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'Expressive' Obligations in Public Good Games: Crowding-in and Crowding-out Effects

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Abstract
We study individual behaviour in a repeated linear public good experiment in which, in each period, subjects are required to contribute a minimum level and face a certain probability to be audited. Audited subjects who contribute less than the minimum level are convicted to pay the difference between the obligation required and the voluntary contribution. We study the 'expressive' power of the obligations. While at early stages subjects contribute the minimum level, with repetition contributions decline below the required amount indicating that expressive obligations are not capable to sustain cooperation. We observe that expressive obligations exert a rather robust crowding-out effect on voluntary contributions as compared to a standard public good game. The crowding-out is stronger when payments collected by the monitoring activity are distributed to subjects rather than when they are pure dead-weight-loss.

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Keywords
Expressive law, motivation crowding theory, laboratory experiments

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1 Introduction

An obligation is a requirement to take (or not to take) a course of action by virtue of a command. Commands can be internal to the individual, or external. In economics it is usually assumed that external rules can modify behaviour with respect to internal commands only if they provide incentives to do so. In particular, in order to improve efficiency in contexts in which individual and social interests are not aligned, economists recognize the importance of punishing deviating behaviors to induce individuals to conform to norms of conduct. Financing public goods through taxation and designing adequate sanctions for tax evaders is an example of the more general economic approach to the analysis of law (Polinsky and Shavell 2000).

It has, however, been argued that legal obligations also exert 'expressive' influences on individuals' behavior that are independent of the system of material incentives they entail (Kahan 1998, Cooter 1998, Kreps 1997, Bowles 1998). We denote as 'expressive' those formal obligations that mantain no incentives (sanctions or rewards) to comply with.

The theory of expressive law has emphasized the positive effect that expressive obligations may exercise on efficiency in social situations. Two main arguments have been suggested. On the one hand, expressive obligations may be representative of moral and ethical values that, once internalized, shape subjective preferences and affect individuals' behaviors (Kahan 1997, Cooter 1998). On the other hand, in several social games with multiple equilibria, expressive obligations, by introducing standards of behavior and focal points, may enhance coordination (Cooter 1998, McAdams 2000). More in general, we say that an expressive obligation exerts crowding-in effects when it induces subjects to act more pro-socially and improves social welfare.

Nevertheless, in many situations characterized by social interactions, external interventions (such as formal regulations or legal rules) may also undermine intrinsic motivations to engage in pro-social behaviors (Kreps 1997, Frey 1997, Bowles 1998). In their review on 'motivation crowding theory', Frey and Jegen (2001) highlight two psychological processes that explain why external regulations may crowd-out intrinsic motivations. According to the 'impaired self-determination' process, individuals with an intrinsic motivation for pro-social behavior may feel overjustified by an external regulation, which may then takes full psychological control for the achievement of a social goal. Likewise, according to the 'impaired self-esteem' process, external regulations may induce subjects to feel as if their intrinsic motivation to adopt pro-social behaviors is not acknowledged. As a result, intrinsically motivated subjects would reduce their effort towards cooperation.

Crowding-in and crowding-out effects of external regulations have been documented in a variety of contexts by a growing empirical literature, mainly (but not exclusively) experimental.[1] Most of the existing evidence, however, does not disentangle the role of material incentives (sanctions or rewards) endorsed by external regulations from their expressive effects (e.g., Gneezy and Rustichini 2000, Bohnet et al. 2001, Falk and Kosfeld 2006).

The main purpose of this paper is to contribute to this literature. We report results from a repeated linear public good experiment in which, in each period, sub-

[1] See Frey and Jegen (2001) for references containing experimental evidence.

jects are required to contribute at least a minimum amount to the public good and face a certain probability to be audited. Audited subjects that have contributed less than the minimum obligation must pay a sum equal to the difference between the amount required and their contribution. Thus, the obligation is 'expressive' since the penalty surcharge is zero and there is no monetary incentive to comply with the formal regulation. We compare results from treatments in which various levels of minimum contributions are required with those from a benchmark, namely a standard linear public good game (VCM). We observe that expressive obligations produce both crowding-in and crowding-out effects. In particular, while in the treatments with the obligations voluntary contributions are positively associated with the minimum payment required, introducing the expressive obligations *per se* have a negative effect on voluntary contributions.

Crowding-in and crowding-out are better detected in a regression analysis that allows to disentangle and separately measure the two effects. We find that crowding-out effects are stronger in treatments in which sanctions collected through the auditing procedure increase the payoff of non audited group members rather than in treatments in which they simply represent dead-weight loss. We also quantify the extent of crowding-in and crowding-out by estimating the break-even minimum contribution in treatment with expressive obligations to raise a level of public good at least as great as in the VCM.

The most related papers to ours are Tyran and Feld (2006) and Galbiati and Vertova (2008). Tyran and Feld (2006) consider a one-shot game in which participants can choose either to contribute the entire endowment to the public good or to give nothing. They study the effect of deterrent sanctions versus non-deterrent sanctions and find that non-deterrent sanctions have an effect on cooperation only when they are self-imposed through majority voting. More similar to our setting, Galbiati and Vertova (2008) design an experiment in which audited subjects can be either sanctioned or rewarded according to the sign of the difference between their actual contribution and the stated obligation. Since reward and penalty are linear around the obligation, a risk neutral self-interested individual should be unaffected by the levels of the obligation. However, authors find that contributions respond positively to variations in obligations, even after controlling for subjective risk aversion.

There are two main differences with respect these contributions and ours. First, our design allows us to clearly disentangle the effects of introducing an expressive obligation *per se* from those implied by the scheme of incentives it endorses. Second, neither of the previous studies, nor as far as we know other studies, have attempted to separately measure the crowding-in and crowding-out effects of expressive obligations. Understanding, however, whether expressive obligations can generate crowding-in and crowding-out effects and whether the effects are mutually exclusive or can simultaneously affect behaviour are theoretically and empirically important questions. Moreover, the two effects may totally or partially cancel out and separately measuring the two effects may be fundamental to draw correct conclusion about the real impact of expressive obligations.

The rest of the paper proceeds as follows. In section 2, we describe the experimental design and state the theoretical predictions. In section 3, we present results. Final remarks and a discussion on the implications of our findings are in the conclusion.

2 Experimental design and theoretical predictions

2.1 Design

Our experiment consists of six treatments. We run two sessions for each treatment. At the beginning of each session, 24 subjects are randomly and anonymously partitioned into 6 groups of 4 members that remain unchanged throughout the 15 periods of the session. The baseline treatment is a linear public good game played in partners condition (VCM). In every period, each subject allocates an endowment of 30 tokens between a private and a collective account. Subjects make their choices simultaneously and anonymously. Tokens allocated to the private account generate a private benefit, whereas tokens allocated to the group account are collectively and mutually remunerative. In particular, a subject receives 2 points for each token she allocates to the individual account, while receives 1 point for each token allocated by her, or by any other member of her group, to the collective account. Thus, the marginal per capital return from allocating tokens to the collective account is 0.5, implying that the unique sub-perfect Nash equilibrium is a situation in which everybody contributes nothing to the public good.

Results of the baseline treatment are compared with subjects' performance in 5 different treatments: NORED(5), NORED(10), NORED(18), RED(10) and RED(18). There are two main differences between the baseline and the additional treatments, henceforth referred to as the obligation treatments. First, in each period of the obligation treatments, subjects are asked to contribute at least s tokens - the *obligation level* - to the collective account. The obligation level is constant within each session, though it varies across treatments. Namely, we considered three values of s: a low level, 5 - in NORED(5) -, an intermediate level, 10 - used in NORED(10) and RED(10) - and a high level, 18 - used in NORED(18) and RED(18). While the low and the high obligation levels were exogenously chosen, the intermediate level is set to the median contribution observed in the first period of the baseline VCM sessions (which were run in advance with respect to the sessions of the obligation treatments).

The second difference is that, after having taken their choices in a period, participants to the obligation treatments enter an audit stage. In particular, at the beginning of each session, subjects are informed that, in every period, there is the possibility that their contributions are randomly selected and audited in order to verify their correspondence with the obligation level. The audit stage consists of a two-step procedure. In the first step, the computer randomly determines, with equal probability, whether the group enters the second step of the audit stage or rather if it directly moves to the next period of the session. In the case the second step is undertaken, the computer selects randomly and with equal probability one of the four group members. Thus, in each period, the contribution of any subject has probability 1/8 of being selected and audited. If the contribution to the collective account made by the selected subject is greater than or equal to the obligation level, then the audit stage does not produce any effect neither on her payoff nor on those of the other group members. On the other hand, in the case the contribution is lower, the payoff of the selected subject is reduced by one point for each token of difference between the obligation level and her contribution. Concerning the effects of the sum paid by the selected subject on the payoff of the other group members, we consider

Table 1: Point-payoffs in experimental settings

Settings	Payoffs
VCM	$2(30 - x_{i,t}) + \sum_{j=1}^{4} x_{j,t}$ always
NORED(s)	$\begin{cases} 2(30 - x_{i,t}) + \sum_{j=1}^{4} x_{j,t} \text{ with probability } (1 - pq); \\ 2(30 - x_{i,t}) - \max\{s - x_{i,t}; 0\} + \sum_{j=1}^{4} x_{j,t} \text{ with probability } pq \end{cases}$
RED(s)	$\begin{cases} 2(30 - x_{i,t}) + \sum_{j=1}^{4} x_{j,t} \text{ with probability } (1 - p); \\ 2(30 - x_{i,t}) - \max\{s - x_{i,t}; 0\} + \sum_{j=1}^{4} x_{j,t} \text{ with probability } pq; \\ 2(30 - x_{i,t}) + \sum_{j=1}^{4} x_{j,t} + \max\{s - x_{z,t}; 0\} \text{ with probability } p(1 - q) \end{cases}$

two different settings. In NORED(5), NORED(10) and NORED(18) payments do not affect payoffs of non selected subjects. On the contrary, in RED(10) and RED(18), the sum paid by the selected subject increases the payoff of any other group member by the same amount.

2.2 Predictions

We study individuals' contributions to the collective account in the various treatments. Let $x_{i,t}$ be the contribution to the collective account of subject i in period t. Let p be the probability that the group proceeds to the second step of the auditing procedure and, conditional on that, let q be the probability of a subject to be audited.

The payoff in points of subject i in period t under the NORED(s), the RED(s) and the VCM setting are shown in Table 1. In the VCM the individual receives $\Pi_{i,t} = 2(30 - x_{i,t}) + \sum_{j=1}^{4} x_{j,t}$. In the NORED($s$), payoff depends on whether a subject is audited. In particular, she receives $2(30 - x_{i,t}) + \sum_{j=1}^{4} x_{j,t}$ either when, with probability $1 - pq$, she is not audited, or when, with probability pq, she is audited and allocates at least the required minimum contribution of s tokens to the collective account. On the other hand, she receives $2(30 - x_{i,t}) - (s - x_{i,t}) + \sum_{j=1}^{4} x_{j,t}$ when, with probability pq, she is audited and allocates less than s tokens to the collective account.

As stressed above, for given s, the only difference between NORED(s) and RED(s) treatments is that, in the latter, payments taken away from the audited subject increase the payoff of the other group members. Thus, a subject receives $2(30 - x_{i,t}) + \sum_{j=i} x_{j,t}$ either when, with probability $(1 - p)$, her group does not enter the second step of the auditing procedure, or when, with probability pq, she is audited and allocates at least s tokens to the collective account, or in the case that, with probability $p(1 - q)$, her group participates to the second step of the auditing procedure, she is not selected for auditing and the audited group member allocates at least s tokens to the collective account. Symmetrically, she receives $2(30 - x_{i,t}) - (s - x_{i,t}) + \sum_{j=i} x_{j,t}$ when, with probability pq, she is audited and allocates less than s tokens to the collective account. Finally, she receives $2(30 - x_{i,t}) + (s - x_{z,t}) + \sum_{j=i} x_{j,t}$ when, with probability $p(1 - q)$, her group enters the second step of the auditing procedure, she is not audited and the audit group member, z, allocates less than s tokens to the collective account.

Determining the equilibrium contributions under the assumption of self-interested subjects in the three treatments is straightforward. In the VCM, given the contributions of the other group members, the payoff function is maximized when $x_{i,t} = 0$. The same prediction applies, for given s, in NORED(s) and RED(s). Suppose that the subject takes her decisions according to the expected utility theory. In any period t of, say, NORED(s), given the contribution of the other group members, each subject chooses $x_{i,t}$ to maximize the following expected utility:

$$2(30 - x_{i,t}) + \sum_{j=1}^{4} x_{j,t} - pq \cdot \max\{(s - x_{i,t}), 0\} \tag{1}$$

The previous expression strictly decreases in $x_{i,t}$. Thus, it is maximized for $x^*_{i,t} = 0$: in other words, since the worse that can happen to a self-interested subject in NORED(s) is to be convicted to pay the amount $(s - x_{i,t})$ if audited, there is no reason for her to give more than what allocated in the standard VCM. The same holds in RED(s) treatments, although in this case the payments of the audited subjects increase the payoffs of the other group members.

The prediction that the equilibrium is invariant across treatments holds under the assumption of self-interested agents (regardless of the degree of risk aversion), as well as under different generalizations of the expected utility theory. The reason is in the 'expressive' nature of the obligation used in our experiment that does not modify the material incentive to free-ride and contribute nothing.

When behaviours depart from self-interest, predictions become less certain. Various models of pro-social behaviour have in particular been proposed in the literature to explain why many individuals cooperate in social dilemma situations, like indeed in public good experiments.[2] With models of voluntary cooperations the effect of expressive obligations depend on the way internal motivations for giving are affected. In the Introduction we have anticipated different hypotheses about the possible impacts. First of all, on the one hand, the level s of expressive obligation may become under some non-selfish approaches a natural benchmark to conform behaviour. For example, in 'reciprocity theories', which are based on the idea that individuals cooperate by matching the contribution of others, s may offer a focal point for coordinating beliefs about the contributions of others. An increase in s may then bring more cooperation favoring coordination on a higher level of contributions. According to the theory of expressive law, legal norms can sometimes affect people's preferences and motives even more directly by communicating and shaping social values. In such a case, expressive obligations may induce or increase pro-social behaviour *per se.*

From an opposite perspective, external regulations may weaken the power of internal ethical constraints. According to motivation crowding-out, by resolving the internal conflict between self-interest and moral constraints, formal and external mechanism delegated to reach social goal may discourage the genuine attitude of individuals to act pro-socially.[3] Following the motivation crowding-out argument, treatments with expressive obligations may be associated to lower contributions

[2]Models of other-regarding preferences or non-selfish models of voluntary giving for example include theories of unconditional commitments, reciprocity theories, theories of social preferences, altruism theories and theories of 'warm-glow' giving (surveys in, e.g., Fehr and Schmidt 2003, Sobel 2005). See Croson (2007) for a recent experimental test of the various theories.

[3]As alluded to in the introduction, crowding out effects have indeed been documented by a rather large literature. However, most of the existing evidence is concerned with situations and

when compared with subjects' performances in the standard VCM. Moreover, a stronger crowding-out may be expected in the RED(s) settings in which payments collected through the monitoring activity are returned to the public fund, since the substitution of internal motivations by external control in the provision of the public good may be perceived even more pervasive.

Obviously, which precise effect and with which strength is actually at work is at the end an empirical question which the experiment addresses. It is clearly also possible that various effects are simultaneously at work.

2.3 Implementation

For each treatment we collected data from 12 independent groups of 4 subjects divided in two sessions of 6 groups each. Overall, 288 subjects participated in the experiment. Subjects, mainly undergraduate students in Economics and Statistics, were recruited by e-mail using a list of voluntary potential candidates. At their arrival, subjects were randomly assigned to a computer terminal, instructions were read aloud and questions were privately answered by experimenters.[4] On average, subjects earned a payment of 11.13 euro which was privately paid in cash at the end of the session. Each session lasted about one hour including time for reading the instructions and paying subjects. The experiment took place at the EELAB (Experimental Economics Laboratory) of the University of Milan – Bicocca between June and September 2009. The experiment was computerized using the z-Tree software (Fischbacher, 2007).

3 Experimental results

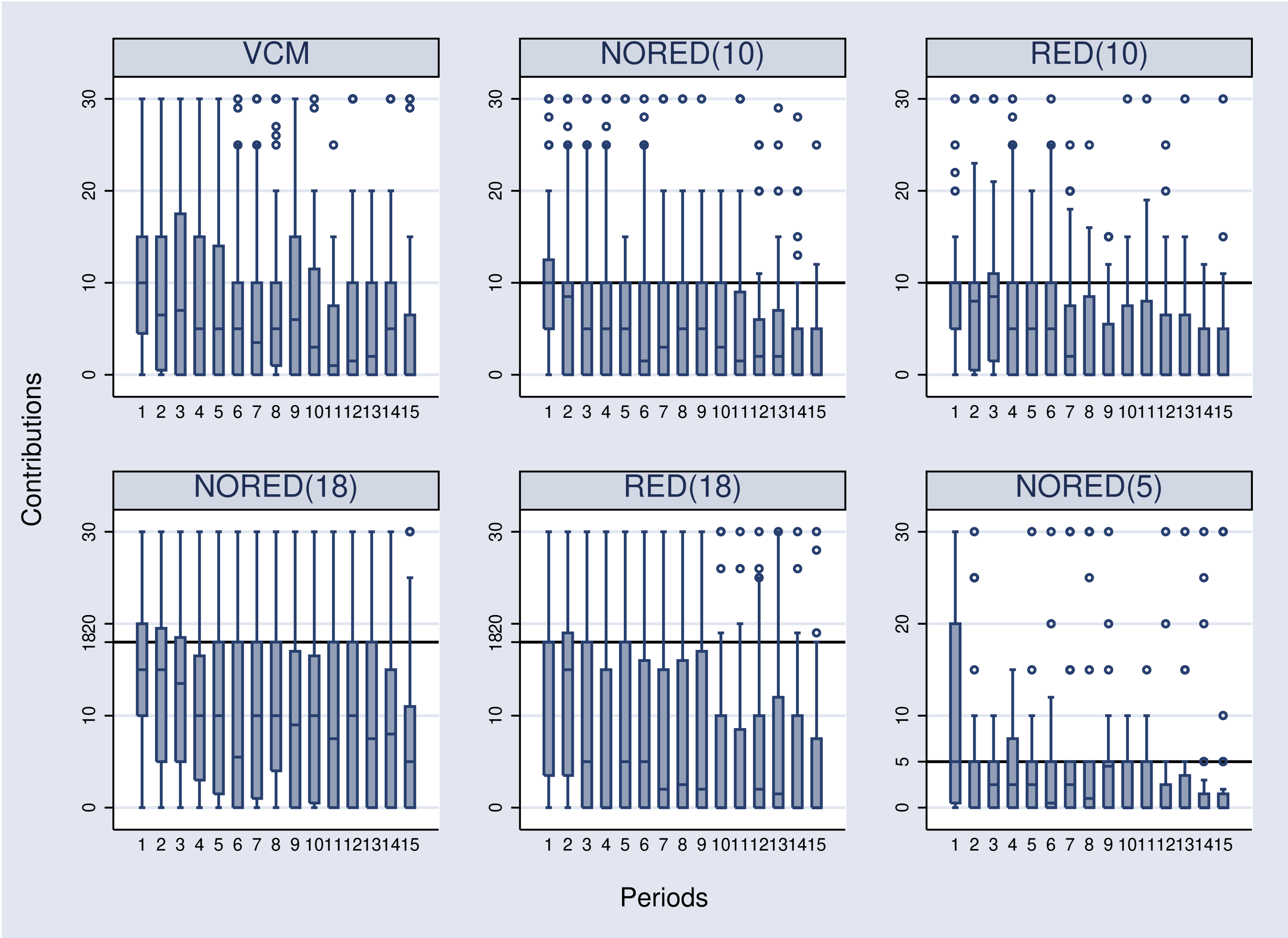
Figure 1 reports the 'box-plots' of the distributions of individual contributions from period 1 to 15 for the six experimental treatments. In the individual plots boxes denote 25%, 50% and 75% quartiles; the upper whisker stretches to the upper adjacent value and the lower to the lower adjacent value. Outside values are marked by circles. The lines in the plots of the obligation treatments correspond to the different obligation levels. As remarked above, the intermediate level $s = 10$ in the NORED(10) and RED(10) obligation treatments corresponds to the first period median of the benchmark VCM treatment. It was though that for this reason the level could be considered by the majority of individuals close to what they perceive as an 'internal' duty, and therefore particularly interested to be also studied as an 'expressive' command. A higher obligation level $s = 18$ was introduced for treatments NORED(18) and RED(18), whereas a lower obligation level was used for NORED(5), namely $s = 5$.

There are similarities and differences between the distributions of contributions among treatments. Regarding the similarities, the graphs in Figure 1 show positive contributions from most participants at the beginning of the games in all treatments. The contributions decrease through the rounds of all treatments both in regard to

experiments in which the external regulations also affected people material incentives. But since the mechanism underlying the effects is mainly psychological, it appears of particular interest to control whether and to what extent crowding-out effects also extend to the case in which law has only an expressive function.

[4]Instructions of the experiment are in Appendix.

Figure 1: Distributions of individual contributions over periods in experimental treatments



the number of participants giving positive contributions and in the level of the contributions given. Still we see that in all treatments there are some individuals giving positive contributions even in the last periods of the games. These are usual features of public good experiments. Nonetheless, it is worth recalling that, on the one side, the evidence of positive contributions contradicts in all treatments the prediction entailed by purely selfish models of complete free-riding with zero contributions given to the public good in all periods. On the other side, the trend of decreasing contributions in public good games is often explained with the interaction of purely selfish individuals with so called 'conditional cooperators', namely people who are willing to contribute more to a public good the more others contribute (Fischbacher et al. 2001). In particular, according to the idea of conditional cooperation, contributions to public good 'spiral downwards' in repeated interactions since non selfish agents[5] decrease progressively their contributions in order to respond to the contributions given by their groups partners and conditioned by the lower contributions given by free-riders.

We are interested in analyzing how subjects' contributions vary across experimental treatments. We start with a descriptive analysis of the results which we split into two parts: first we look at the distributions of individual contributions across treatments and then we look at the average contributions levels. Afterwords we perform a parametric analysis to better detect the forces which determine the descriptive evidence.

3.1 Distributions of individual contributions across treatments

Table 2 reports the distributions of contributions underlying the graphs in Figure 1. Two observations emerge from the data.

First, subjects in the obligation treatments tend to contribute the amount s required by the obligation more often than in the VCM treatment. For example, in the first period of the VCM, only 6 subjects contribute 5 tokens whereas the same amount is contributed by 16 subjects in NORED(5). Similarly, 9 subjects contribute 10 tokens in period 1 of the VCM versus 14 and 18 subjects who allocate 10 tokens to the collective account in NORED(10) and RED(10), respectively. Finally, whereas no subject contributes 18 tokens in period 1 of the VCM, 8 and 15 subjects meet the obligation in NORED(18) and RED(18), respectively. This confirms that, at least in the first periods of the sessions, subjects perceive the amount required by the expressive obligation as a focal point to which they can anchor their contributions. The effect, however, being stronger at the beginning of the various sessions, becomes weaker as more periods are played by the subjects due to the general decrease in the overall level of cooperation.

Table 3 reports results from a difference-of-proportions test across treatments and subsets of periods for the null hypothesis that the proportion of subjects contributing s tokens in the VCM and in the obligation treatments are the same. In particular, the Table reports z-statistics and p-values of the tests conducted over periods 1-5, 6-10, 11-15 and over the entire sessions.[6]

[5]Conditional cooperation can be considered as a motivation for contributing in its own or be a consequence of some fairness preferences like 'altruism', 'warm-glow', 'inequity aversion' or 'reciprocity' (Fischbacher et al. 2001, p. 397).

[6]In order to take into account for both potential individual dependency over time and dependency within each matching group, the reported statistics refer to the β-coefficients estimated in a linear

Table 2: Distributions of contributions per period in experimental treatments

	VCM									NORED(5)								
	Tokens									Tokens								
Periods	0	1-4	5	6-9	10	11-17	18	19-29	30	0	1-4	5	6-9	10	11-17	18	19-29	30
1	8	4	6	1	9	11	0	4	5	11	4	16	0	4	1	0	2	10
2	12	4	8	1	4	8	1	7	3	14	4	17	0	2	2	0	7	2
3	17	2	4	2	6	5	0	10	2	20	6	14	0	2	0	0	6	0
4	13	7	8	1	3	6	0	7	3	21	2	11	0	7	3	0	3	1
5	19	3	6	0	7	4	0	5	4	21	4	14	0	4	1	1	2	1
6	15	4	10	0	8	6	0	4	1	22	4	13	0	3	4	0	1	1
7	18	8	6	1	5	5	0	3	2	19	6	11	1	3	4	0	2	2
8	11	9	6	1	10	4	0	4	3	25	3	10	3	0	2	0	2	3
9	13	5	5	2	8	10	1	3	1	22	2	12	3	3	3	0	2	1
10	19	6	4	0	7	5	0	6	1	29	1	9	0	4	0	1	4	0
11	22	6	7	2	6	4	0	1	0	31	2	9	1	2	1	0	2	0
12	21	5	5	0	7	6	0	1	3	34	2	6	0	2	1	0	2	1
13	20	6	7	0	8	5	0	2	0	30	4	4	0	5	2	0	2	1
14	19	4	9	0	6	7	0	1	2	35	1	3	1	2	2	0	3	1
15	26	4	6	2	3	4	0	1	2	35	2	6	0	3	0	0	0	2
All	257	77	97	13	97	90	2	59	32	369	47	155	9	46	28	2	40	26

	NORED(10)									RED(10)								
	Tokens									Tokens								
Periods	0	1-4	5	6-9	10	11-17	18	19-29	30	0	1-4	5	6-9	10	11-17	18	19-29	30
1	9	1	9	3	14	2	0	5	5	11	0	5	5	18	4	0	3	2
2	13	3	7	2	14	2	0	3	4	12	3	5	8	11	3	0	3	3
3	17	6	7	1	6	6	0	3	2	12	3	6	6	9	6	0	4	2
4	15	4	7	5	10	2	0	3	2	19	1	11	3	7	3	0	3	1
5	18	5	4	1	13	5	0	0	2	20	1	8	4	11	2	1	1	0
6	21	5	8	1	6	2	0	4	1	19	3	7	2	8	5	0	3	1
7	18	7	6	1	10	2	0	2	2	23	4	6	6	4	0	1	4	0
8	20	3	8	1	11	1	0	3	1	26	4	4	4	6	3	0	1	0
9	19	4	3	3	13	4	0	1	1	27	1	8	4	4	4	0	0	0
10	20	5	6	3	9	4	0	1	0	27	1	6	5	6	2	0	0	1
11	23	5	5	3	6	3	0	1	2	27	4	3	4	5	3	0	1	1
12	22	8	6	2	5	1	0	4	0	27	5	4	3	5	2	0	2	0
13	23	6	4	4	5	3	0	3	0	29	2	5	2	4	5	0	0	1
14	28	5	5	0	5	2	0	3	0	29	5	8	2	3	1	0	0	0
15	31	3	6	0	5	2	0	1	0	30	5	6	1	3	2	0	0	1
All	297	70	91	30	132	41	2	37	22	328	42	92	59	104	45	2	25	13

	NORED(18)									RED(18)								
	Tokens									Tokens								
Periods	0	1-4	5	6-9	10	11-17	18	19-29	30	0	1-4	5	6-9	10	11-17	18	19-29	30
1	3	2	4	2	6	9	8	4	10	11	1	2	1	3	5	15	6	4
2	7	3	5	3	2	7	7	10	4	11	1	2	2	6	6	8	9	3
3	8	1	5	3	5	3	11	7	5	19	3	3	0	3	7	6	6	1
4	10	2	5	2	7	10	8	2	2	25	2	4	0	2	5	5	4	1
5	11	2	6	1	6	6	6	6	4	20	2	6	1	3	2	8	3	3
6	16	5	3	4	2	5	5	3	5	19	3	5	1	3	6	7	2	2
7	11	4	5	2	5	7	6	5	3	22	4	3	0	4	4	8	2	1
8	10	2	5	3	6	8	7	3	4	23	4	4	1	1	4	8	1	2
9	14	4	2	4	6	6	4	5	3	22	5	3	1	3	3	7	3	1
10	12	3	4	3	9	5	5	5	2	27	3	3	0	5	3	3	2	2
11	16	5	3	0	5	6	5	6	2	26	3	6	1	1	2	5	3	1
12	15	4	3	1	3	9	8	1	4	22	6	4	1	5	4	2	3	1
13	16	2	4	3	4	5	7	3	4	22	5	2	3	4	4	5	2	1
14	14	2	5	4	5	8	4	2	4	28	4	1	1	5	1	5	2	1
15	19	2	6	4	5	3	3	2	4	30	4	2	0	4	2	3	2	1
All	182	43	65	39	76	97	94	64	60	327	50	50	13	52	58	95	50	25

TABLE 3: Difference-of-proportions tests of contributions equal s across treatments

		$\Pr(x_i = s)$ in VCM = $\Pr(x_i = s)$ in treatment:				
		NORED(5)	NORED(10)	RED(10)	NORED(18)	RED(18)
		$s = 5$	$s = 10$	$s = 10$	$s = 18$	$s = 18$
Periods 1-5	z	-3.048^{***}	-2.722^{***}	-2.673^{***}	-5.529^{***}	-4.011^{***}
	p	0.0023	0.0064	0.0075	0.0000	0.0000
Periods 6-10	z	-1.790^{*}	-0.779	0.797	-4.419^{***}	-3.277^{***}
	p	0.0733	0.4358	0.3289	0.0000	0.0010
Periods 11-15	z	0.574	0.375	1.056	-6.180^{***}	-2.645^{***}
	p	0.5656	0.7070	0.2907	0.0000	0.0081
Periods 1-15	z	-1.786^{*}	-1.106	-0.311	-6.441^{***}	-4.177^{***}
	p	0.0741	0.2690	0.7554	0.0000	0.0000

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

Focusing on the first five periods, the null hypothesis can be rejected ($p < 0.01$) in favor of the alternative statement that individuals contribute the required amount s more often in the obligation treatments than in the VCM. With repetition, this effect tends to disappear in NORED(5), NORED(10) and RED(10) while it remains highly significant in NORED(18) and RED(18). A reasonable explanation for this evidence is that, whereas contributing 5 and 10 tokens may represent natural focal choices in all treatments (regardless of the presence of an obligation), very few subjects in the VCM are willing to contribute 18 tokens.

A second noteworthy characteristic of the distributions reported in Table 2 (see also the graphs in Figure 1) is that, in the obligation treatments, subject tend to contribute “at most” - rather than “at least” - the required amount s. Table 4 presents results from a difference-of-proportions test conducted similarly as above, across treatments and subsets of periods, for the null hypothesis that the proportion of subjects contributing more than s tokens in the VCM and in the obligation treatments are the same.[7] Notice that, when the null hypothesis is rejected, two alternatives can be specified: a) expressive obligations exert crowding-in such that the number of subjects contributing more than s tokens is higher in the obligation treatments than in the VCM; b) expressive obligations crowd-out contributions, such that the number of subjects contributing more than s tokens is higher in the VCM than in the obligation treatments. Looking at Table 4, we reject the null hypothesis in favour of the crowding-out effect of expressive obligations in NORED(5), NORED(10) and RED(10). The null hypothesis is instead not rejected in NORED(18) and RED(18). This can be explained with the fact that, regardless of the presence of an obligation, only a minority of subjects in all treatments contribute more than 18 tokens to the public good. Still, we remark that, at least in comparison with what

two-way random effects model of the following form: $y_{igt} = k + \alpha_i + \gamma_g + \beta \cdot TREAT_i + \varepsilon_{it}$, where y_{igt} takes value 1 if individual i of group g gives s tokens to the public good at round t of her treatment and takes value 0 otherwise; $TREAT_i$ is a dummy for the obligation treatment; k is the constant, α_i and γ_g are the random effects for, respectively, individuals and matching groups.

[7]The same procedure discussed in the previous footnote applies here. The only difference with respect the previous specification concerns the dependent variable y_{igt} of the subsidiary regression that now assumes value 1 if individual i of group g contributes (strictly) more than s tokens at round t and takes value 0 otherwise.

TABLE 4: Difference-of-proportions tests of contributions greater than s across treatments

		$\Pr(x_i > s)$ in VCM = $\Pr(x_i > s)$ in treatment:				
		NORED(5)	NORED(10)	RED(10)	NORED(18)	RED(18)
		$s = 5$	$s = 10$	$s = 10$	$s = 18$	$s = 18$
Periods 1-5	z	2.837***	2.098**	2.837***	−0.236	0.601
	p	0.0045	0.0359	0.0045	0.8174	0.5475
Periods 6-10	z	2.110**	2.096**	2.479**	−0.652	0.879
	p	0.0348	0.0360	0.0132	0.5138	0.3791
Periods 11-15	z	1.550	1.011	1.429	−1.283	−0.354
	p	0.1211	0.3711	0.1528	0.1993	0.7230
Periods 1-15	z	2.301**	1.989**	2.308**	−0.751	−0.437
	p	0.0213	0.0466	0.0210	0.4525	0.6615

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

observed in the VCM, even in NORED(18) and RED(18) subjects *do not* contribute above the amount required by the expressive obligation. In other words, this means that in all the obligation treatments the effect of expressive obligation is to bring individual contributions at most at the level of the required s.

3.2 Average contributions across treatments

Figure 2 plots the average contributions in the five treatments over periods. Panel a) compares average contributions in the VCM with those in NORED(10), NORED(5) and NORED(18). The panel shows that the average contributions in the VCM are lower than those in NORED(18) while they lie above those in NORED(5) and NORED(10). The average contribution in the VCM overall periods is 7.34 tokens, passing from 11.1 tokens (slightly more than 1/3 of the initial endowment) in period 1 to 4.8 tokens in period 15. In NORED(10), the average contribution is 10.6 in period 1, 2.8 tokens in period 15 and 5.85 overall. The average contribution is lower in NORED(5), in which it passes from 10.1 tokens in the first period to 2.6 tokens in the last period, amounting to 5.10 tokens overall. Finally, in NORED(18) the average contributions are higher, starting from 15.7 tokens in period 1 and ending up to 7.6 tokens in period 15 while 10.72 tokens is the overall average.

Table 5 reports, for subsets of 5 periods as well as overall the entire session, results from a Wilcoxon rank-sum test for the null hypothesis that median contributions in the VCM and NORED(s) treatments are the same. The unit of observation in the statistical test is the group average contribution. Differences in the average contribution between VCM and NORED(10) are not statistically significant while those between VCM and NORED(5) are on the edge of statistical significance: they are not statistically significant on period 1-5, it is statistically significant at 10% level from period 6 onwards.[8] Differences in the average contributions between VCM and

[8]Interestingly, focusing at early periods, although the average contribution in VCM is relatively similar to that in NORED(5) (in period 1, the average contribution is 11.1 and 10.1 tokens in the VCM and NORED(5), respectively), the median contribution in the former is much lower than in the latter (for example, in period 1, the median is 5 and 10 tokens in NORED(5) and in the VCM,

FIGURE 2: Average contributions in periods 1-15: comparisons between treatments.

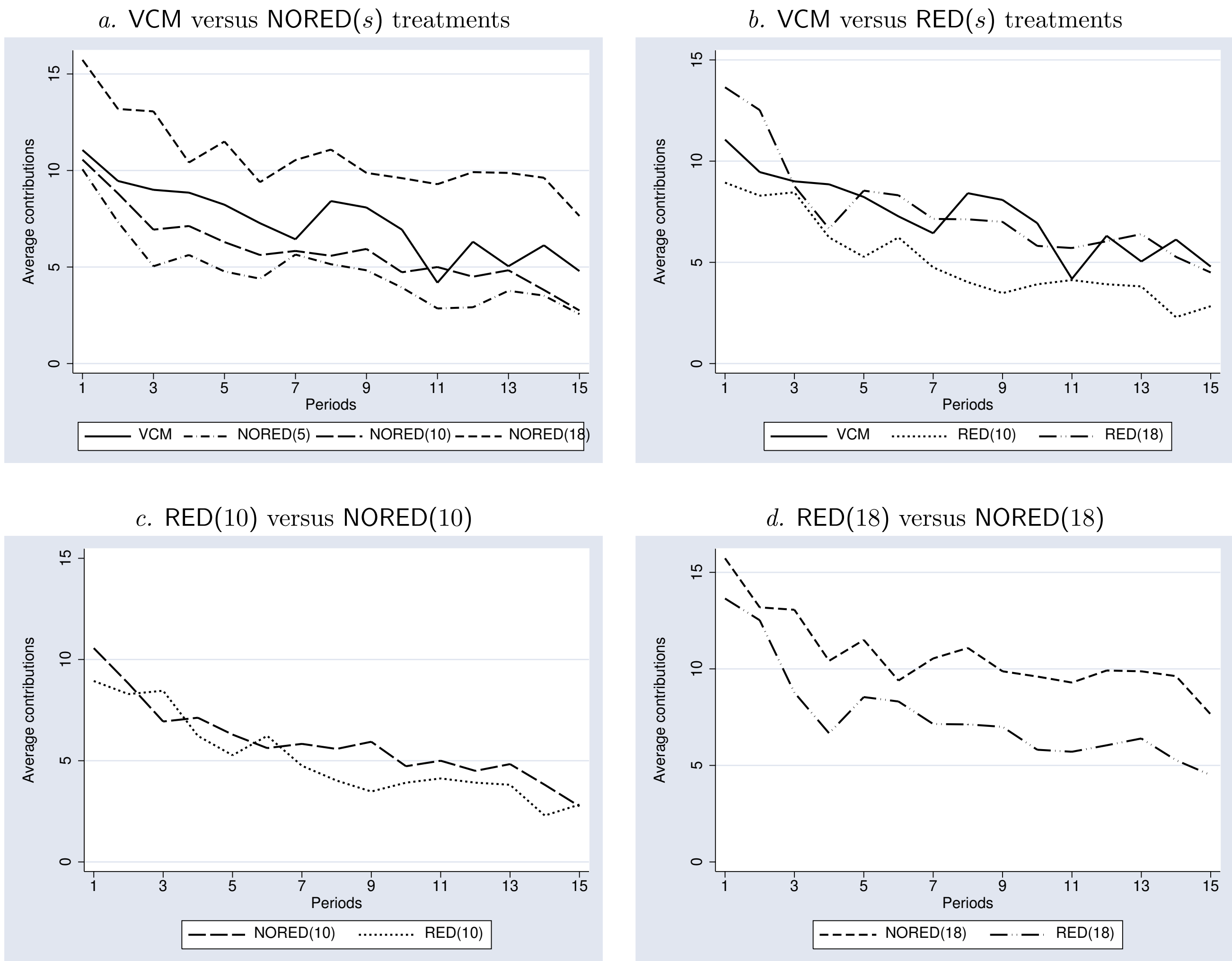


TABLE 5: Wilcoxon rank-sum tests: VCM versus NORED(s) treatments

		Periods			
		1-5	6-10	11-15	1-15
VCM-NORED(10)	z	0.635	1.415	0.520	0.866
	p	0.5254	0.1569	0.6033	0.3865
VCM-NORED(5)	z	1.617	1.877*	1.675*	1.790*
	p	0.1059	0.0605	0.0940	0.0734
VCM-NORED(18)	z	−2.194**	−1.069	−2.137**	−1.935*
	p	0.0282	0.2853	0.0326	0.0530

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

TABLE 6: Wilcoxon rank-sum tests: VCM versus RED(s) treatments

		Periods			
		1-5	6-10	11-15	1-15
VCM-RED(10)	z	1.386	2.282**	1.270	1.963**
	p	0.1658	0.0225	0.2039	0.0496
VCM-RED(18)	z	−0.289	1.097	0.346	0.520
	p	0.7728	0.2727	0.7290	0.6033

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

NORED(18) are statistically significant (with the exception of periods 6-10) and more stable over periods.

In panel b) of Figure 2, we compare contributions in the VCM with those in the RED(s) treatments. In period 1, the average contribution in RED(18) is 13.6 tokens, a bit higher than in the VCM series. However, starting from period 3 differences between the two treatments disappear. The overall average contribution in RED(18) is 7.56. The RED(10) series lies below the other two treatments in all periods: the overall average contribution is 5.10 tokens, passing from 8.9 in period 1 to 2.8 tokens in period 15. A Wilcoxon rank-sum test (see Table 6) shows that there is no significant difference between the median contribution in the VCM and in RED(18). Some significant difference between contributions in the VCM and in RED(10) is detected in periods 6-10, which is also confirmed by the test conducted on all periods.

Panels c) and d) of Figure 2 compare, for the corresponding values of s, the average contributions in the RED(s) treatments with those in the NORED(s) treatments. Although the graph shows that the average contributions in RED(10) are below those in NORED(10) for most of the periods, the rank-sum test indicates that such differences are not statistically significant (see Table 7). Conversely, the average contributions are clearly higher in NORED(18) than in RED(18) and this is confirmed by a Wilcoxon rank-sum test for the various subsets of periods as well as overall.

Summarizing, the evidence from the NORED(s) treatments supports the hypothesis that expressive obligations affect (the average) contributions to the public good. This is more prominent in NORED(18), where the high amount required by the obligation ($s = 18$) brings the average contribution above the level spontaneously

respectively, see Figure 1).

Table 7: Wilcoxon rank-sum tests: NORED(s) versus RED(s) treatments

		Periods			
		1-5	6-10	11-15	1-15
NORED(10)-RED(10)	z	0.318	0.954	0.433	0.751
	p	0.7507	0.3403	0.6649	0.4529
NORED(18)-RED(18)	z	1.790*	2.282**	2.195**	2.136**
	p	0.0734	0.0225	0.0282	0.0327

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

arising in the VCM treatment. There is also evidence that in NORED(5), where the obligation level is lower than the median giving in the first period of the VCM, contributions are lower than what observed in the benchmark. When the obligation level is set at the median contribution in the first period of the VCM ($s = 10$), the expressive obligation does not cause any difference in subjects' contributions with respect the benchmark. However, the behavioral factors that drive contributions in the VCM and NORED(10) to the same average may not necessarily be the same: in particular, while decisions in the VCM are voluntarily and freely taken, in NORED(10) they may reflect an initial tendency to conform to the expressive obligation followed by the predominance of the crowding-out effect in later periods.[9]

The effects of expressive obligations on subjects' contributions are further qualified by analyzing data of the RED(s) treatments. In particular, contributions in these treatments do not significantly differ from those observed in the VCM, nor even in RED(18) where s is significantly higher than the average contributions collected in any round of the VCM. On the contrary, there is evidence that in RED(10) - namely when the required amount is equal to the median giving in the first period of the benchmark - subjects in the obligation treatment contribute even less than those participating to the VCM. The evidence that expressive obligations generate lower contributions when fines collected through the auditing activity increase the payoff of non audited group members is also supported by the direct comparison between NORED(18) and RED(18).

3.3 Regression analysis

The descriptive analysis of the previous sections provides *prima facie* evidence that expressive obligations may affect subjects' contributions through different channels, that are however difficult to disentangle and separately measure. In particular, we have first noticed that, ceteris paribus, subjects tend to conform their contributions to the obligation level s. Secondly, we have seen that when subjects do not conform to the obligation, they tend to contribute less (rather than more) than the required amount. Thirdly, we have detected other potential effects at work, including a lower propensity of subjects to contribute in the RED(s) treatments rather than in the NORED(s) treatments. Finally, out of the effects of the expressive obligations, as in typical public good experiments, we have observed a negative pattern of contributions over time.

[9]Clearly, results partially supporting this hypothesis come from Section 3.1; more direct evidence is provided below.

TABLE 8: Regressions - Indipendent variable: contribution

	(1) Tobit random effect	(2) Two-way linear random effect
Period	-0.5111***	-0.2670***
	(0.0438)	(0.0248)
Obligation level	0.6641***	0.3853***
	(0.1458)	(0.0915)
Obligation dummy (yes=1; no=0)	-7.5919*** (2.2826)	-4.1450*** (1.4324)
Obligation level × redistribution dummy	-0.2760*** (0.1003)	-0.1342** (0.0631)
Audit in $(t-1)$ (yes=1; no=0)	-1.3806*** (0.3620)	-0.6620*** (0.2051)
Contribution of others $(t-1)$	0.0962*** (0.0146)	0.0542*** (0.0086)
Constant	6.1130***	8.1278***
	(1.5677)	(0.9829)
N	4320	4320
Group	72	72
Wald χ^2	344.75	303.65
Prob> χ^2	0.0000	0.0000

Standard errors in parentheses

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

In this section we conduct a regression analysis to better detect the various effects and to possibly measure the extent of the crowding effects in the various directions. In Table 8 we report the estimates of a Tobit random effects model, in which the dependent variable is the individual contribution $x_{i,t}$. The model accounts for potential individual dependency over time. For robustness check, we also report results of a linear two-way random effects model which accounts for potential individual dependency both over time and within each matching group.

In the regressions, we include the following independent variables: *i.* a variable 'period' to capture the time trend in the data; *ii.* a variable 'obligation level' assuming value 0 in the VCM and $5, 10, 18$ according to the required s in the corresponding obligation treatment; *iii.* an 'obligation dummy' taking value 1 in the obligation treatments and 0 in the VCM treatment; iv. a variable interacting 'obligation level' with a 'redistribution dummy' variable, the latter taking value 1 in the RED(s) treatments and 0 in all the other treatments; *v.* a dummy variable 'audit in $(t-1)$' assuming value 1 if subject i is audited at period $(t-1)$ and 0 otherwise; *vi.* a variable 'contribution of others in $(t-1)$' which stands for the sum of contributions given in period $(t-1)$ by the other group members.

Results from the two econometric models are qualitatively the same and, as follows, we refer to those from the Tobit model. The coefficients of 'obligation level' and 'obligation dummy' are highly significant ($p < 0.01$) and opposite in sign, positive for the former and negative for the latter. Thus, expressive obligations are associated with both a crowding-in and a crowding-out effect: while the required amount, s, positively affects subjects' contributions, on the other hand the presence of an expressive obligation *per se* decreases the overall level of cooperation with respect the VCM. This also means that there is a qualitative difference between the obligation treatments and the benchmark treatment.

Further, the results show that extra crowding-out effects occur in obligation treatments when fines collected from auditing are returned to the public good. In particular, the dummy for the RED(s) treatments interacted with the obligation level reports a negative sign, indicating that the crowding-out effects due to expressive obligations are stronger in the RED(s) treatments than in the NORED(s) treatments, and that the strength of the reduction is the greater the higher is the obligation level s.[10]

Additional standard results qualify our evidence. The coefficient of the linear trend is negative and highly significant. Moreover, as observed in other public good experiments, we find a positive and highly significant relationships between individual contributions and the number of tokens allocated to the collective account by the other group members in the previous period. We also controlled for different strengths of both relationships depending on the treatments, but with negative results Thus, our evidence indicates that expressive obligations do not seem able to affect the decline of cooperation over time occurring in a standard VCM game, neither to overcome the phenomenon of conditional cooperation documented in several previous public good experiments (Fischbacher et al. 2001). Interestingly, being audited in period $(t-1)$ reduces contributions in t. A standard explanation for this result is that subjects who are audited and fined in $t-1$ seek to recover the loss by reducing their contribution in t. Alternatively and in line with previous considerations, by replacing internal moral constraints with external coercive control, being audited may represent an additional source of motivation crowding-out.

3.4 Crowding-in and crowding-out

In line with previous results (Galbiati and Vertova, 2008), we find that the obligation level is positively correlated with contributions. It is interesting that we confirm this effect in a setting in which obligations do not entail any incentive to comply with. Moreover, as far as we know, there are no studies that simultaneously disentangle the crowding-in effect associated with the required amount from the possible crowding-out effect that obligations *per se* exert on subjects' contributions. The latter effect, in addition, is not neligible. In particular, while contributions increase by 0.664 tokens for each unit of expressive obligation s (the coefficient of 'obligation level', see Table 8 again), the presence of an obligation *per se* crowds-out contributions by 7.592 tokens (the coefficient of 'obligation dummy'). Clearly, this means that an expressive obligation fixed at the break-even point of 11.432 tokens (namely, the

[10] We also replicated our estimates by replacing the interaction term with the 'redistribution dummy' alone. Although we find a negative and significant coefficient of the dummy, the fits of the models are lower than in that of the regressions presented here.

ratio between two coefficients) is necessary to restore cooperation in the NORED(s) treatments at the same level as in the VCM.

In the RED(s) treatments, when points collected through the auditing procedure increase the payoff of non audited group members, the regression has documented an additional source of crowding-out measured by the estimated coefficient of the interaction term 'obligation level × redistribution dummy', which diminishes the positive impact of each unit of expressive obligation to 0.388 (namely, the difference between the estimated coefficients of 'obligation level', 0.664, and the interaction term, 0.276), and raises the 'break-even' point to 19.562 tokens (the ratio 7.592/0.388).

TABLE 9: Estimates of break-even points from tobit model

Break-even in NORED(s)	Break-even in RED(s)
11.432***	19.562***
(2.5412)	(5.3809)

Standard errors in parentheses
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

The estimates of the two break-evens are reported in Table 9 with the corresponding standard errors. It is interesting to compare the estimates with the expressive obligations used in the experiment.[11] In particular, the break-even point of about 11 tokens estimated for the NORED(s) treatments is not far from the value of $s = 10$ ($p \simeq 0.576$ in the statistical test), namely the median contribution in the first period of the VCM that is used as expressive obligation in NORED(10) and RED(10). Thus, the estimated break-even point is coherent with the equivalence found between the VCM and the NORED(10) treatment in terms of the average contributions (see again Table 5), though clearly we have now explicit evidence that different forces drive the similar average contributions in the two treatments.

On the other side, the estimate of about 19 tokens for the break-even point in the RED(s) treatments is greater than $s = 10$ ($p \simeq 0.076$) and this explains why the average contributions in the RED(10) were actually lower than those in the VCM. The implication is that in the RED(s) treatments crowding-out due to expressive obligations tends indeed to outweigh crowding-in.

4 Concluding remarks

Theories of expressive law argue that legal norms and external obligations influence the behaviour of agents in social interactions beyond the material incentives (sanctions and rewards) they mantain. Testing this intuition is a relevant issue since, if correct, it implies that we may need less state coercion to stimulate individuals' cooperation and enhance social welfare.

[11]The estimates according to the two-way linear model (with truncation) are of the same order, namely 10.757 (standard errors: 2.7612) for the break-even without redistribution of fines and 16.501 (standard error: 4.7370) for the break-even with redistribution of fines.

In this paper we have experimentally studied the effects of expressive obligations on individuals' attitude to cooperate. In particular, we have reported results from a repeated linear public good game in which, in each period, subjects faced an expressive obligation to contribute a minimum amount, with a payment for the transgressors which did not alter their incentive to free-ride.

We find that at early periods the majority of individuals contribute what required by the expressive obligations, confirming that legal rules have a positive effect in coordinating individuals' behaviour. Subjects, however, never contribute above what required by the expressive obligation and contributions tend to decline over periods.

Our results indicate that expressive obligations induce subjects to substitute intrinsic motivations to contribute with external commands. Using standard parametric techniques, we separately measure the crowding-in and the crowding-out effects of expressive obligations and find that the latter effects are not negligible and stronger when sanctions collected by monitoring activity are returned to the public good.

The results add to the existing experimental evidence on the expressive power of legal rules. Our findigs are consistent with the so called motivational crowding theory, which suggests that external regulations may generate some unintended negative effects on efficiency mainly because they weaken internal motivations for pro-social behaviour. Recent contributions have emphasized the importance of taking into account of these displacement effects of formal obligations when designing public policies that prescribe specific incentive schemes (Bowles and Hwang 2008). The evidence reported in this paper suggests that an analogous attention to the crowding-out effects of formal rules may be required when considering public policies based on the notion of self-enforcing law.

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Appendix

A Instructions used in the experiment

[*Instructions were originally written in Italian. The variable x appearing in the instructions of RED(10), RED(18), NORED(5), NORED(10), NORED(18) assumed values 5, 10 and 18 according to the obligation used in the treatment.*]

[ALL TREATMENTS]
Welcome. Thanks for participating in this experiment. If you follow the instructions carefully you can earn an amount of money that will be paid to you in cash at the end of the experiment. During the experiment you are not allowed to talk or communicate in any way with other participants. If you have any questions raise your hand and one of the assistants will come to you to answer it. The rules that you are reading are the same for all participants.

General rules
In this experiment there are 24 persons who will interact for 15 periods. At the beginning of the experiment you will be assigned randomly and anonymously to a group of four people. Therefore, of the other three people in your group you will know neither the identity nor the earnings. Finally, the composition of your group will remain unchanged throughout the experiment.

How your earnings are determined
In each of the 16 periods you have to decide how to allocate an endowment of 30 tokens between a PRIVATE ACCOUNT and a COLLECTIVE ACCOUNT, considering the following:
for each token that you allocate to the PRIVATE ACCOUNT, you receive 2 points;
for each token allocated to the COLLECTIVE ACCOUNT by you or by any other of the members of your group, every group member receives 1 point.

[RED(10), RED(18), NORED(5), NORED(10), NORED(18)]
In every period, each participant will be asked to allocate at least x tokens to the COLLECTIVE ACCOUNT (required amount). The required amount for the COLLECTIVE ACCOUNT will remain unchanged throughout the 15 periods of the experiment.

In each period, there is a chance that your allocation to the COLLECTIVE ACCOUNT is randomly selected among those of your group members and audited in order to verify its correspondence with the required amount. In particular, at the end of each period and only after each member of your group has decided how to allocate the 30 tokens between the two funds, the computer will draw randomly and with equal probability one of two balls, colored RED and GREEN, respectively. If the selected ball is GREEN, then none of the allocations made by the members of your group to the COLLECTIVE ACCOUNT will be audited. On the contrary, if the selected ball is RED, then the computer will randomly assign to each of the members of your group one of four tickets, numbered from 1 to 4. At that point, the computer will draw randomly and with equal probability one of the four tickets. The allocation to the COLLECTIVE ACCOUNT made by the owner of the selected ticket will be audited. Notice that the probability that your allocation to the COLLECTIVE ACCOUNT is audited in a period is independent from the probability of auditing in the other periods.

The effects of the audit stage

If you are the owner of the selected ticket and the number of tokens you have allocated to the COLLECTIVE ACCOUNT is greater than or equal to the required amount, then the audit stage does not produce any effect on your earnings in points of the period, nor on those of your group members. On the other hand, if the number of tokens you have allocated to the COLLECTIVE ACCOUNT is lower than the required amount, then your earnings in points in that period will be reduced by one point for each token of difference between the required amount and your allocation.

[NORED(5), NORED(10), NORED(18)]

The points taken out from your earning in the audit stage do not produce any effect on the earnings of the other members of your group.

[RED(10), RED(18)]

The points taken out from your earning in the audit stage increase earnings of the other members of your group. In particular, the earnings in points obtained by any of the members of your group in that period will increase by one point for each token of difference between the required amount and your allocation.

[VCM]

At the end of each period the computer will display how many tokens you have allocated to the PRIVATE ACCOUNT, how many tokens you have allocated to the COLLECTIVE ACCOUNT, how many tokens have been allocated by your group to the COLLECTIVE ACCOUNT, how many points you have obtained from the PRIVATE ACCOUNT, how many points you have obtained from the COLLECTIVE ACCOUNT, and how many points you have obtained in total in the period.

[NORED(5), NORED(10), NORED(18)]

At the end of each period the computer will display three consecutive screens. The first screen shows how many tokens you have allocated to the PRIVATE ACCOUNT and how many tokens you have allocated to the COLLECTIVE ACCOUNT. The second screen shows whether your group has been audited as consequence of the random procedure explained above. Finally, the third screen shows the results of the audit procedure, how many points you have obtained from the PRIVATE ACCOUNT, how many points you have obtained from the COLLECTIVE ACCOUNT, how many points you lose if your allocation to the COLLECTIVE ACCOUNT is selected for auditing and you have allocated to the COLLECTIVE ACCOUNT less than the required amount, and how many points you have obtained in total in the period.

[RED(10), RED(18)]

At the end of each period the computer will display three consecutive screens. The first screen shows how many tokens you have allocated to the PRIVATE ACCOUNT and how many tokens you have allocated to the COLLECTIVE ACCOUNT. The second screen shows whether your group has been audited as consequence of the random procedure explained above. Finally, the third screen shows the results of the audit procedure, how many points you have obtained from the PRIVATE ACCOUNT, how many points you have obtained from the COLLECTIVE ACCOUNT, how many points you lose if your allocation to the COLLECTIVE ACCOUNT is selected for auditing and you have allocated to the COLLECTIVE ACCOUNT less than the required amount, how many points you earn if the allocation to the COLLECTIVE ACCOUNT made by the member of your group that is selected for auditing is lower than the required amount, and how many points you have obtained in total in the period.

[ALL TREATMENTS]

At the end of the experiment the total number of points you have obtained in the 15 periods will be converted in Euros at the rate 100 points = 1 Euro.