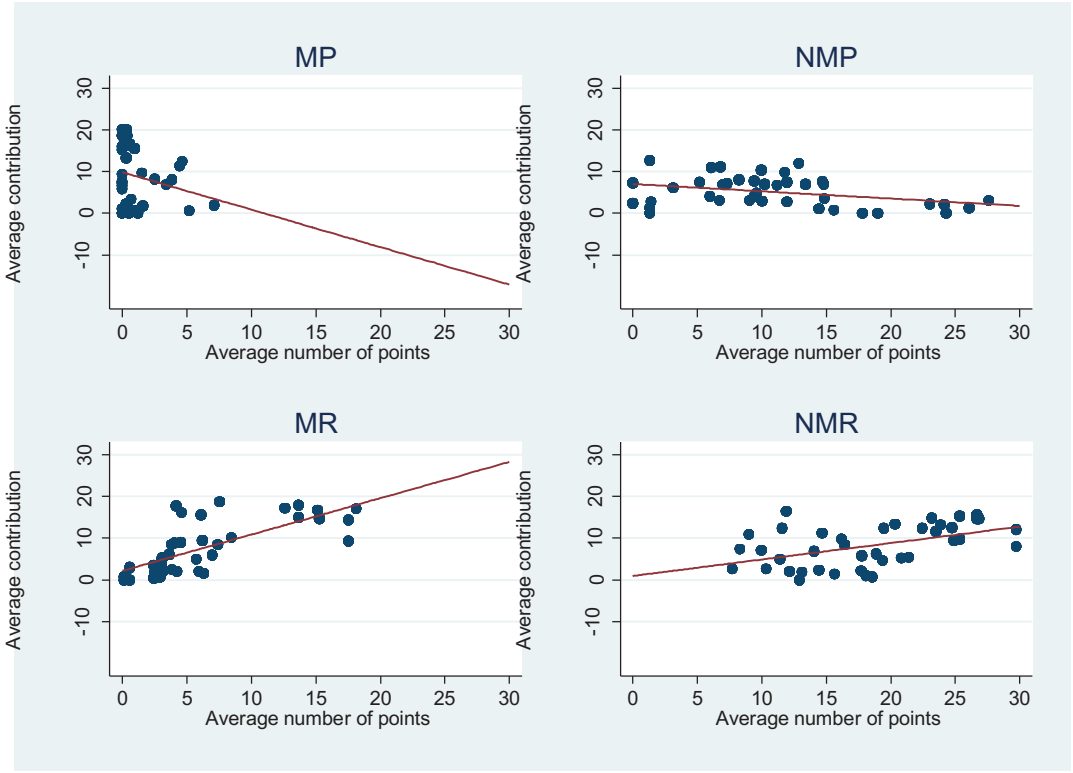
downward changes in the incentives. Furthermore, only the study by Bruttel and Friehe (2014) was specifically dedicated to a public good provision.

In order to try to explain the absence of long-lasting effects we can look at how incentives, that is having received punishment or rewards points, either monetary or non-monetary have, maybe diverging, long-term effect on the contributions. Figure 6 presents the average contribution in period 16-30 according to the number of points received during the periods 1-15, for each treatment. We will come back below to the drivers of assigning or receiving points during the first part of the experiment but we see from Figure 6 that the effect of the points on the later contributions is different according to the treatment and then according to the meaning of the received points. On average those who have been punished a lot tend to contribute less afterwards whereas those who have been awarded a lot contribute more.

These surprising results show that in the punishment treatments, those who did not contribute in the first sequence, mostly the free riders then[8], are likely to keep on their initial behavior all along the experiment. In the punishment treatments, they do not contribute during the first 15 periods, then are sanctioned (see the determinants of being sanctioned in the next section below) and continue not contributing the last 15 periods. It also appears that those who were highly punished in the first sequence of periods (and then did not contribute much) contribute even less in the last periods; likely to gain back what they lose because of punishment points. On the contrary, in the rewards treatments, we observe that those who have been highly rewarded because of their high contributions are those who contribute more once rewards opportunities have been removed. Those who did not contribute still do not.

[8] Figure A1 in the appendix shows that those who have been punished a lot in the first sequence are also those who did not contribute.

Figure 6: Average contributions in Part 2 and number of points received in Part 1



Result 3: a) in MP those who contributed less during the first periods and have been highly sanctioned are also those who contribute less once the sanction opportunity has been removed. b) In MR and NMR, we observe some kind of delayed reciprocity since those who have been highly rewarded are those who contribute more once the rewards have been removed.

Table 4 confirms these results by presenting regressions by treatment for periods 16-30 when we introduce the total number of points received during periods 1-15 as an explanatory variable[9]. The number of points obtained during the first periods displays a different effect depending on the context: those who have received a lot of rewarding points, either monetary or non-monetary, contribute more during the last 15 periods than those who have received fewer points. On the contrary, those who have been assigned with a lot of punishment points decrease their contributions. In both case, monetary points appear to have a stronger effect than non-monetary. These results also explain why we observe a less severe impact at the end of the incentives in the reward treatments. Indeed those who have been deeply punished during the first part of the experiment contribute less in the second part. In comparison to the

[9] We also tried with the average number of points received and it does not change the conclusions. Results are available upon request.

rewards treatments, the contamination of cooperator (likely conditional) is much more rapid and important due to those free-riders.

Table 4 : Determinants of contributions by treatment in periods 16-30

	(1) *MP*	(2) *NMP*	(3) *MR*	(4) *NMR*
Relative contribution in t-1	-1.133*	-0.419**	-0.255	-0.810***
	(0.675)	(0.197)	(0.304)	(0.199)
N points received	-0.142*	-0.040***	0.120***	0.051***
	(0.130)	(0.012)	(0.017)	(0.015)
Deviation from part 1	2.507***	0.761***	0.664	1.348***
	(0.921)	(0.261)	(0.435)	(0.209)
Period	-0.351	-0.375***	-0.824***	-0.180
	(0.252)	(0.131)	(0.254)	(0.117)
Constant	63.433*	17.559*	22.681*	-4.279
	(36.243)	(9.488)	(12.063)	(10.570)
N	560	560	560	560

Notes: Standard errors are in parentheses and are clustered by group. All regressions contain a control for the age and a dummy for gender as well as a dummy if the subject studies economics or management. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3.2. Punishments and rewards

Our data allow us to look at the determinants of assigning and receiving points in each of the four treatments for periods 1-15. In the following, we study both the determinants of receiving and assigning points. Our previous results show that all four incentivized treatments significantly increase contributions in the first periods. Figure 6 depicts the average number of points received as a function of deviations from the others' average contribution in the group. Figure 6 shows that in both *punishment* treatments negative deviations from the average are strongly punished. The number of points drop to almost 0 when the deviation is positive. On the contrary, the number of rewarding points is an increasing function of the deviation from the average. Surprisingly the average number of points appears to be almost constant once the deviation is positive. In both treatment conditions, *punishment* and *reward*, many more points are received in the nonmonetary treatments.

Figure 6 : Received points for deviations from others' average contributions

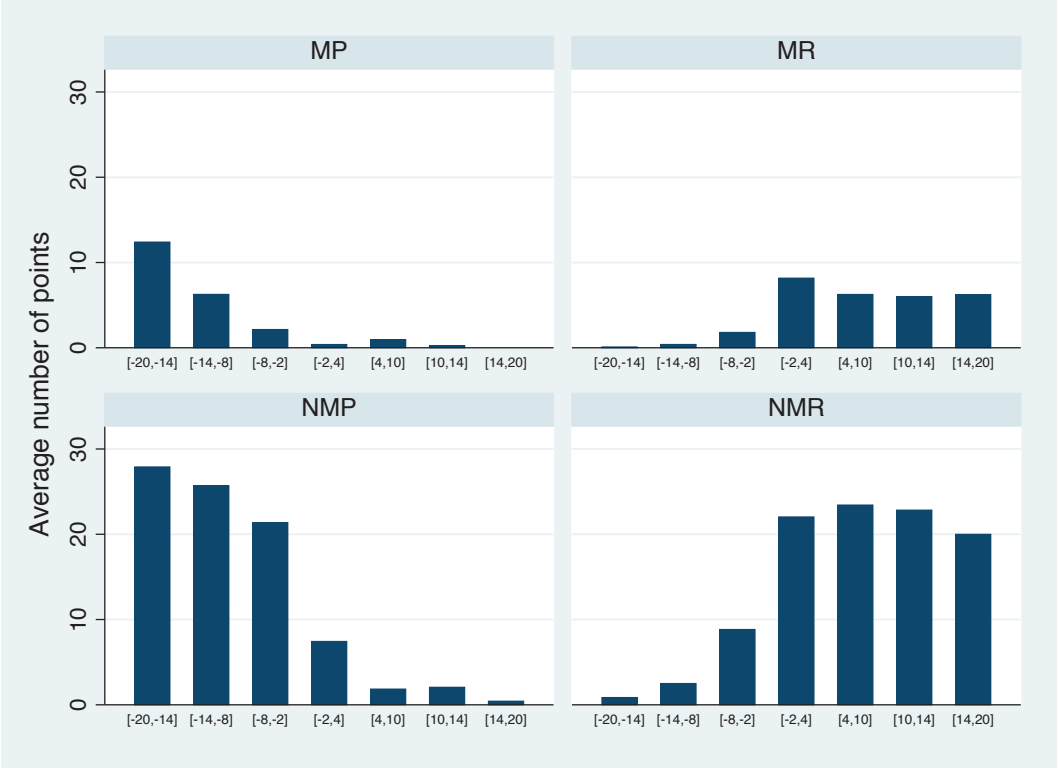


Table 5 presents Tobit regressions separately for the four treatments. The dependent variable is the total number of points received in each period by a subject and we introduce the others'contributions and the deviation from these as explaining variables. As in Fehr and Gachter (2000), we consider positive and negative deviations. Indeed Figure 6 suggests that positive and negative deviations from the others' average contribution elicit different responses. The positive deviation is the actual deviation of a subject's contribution from the others' average in case that his or her own contribution is above the average. It is zero if the subject's own contribution is equal to or below the others' average. The negative deviation is constructed analogously. In all four treatments, the absolute negative deviation is highly significant and the effect is negative for punishments and positive for rewards. Which means that, in *MP* and *NMP*, the more a subject's contribution falls short of the average the more that subject gets punished. On the contrary, in *MR* and *NMR*, the more a subject's contribution falls short of the average the less that subject gets rewarded. Results are similar with the positive deviation except that the coefficient for *MP* is not significant. The same applied for the others contribution variable. This tends to show that in the case of monetary punishment, it is only the negative deviation from the average that pushes to get punished.

Result 4: a) In MP and NMP, negative deviations from the others average contribution are sanctioned but positive deviations are not rewarded in MP and b) in MR and NMR positive deviations from the others average contribution are rewarded and negative deviations lower the rewards.

Table 5 : Determinants of receiving points -Periods 1-15 – Tobit regressions

	(1) *MP*	(2) *NMP*	(3) *MR*	(4) *NMR*
Others total contribution	0.022	-0.653***	0.237***	0.322***
	(0.034)	(0.190)	(0.046)	(0.045)
Positive deviation	0.367	-2.537***	0.477***	1.882***
	(0.323)	(0.681)	(0.072)	(0.317)
Negative deviation	-1.328***	-7.112***	0.898***	1.419***
	(0.326)	(1.612)	(0.163)	(0.190)
Period	-0.101	0.366	-0.224*	-0.174
	(0.090)	(0.224)	(0.126)	(0.110)
Constant	-12.438**	26.039	0.810	7.155
	(6.188)	(16.206)	(3.112)	(9.311)
N	600	600	600	600

Notes: Standard errors are in parentheses and are clustered by group. All regressions contain a control for the age and a dummy for gender as well as a dummy if the subject studies economics or management. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Finally, we can also look at the determinants of assigning points to the others. Figure 7 displays the average number of points given by period in the four treatments. Not surprisingly subjects assign much more points when they do not cost anything. Also they assign much more points on average in the reward treatments than in the punishment treatments. Remember that in *MR*, assigning points corresponds to a transfer of resources whereas in *MP*, assigning points costs to both subjects. Also it appears that there is a decrease of monetary punishment overtime but an increase of non-monetary punishment. Except for the last period, rewarding appears to be almost constant overtime.

Figure 7 : Average points given by treatment conditions

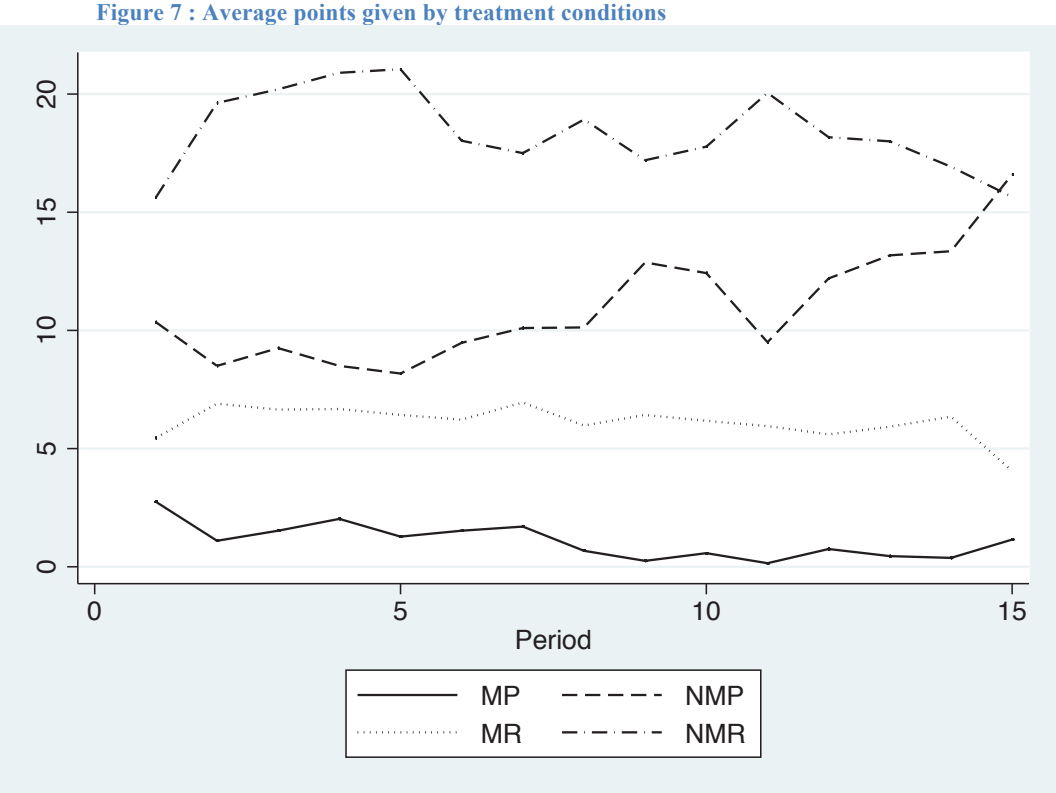


Table 6 explores the potential differences between treatments through a Tobit regression performed on individual decision to assign points. As in Table 5, we estimate one regression for each treatment condition. The dependent variable is the number of points assigned to each partner, going from 0 to 10, which explains the large number of observations by treatment. The main explaining variables are the deviation of the group's member contribution from the subject's own contribution and from the group's average. That is, for an individual to which the subject assigns points, how far is her contribution from the subject's contribution and from the average of the group they belong to. We also control for the total group contribution. In both *MP* and *MR*, when the other group's member is above the subject's own contribution, it does not affect the decision to assign points. In the case of non-monetary incentives, being above the subject's contributions affects negatively the decision to punish and positively the decision to reward, which is trivial. What seems also important in the case of *monetary* rewards is the deviation from the group's average. When the group's member contribution is above the average, monetary rewards increase but sanctions, both monetary and non-monetary, are not affected. The total group contribution positively impacts the number of points assigned in *MR* and *NMR* and negatively in *NMP and MP*.

Result 5: a) Subjects assign less (more) non-monetary sanctions (rewards) to those who contribute more than their own contribution. b) Subjects assign more rewards to those who contribute more when the contribution is above the group's average.

Table 6 : Determinants of sanctioning or rewarding behavior – Periods 1-15 - Tobit regressions

	(1) *MP*	(2) *NMP*	(3) *MR*	(4) *NMR*
Deviation from its own cont.	-0.327	-0.710***	-0.072	0.260**
	(0.213)	(0.208)	(0.055)	(0.128)
Deviation from the average	0.065	0.270	0.176**	-0.057
	(0.208)	(0.427)	(0.087)	(0.228)
Group contribution	-0.078*	-0.271***	0.125***	0.234***
	(0.046)	(0.064)	(0.027)	(0.051)
Period	-0.447***	0.151	-0.147**	-0.057
	(0.100)	(0.154)	(0.064)	(0.069)
Constant	2.869	-0.495	-1.427	-6.067
	(7.736)	(12.982)	(3.828)	(8.512)
N	1800	1800	1800	1800

Notes: Standard errors are in parentheses and are clustered by group. All regressions contain a control for the age and a dummy for gender as well as a dummy if the subject studies economics or management. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

4. Conclusion

This paper investigates the long-lasting effects of various temporary incentives in public good games. More specifically, it aims at comparing the effects of monetary and nonmonetary punishments and rewards when they are stopped after a given number of periods. These incentives are shown to be effective in increasing contributions when they are applied. However, once they are removed, we do not observe long-lasting effects. In fact, in all treatments, the end of the possibility to punish or rewards free riders do not lead to a direct dramatic drop in contributions. Instead the contributions go to the level of those found in the baseline in the initial periods. Thus the end of the incentives acts as a restart effect. These results tend to show that individual choices of contribution are only made according to the incentives at play but these incentives do not affect the preferences toward contribution. Indeed, once the incentives are no more present, the subjects in our experiment play as if they have not played before and contribute as those in the initial periods of the *Baseline*.

The absence of permanent effects of short-term incentives is similar to previous experimental results on pubic goods contributions (Bruttel and Friehe, 2014) except that we do not observe back-fired effects. In our experiment, the end of the incentive mechanism acts as a restart

effect and thus does not affect preferences nor habit towards contribution. Our results also contradict some of the empirical literature, especially in energy and environmental conservation (Cost and Gerard, 2015; Alcott and Rogers, 2014), that tend to show the existence of long-lasting effects. The specific nature of our public good game without any framing may explain the difference. There is no way to interest the subjects to an important societal question in our experiment that might perhaps impact on the behavior in the long run.

Another interesting result underlines the necessity to look at the type of incentives in the design of policies. Nonmonetary rewards had the same impact on contributions as monetary ones and so it questions the necessity to further investigate the possibilities of providing nudges to agents. In the particular case of public and social improvements, one reason to rely on the programs based on nonmonetary incentives concerns the sustainability of the funding possibilities and trust in institutions. In fact, monetary incentives can be more costly for institutions asking for individual contributions to a public good as they are difficult to quantify and often insufficient (i.e. not covering all the agent's real costs); furthermore, they can create some perverse effects (a positive contribution but a negative externality in another area), they are temporary and finally they can be rejected.

Our finding leaves wide rooms for further research and new experiments. Especially it seems interesting to look at the dynamics of the incentives effect. Our results show that to sustain cooperation, it is important to maintain incentives.

References

Acland, D. and M. R. Levy (2015) Naiveté, projection bias, and habit formation in gym attendance, *Management Science*, 61(1), 146–160.

Allcott, H. (2011). Social Norms and Energy Conservation, *Journal of Public Economics,* 95 (9-10), 1082–95

Allcott, H. and T. Rogers (2014). The Short-Run and Long-run effects of Behavioral Interventions: Experimental Evidence from Energy Conservation, *American Economic Review*, 104(10), 3003-3037.

Ariely, D., Bracha, A. and Meier, S. (2009). Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially, *American Economic Review*, vol. 99(1), 544-55

Becker, G. S. (1968). Crime and Punishment: An Economic Approach, *Journal of Political Economy*, vol. 76, pages 169.

Becker, Gary, and Kevin Murphy (1988). A Theory of Rational Addiction. *Journal of Political Economy*, 96(4): 675–700.

Brandts, J. and Cooper, D. J. (2006). A change would do you good.... An experimental study on how to overcome coordination failure in organizations. *The American Economic Review*, 669-693.

Bruttel, L. and Friehe, T., (2014). Can short-term incentives induce long-lasting cooperation? Results from a public-goods experiment. *Journal of Behavioral and Experimental Economics* 53 (2014) 120–130.

Bryan, Gharad, Shyamal Chowdhury, and Ahmed Mushfiq Mobarak (2014). Underinvestment in a Profitable Technology: The Case of Seasonal Migration in Bangladesh. *Econometrica*, 82(5): 1671–1748.

Charness,G. and U. Gneezy (2009) Incentives to Exercise, *Econometrica*, 77(3),909–931

Chaudhuri, A., (2011). Sustaining cooperation in laboratory public goods experiments: a selective survey of the literature. *Experimental Economics*, 14, 47-83.

Costa, F. and Gerard F (2015). Hysteresis and the social cost of corrective policies: evidence from a temporary energy saving program, unpublished.

Croson R. & N. Treich (2014). Behavioral Environmental Economics: Promises and Challenges, *Environmental & Resource Economics,* vol. 58(3), 335-351

Dupas, P. (2014). Short-Run Subsidies and Long-Run Adoption of New Health Products: Evidence From a Field Experiment. *Econometrica*, 82(1): 197–228.

Egas, M. and Riedl, A. (2008). The economics of altruistic punishment and the maintenance of cooperation. *Proceedings of the Royal Society B: Biological Sciences*, *275*(1637), 871-878.

Engel, S., Pagiola, S. and Wunder, S. (2008). Designing payments for environmental services in theory and practice: An overview of the issues. *Ecological economics,* 65(4), 663-674.

Fack, G. and Grenet, J. (2015) "Improving College Access and Success for Low-Income Students: Evidence from a Large Need-Based Grant Program", *American Economic Journal: Applied Economics*, vol. 7, no. 2, pp. 1-32

Fehr, E. and Gächter, S. (2000). Cooperation and punishment in public goods experiments. *American Economic Review, 90(4),* 980–994.

Fehr, E. and Gächter, S. (2002). Altruistic punishment in humans. *Nature, 415,* 137–140.

Ferraro, P. J., and M. K. Price (2013). Using Nonpecuniary Strategies to Influence Behavior: Evidence from a Large-Scale Field Experiment. *Review of Economics and Statistics*, 95(1): 64–73.

Giné, X., Karlan D. and J. Zinman (2010). Put your money where your butt is: acommitment contract for smoking cessation, *American Economic Journal: Applied Economics*, 213–235.

Gneezy, U. and J. A. List (2006). Putting Behavioral Economics to Work: Testing for Gift Exchange in Labor Markets Using Field Experiments. *Econometrica* 74 (5): 1365–84.

Gneezy, U., Meier, S. and Rey-Biel, P. (2011) When and Why incentives (Don't) Work to Modify Behavior. *The Journal of Economic Perspectives*, Vol. 25, No. 4 (Fall 2011), pp. 191-209

Gneezy, U. and A. Rustichini (2000). Pay Enough or Don't Pay at All, *The Quarterly Journal of Economics*, 115(3): 791–810.

Greiner, B. (2004). An online recruitment system for economic experiments.

Hamman, J., · Rick, S., & · Weber, R.A, (2007). Solving coordination failure with "all-or-none" group-level incentives. *Experimental Economics* (2007) 10: 285–303

Ito, K, Ida, T. & Tanaka, M. (2015). The Persistence of Moral Suasion and Economic Incentives: Field Experimental Evidence from Energy Demand, *NBER Working Paper 20910*, NBER.

Jin, L., & Huang, Y. (2014). When giving money does not work: the differential effects of monetary versus in-kind rewards in referral reward programs. *International Journal of Research in Marketing*, *31*(1), 107-116.

Landry, C. E, Lange A., List J.A., Price, M.K. and N. G Rupp (2010). Is a Donor in Hand Better than Two in the Bush? Evidence from a Natural Field Experiment. *American Economic Review*, 100(3): 958–983.

Ledyard, O. (1995). Public goods: some experimental results. In J. Kagel & A. Roth (Eds.), *Handbook of experimental economics*, Princeton University Press.

Masclet, D., Noussair, C., Tucker, S., Villeval, M.C. (2003). MOnetary and non-monetary punishment in the voluntary contributions mechanism. *The American Economic Review*. Vol 93, n°1, 366-380.

Meier, S. (2007). Do subsidies increase charitable giving in the long run? Matching donations in a field experiment. *Journal of the European Economic Association*, *5*(6), 1203-1222.

Miller, C. (2014). The Persistent Effect of Temporary Affirmative Action, unpublished.

Nikiforakis, N., & Normann, H. T. (2008). A comparative statics analysis of punishment in public-good experiments. *Experimental Economics*, *11*(4), 358-369.

Nikiforakis, N. (2010). Feedback, punishment and cooperation in public good experiments. *Games and Economic Behavior*, *68*(2), 689-702.

Nsoh, W., & Reid, C. T. (2013). Privatisation of Biodiversity: Who Can Sell Ecosystem Services?. Environmental Law and Management, vol 25, no. 1, pp. 12-20.

Reiss, P. C. and M. W. White (2008). What changes energy consumption? Prices and public pressures. *RAND Journal of Economics*, 39(3): 636–663.

Sattler C., Trampnau, S., Schomers, S., Meyer, C and B. Matzdorf (2013). Multi-classification of payments for ecosystem services: How do classification characteristics relate to overall PES success?, *Ecosystem Services*, Vol6, 31-45.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge*. Yale University Press.

Sefton, M., Shupp, R., & Walker, J. M. (2007). The effect of rewards and sanctions in provision of public goods. *Economic Inquiry*, *45*(4), 671-690.

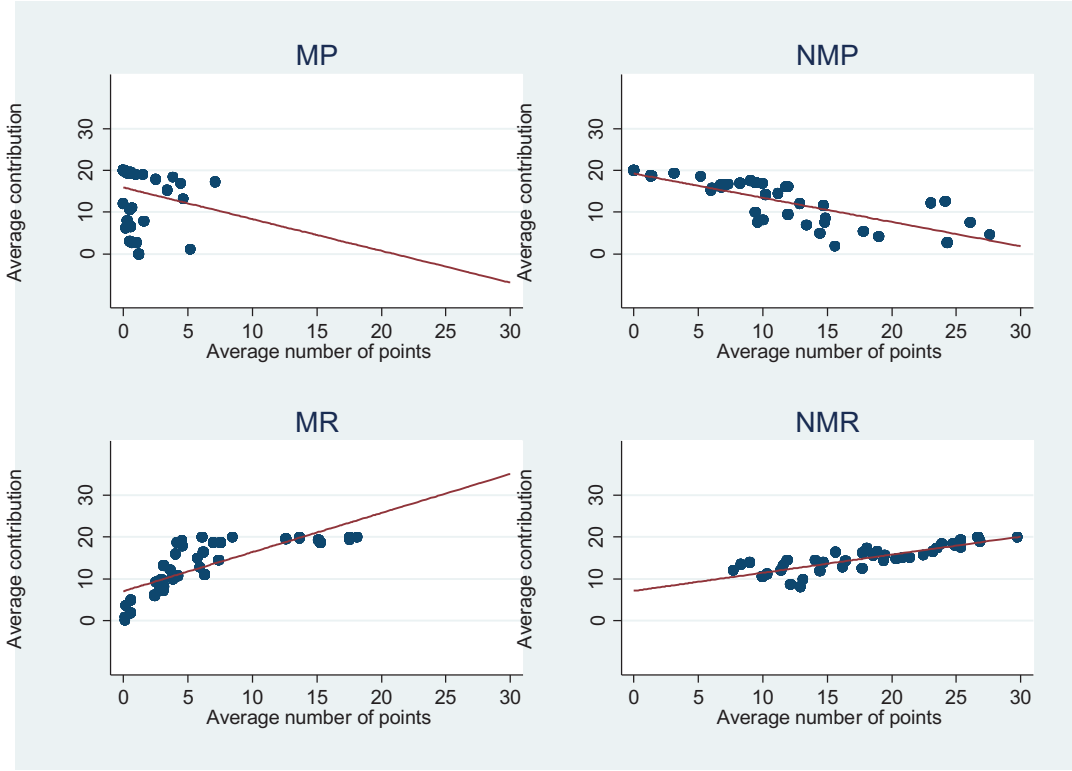
Sutter M., Haigner S. & M. G. Kocher (2010). Choosing the Carrot or the Stick? Endogenous Institutional Choice in Social Dilemma Situations, *Review of Economic Studies*, Oxford University Press, vol. 77(4), 1540-1566.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge*. Yale University Press.

Appendix

Figure A1: Average contributions and number of points received in Part 1

1.



Instructions – MP treatment

Thank you for participating in this experiment on decision making. In this experiment, your earnings depend on both your decisions and the other participants' ones. We ask you to read these instructions carefully; they should allow you to understand the experience. All your decisions are anonymous. You will never enter your name on the computer. You indicate your choice on the computer to which you are sitting.

From now we ask you not to talk. If you have a question please raise your hand and an experimenter will meet you in private. It is forbidden to communicate with another participant during the experiment. If you violate this rule you will be disqualified from this experience and of any potential payment.

The 20 participants in the experiment are divided into groups of 4. So you are in a group with three other participants. You cannot know the identity of other members of your group. As no member can know your identity. You do not know the constitution of other groups. Your group will remain the same throughout the experiment. Your earnings will depend on your decisions and the decisions of other members of your group.

This experience includes 30 successive periods divided into two parts of 15 independent periods. In each period, you will earn gains calculated in tokens. At the end of the experience your total earnings in tokens accumulated over the 30 periods will be translated at the following rate:

30 tokens = 1 €

Gains in euro you have made will then be paid in cash.

PERIODS 1-15

Each of the first 15 periods is into two stages.

<u>Stage 1</u>

At the beginning of each period you get 20 tokens. These 20 tokens constitute your initial endowment for this period. You must decide how to use this endowment. More precisely, you must decide how many tokens you want to invest in a common project to the group to which you belong and how many tokens you want to keep for you.

Specifically, at the beginning of each period you decide the number of tokens between 0 and 20 you want to invest in the common project. Choosing your investment in the project automatically determines the number of tokens you keep for yourself (20 minus your investment fees). For example, if you decide to invest 15 tokens in the project, you keep 5 tokens for you.

After each member of your group has made its investment choices, you are informed of the total amount invested in the project (that is to say your contribution and the others 'ones). You are also informed of your earnings for that period.

Your earnings for this period are the sum of two amounts:
1. The number of tokens you have not invested in the joint project and you have kept for you.
2. The income obtained through your investment in the joint project.

The investment in the joint project entitles you to an income. The income of the joint project is 40% of total contributions to the project of the 4 members of the group (including your contribution).

Your gain for the period = (20 - your invested amount) + 0.4 * (the total of the invested amounts)

The income from the project is calculated in the same way for all members of your group, each group member thus receives the same project income.
For example, if the total amount invested by the four members of the group is 60 tokens, each group member receives an income of 0.4 * 60 = 24 tokens. If the total investment is 9 tokens, each group member receives an income of 0.4 * 3.6 = 9 tokens from the project.

All the tokens that you do not invest in the joint project are for you. On the other hands, each token you spend for the joint project increases the total contribution of 1 token and therefore increases your income from the proposed 0.4 * 1 = 0.4 token. The income of other group members is also increased by 0.4 token in this case. Your investment in the joint project thus increases the income of other group members. Similarly, any investment in the joint project by another member of the group increases your own income and that of other group members.

- For example, if all group members keep their initial endowment of 20 tokens and do not contribute to the joint project, each group member receives 20 tokens he or she kept and receives nothing from the project. The total gain for each member is 20 tokens.
- If all group members invest their entire initial allocation of 20 tokens in the project, the sum of contributions is 80 tokens. Each group member will therefore receive an income of 32 tokens of the project and kept 0 token. The total gain for each member is 32 tokens.

Stage 2

At the beginning of the second stage, you are informed of the level of individual contributions that each member of your group has done for the project. You then have the possibility to express your disapproval against each member in distributing points. You can distribute a large number of points to a member of your group if you disagree with his decision to invest in the first step. You can give from 0 to 10 maximum points: 10 points if you strongly disagree with his decision to 0 points if you do not disapprove of his decision.

The other members of your group you can also distribute points if they wish. So you must decide for each member of your group, after learning of their contribution to the joint project, how many disapproval points you want to give. If you do not want to show your disapproval against a member, you can assign 0 points disapproval.

Remember that the same 3 participants and you form the group until the end of the experiment. However you will not have the opportunity to identify each member individually. During each period, the investment in the joint project will be presented in ascending order without indication of the link between investment and the group member who has achieved it.

Each point you give to another member of your group has a cost for you. Each point you give reduces your earnings from Stage 1 of 0.25 tokens.

• If you distribute 2 points to a member of your group. His earnings are reduced by 2 tokens and yours are reduced of 0.25 * 2 = 0.5 tokens. If you give 8 extra points to another member of your group, earnings are reduced by 8 tokens but your earnings are reduced in total (2 + 8) * 0.25 = 2.5 tokens.

• If you give 0 point to a member of your group nor his gains nor yours are affected.

The total amount of your earnings at the end of the period is calculated as follows:

Gain for the period = earnings from Stage 1 - the sum of points received from other Members - 0.25 * points given to the other members

Your earnings for the period can be negative if your earnings from Stage 1 are not sufficient to offset the points received and the costs of points distributed to other members.

Once all participants have made their choice, your earnings for the period will be announced and another period will begin.

PERIODS 16-30

During the periods from 16 to 30, you have to take the same decisions as in stage 1 of periods 1 to 15. However you will not have the opportunity to distribute points of disapproval to the members of your group. The other members of your group will no longer distribute more points. So you cannot show your disapproval, and no member of your group can show it neither.

Your unique decision in each period will be to decide how much of your 20 initial endowment of tokens you want to invest in the joint project. The yield of the joint project is identical to the first 15 periods

Your earnings will be calculated in the same manner as in stage 1 in the first 15 periods:

Your gain for the period = (20 - your contribution) + 0.4 * (the total contributions)