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The Effect of Elections on Third-Party
Punishment: An experimental Analysis

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The Effect of Elections on Third-Party Punishment: An experimental Analysis*

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Abstract

In this paper we analyze the behavior of an official who is elected democratically rather than being appointed exogenously. To this aim, we conduct an economic experiment in which officials are third party punishers in a public goods game. We consider two different scenarios which differ in the degree of cooperation within the society. We find that officials increase their punishment when they face elections in both scenarios. The increase in punishment is larger in the more cooperative scenario although differences are not statistically significant. Contrary to candidates' expectations, voters always vote for the least severe candidate.

Keywords : Opportunism, Ideology, Punishment, Public Goods Games, Voting.

JEL Classification: D72, C92

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1 Introduction

In many real-life social systems, the decisions affecting virtually all members of society are made by elected representatives. Representative democracies are the most salient example, but similar voting systems can be found at the level of firms, classes, clubs and so forth. Given the prevalence and impact of such institutions, it is crucial to understand the motivations behind the decisions of elected officials. Could we expect that officials who compete to be elected behave differently than officials who do not face this competition? We exploit the methodology of laboratory experiments to analyze the consequences on policies when policy makers are elected in a political competition process.

To achieve this aim, we analyze third-party punishment in a public goods game (PGG, henceforth). In the first stage of this game, a group of experimental subjects simultaneously decide how much to contribute to a public good. In the second stage, the contributions from the first round are shown to a different group of subjects who then have the opportunity to deduct points from the first group of subjects. We compare the benchmark case - PGG with punishment - with an extension in which punishers face elections after deciding how much to punish. In a third stage, other subjects (who differ from contributors and punishers in the first PGG) vote in pairwise comparisons to decide which of the punishers from the first PGG they prefer to be their punishers in a second PGG with punishment they will play. To do so, they are provided with the proposed punishment policies from the first PGG.

PGG provides an appropriate framework for real-life electoral processes since it represents social dilemma situations in which the pursuit of individual interests enters into conflict with the maximization of social welfare.¹ In this kind of situation, the implementation of a sanctioning institution that punishes individual behavior if it deviates from the welfare maximizing action is a widely used solution to prevent norm violation.² In fact, many

¹Since deducting points is costly, theory predicts that no punishment occurs in the second stage and, consequently, no one contributes in the first stage, while the efficient outcome is full contribution without any punishment.

²There is extensive experimental evidence that in the absence of the punishment option, contributions in the PGG decline over time and become virtually zero, whereas the punishment device leads to full cooperation after a few experimental rounds (see Fehr and Gächter, 2002; Henrich et al., 2001 and Henrich et al., 2006 for experimental evidence, or Chaudhuri, 2007 for a survey). The literature has shown that punishment also exists in situations where the punisher is not “hurt” by the norm violation (the main difference between the results found in second-party and third-party punishment is that the latter is less severe (see Fehr and Fischbacher, 2004 or Charness et al., 2009, among others).

common-pool resource regimes around the world rely on sanctions and there is agreement in the literature that an effective sanctioning system is a major determinant of the success of such regimes (see, for example, Ostrom, 1999). At the state level, legal systems control and enforce norm adherence. In the international arena, well-known examples also exist. For instance, the EU Stability and Growth Pact was created to enforce budgetary discipline among EU member states, while the Kyoto Protocol aims to reduce global greenhouse gas emissions by implementing legally binding agreements. In all these cases, sanctions are imposed by a central authority, which is elected democratically.

We focus on the differences in punishment behavior between the baseline - where the electoral process is absent - and the situation in which subsequent elections take place. In the former, punishment is due to individuals' dislike of the norm violation since subjects punish without any possible material reward. When third-party punishers face an electoral process they may obtain an extra future potential payoff in case of winning. Selfish third-party punisher would want to capture the vote of the majority in order to get this material payoff. To do that they must foresee the preferences of voters on punishment.

The level of norm violation observed may be a useful source of data for candidates to predict voters' preferences on punishment. For instance, if the group to punish is very cooperative candidates may expect that voters want a severe punishment to deviators. To check this hypothesis we perform the experiment with two groups of contributors: One relatively more cooperative and another considerably less cooperative.

Our results are as follows. First, we observe that punishers spend their money by punishing non-cooperative behavior without any future reward. Nevertheless, punishment behavior increases significantly when subjects face a subsequent election. This suggests that candidates believe that voters prefer a severe punisher in order to enhance cooperation and adjust their behavior accordingly.

Second, we observe that this increase in punishment is larger for low contribution levels, while there seems to be only a negligible effect on the punishment of highly contributing individuals. However, when we compare the effect of elections on punishment in a more cooperative and a less cooperative group of contributors we do not find significant differences.

Finally, we also find that voters prefer candidates who punish less severely. It is common for participants in the first round of a PGG not to want any enforcement mechanism such as punishment (see for instance Gürerk, Irlenbusch and Rockenbach, 2006). However, this result seems to be contradictory to candidates' expectations on voters preferences on punishment.

Our paper is related to several strands of literature. First, it is related with the literature that addresses experimentally third-party punishment in PGG. Most of the papers in this topic focus on the effects of a third-party punishment in the level of cooperation (see Fehr and Fischbacher, 2004, Charness et al., 2009, or Kroll, Cherry, and Shogren, 2007 among others). In our paper, we focus exclusively in punishment behavior ignoring its consequences. At this regard, Lopez-Perez and Leibbrandt, 2011, find that egalitarian motives play an important role in third-party punishers' behavior. Moreover, they find that third-party punishment is correlated with the degree of inequality between the third party and the punished party. They only consider altruistic third party punishers. In our work, we focus in the possible change in the punishment when third-party punisher are elected rather than be solely altruistic.

Since we introduce electoral process in our experiment, our paper is also related to some extent with the literature dealing with laboratory experiments in political economy (Palfrey, 2009) and political science (Green and Gerber, 2003). In particular, we deal with motivations of candidates which traditionally are in standard political economy models: The probability of winning and the policy finally implemented (see Downs, 1957 and Wittman 1973). However, we do not focus in this topic as it is well done by Morton (1993) to explain policy divergence in elections. We just use the standard framework in political economy to analyze the potential change in policies when these are the outcome of political competition.

The rest of the paper is organized as follows. A theoretical framework is presented in Section 2. Then, the main hypotheses tested in the experiment are presented in Section 3, followed by a detailed explanation of the experimental design in Section 4. The main results of the experiment are provided in Section 5, while concluding remarks are presented in Section 6.

2 Theoretical Framework

In this section we define a simple theoretical framework based on the standard political competition theory. We assume that there are two candidates, labeled by $i = 1, 2$. Each candidate is endowed with the same positive amount of money $w > 0$. Both candidates decide simultaneously the share of her endowment devoted to a policy proposal that affect voters' welfare. Let x_i be the cost of candidate i 's policy proposal, such that $x_i \leq w$. Candidates care about their private consumption and about the policy proposal.

Moreover, we assume that each candidate has an ideal public policy associated to a cost \bar{x}_i . Later, we will refer to \bar{x}_i as the ideological view about the public policy for candidate i . Without taking into account the cost of the policy in terms of private consumption, by deviating from their ideal policy, candidates make them worse off. Finally, candidate i 's utility depends on the outcome of the elections. For the sake of simplicity, we define candidate i 's utility function as follows:

$$U_i(x_i) \begin{cases} \alpha_i(w - x_i) - \beta_i(\bar{x}_i - x_i)^2 & \text{if } i \text{ loses} \\ \alpha_i((w - x_i) + k) - \beta_i(\bar{x}_i - x_i)^2 & \text{if } i \text{ wins} \end{cases}$$

where $\alpha_i \geq 0$ and $\beta_i \geq 0$ states for the relative importance of candidate i 's private consumption and policy respectively; and k states for the price of winning the election. Let assume that in the case of tie, the breaking rule is that both candidates win with equal probability. Notice also that we assume that the policy proposal x_i is costly independently on the outcome of the election. That can be interpreted as both policy proposal are implemented, so consequently, both candidates may reduce their private consumption no matter the outcome of the election.³

Notice also that if there was no election, and a dictator decided the policy implemented, the utility-maximizer policy for a dictator will be $x_i^d = \bar{x}_i - \frac{\alpha_i}{2\beta_i}$. That is, the dictator's ideal policy corrected by the relative importance of private consumption over public policy. Therefore, we can state the following result:

Result 1 The optimal cost of public policy for a dictator, x_i^d , is such that

- i) it is always smaller or equal than the cost of her ideal policy, \bar{x}_i , i.e. $x_i^d \leq \bar{x}_i$.
- ii) it is increasing in the cost of her ideal policy \bar{x}_i ,
- iii) and it is decreasing in the relative importance of private consumption, $\frac{\alpha_i}{\beta_i}$.

Consider now the case of elections. Given a pair of policies (x_1, x_2) , let $P(x_1, x_2)$ be the perceived probability that candidate 1 wins the elections. We assume that both candidates have the same information about the probability of winning, so $1 - P(x_1, x_2)$ will be the perceived probability that candidate

³We can justify this assumption interpreting the cost of the policy as the cost of the candidate's electoral campaign.

2 wins the elections. Moreover, let $P(x_1, x_2)$ be a differentiable function in the domain $]0, w[^2$. Then, if both candidates maximize their expected utility to decide their policy proposal before election takes place, we obtain the following candidates' best reply functions:

$$\begin{aligned} x_1^e &= \bar{x}_1 - \frac{\alpha_1}{2\beta_1} \left(1 - \frac{\partial P(x_1, x_2)}{\partial x_1} k\right) \\ x_2^e &= \bar{x}_2 - \frac{\alpha_2}{2\beta_2} \left(1 + \frac{\partial P(x_1, x_2)}{\partial x_2} k\right) \end{aligned}$$

From this expression we can state the following result.

Result 2 If both candidates believe that an increase in their expenditure in public policy increases their probability of winning the election, i.e. $\frac{\partial P(x_1, x_2)}{\partial x_1} > 0$ and $\frac{\partial [1-P(x_1, x_2)]}{\partial x_2} > 0$, then the expenditure in public policy is higher under elections than in the dictator case.

The competition for the reward from winning the election may lead candidates to expend more or less money than what they would expend in the case of being dictators. We refer to this difference of money as the level of opportunism of a candidate.⁴ Then, the higher the difference (in absolute terms) between a candidate's expenditure under elections and a candidate's expenditure when she is the dictator, the higher the level of opportunism.

By the expression of candidate i 's best reply function, candidate i 's level of opportunism is given by $|x_i^d - x_i^e| = \left| \frac{\alpha_i}{2\beta_i} \frac{\partial P(x_1, x_2)}{\partial x_i} k \right|$. Thus, both *i*) the effect of the expenditure on the perceived probability of winning, and *ii*) the price of winning the election, increases the level of opportunism of both candidates. In the next section, we design an experiment to test whether there exists opportunism in candidates' decisions about policy.

3 Experimental design

The experiment was conducted at the University of Granada with 198 participants, who were recruited via posters in the Faculty of Economics. All sessions were run in the lab using z-Tree software (Fischbacher, 2007). No one was allowed to participate in more than one session. On average, each participant received around 13.18€ for a one-hour session. The experiment

⁴The standard definition of opportunism in political economics is the art of seeking victory in elections without regard for the policy implemented (see Downs, 1957).

consisted of two stages in Treatment 1 and five stages in Treatment 2. At the end of the experiment all the subjects filled out a questionnaire to allow us to control for potential heterogeneity across subjects and study the pure effects of our treatment variations. In what follows, we explain the experimental design in more detail.

3.1 Treatment 1: Non-Voting

3.1.1 Stage 1: Public Goods Game

The first stage was the standard PGG. This is a n -player game in which every player $i = 1, \dots, n$ is given an initial endowment of w experimental points and has the opportunity to contribute an amount of c_i units to a public good, $0 \leq c_i \leq w$. For a given contribution profile (c_1, \dots, c_n) , the payoff function for player i is given by:

$$\pi_i(c_1, \dots, c_n) = w - c_i + r \sum_{j=1}^n c_j \quad \frac{1}{n} < r < 1.$$

The parameter r determines the marginal *per capita* return from a contribution profile. Given a contribution profile, a player is always better off contributing zero to the public goods game. Thus, the unique Nash equilibrium is $(0, \dots, 0)$.

In the experiment, we followed standard values used in the experimental literature, setting $w = 50$ experimental points and $r = 0.1$. The conversion rate for points to euros was 100:1 (100 points = 1€).

The PGG was played by four groups of 20 subjects ($n = 20$). Each subject made one decision that was valid for 48 rounds. The reason for including this feature will be explained later in Stage 2. From each group we have then 48 identical contribution profiles. Table 1 shows an example of the structure of the data collected from a single group playing the PGG (i states for contributor and R stands for round).

Table 1. Contribution Profiles

$i \backslash R$	1	2	3	...	48
1	c_1	c_1	c_1	c_1	c_1
2	c_2	c_2	c_2	c_2	c_2
3	c_3	c_3	c_3	c_3	c_3
...
20	c_{20}	c_{20}	c_{20}	c_{20}	c_{20}

In order to test the robustness of our results, we chose the most contributing and the least contributing groups from the four groups of subjects in Stage 1, which we label *cooperative* and *non-cooperative* scenarios throughout the paper.⁵ To avoid deception, we did not tell the subjects in Stage 1 that the group shown to the punishers would be chosen randomly. Rather, they were only informed that two out of four groups would be punished in the following stages, without specifying any selection criteria. The histograms of the contributions in the two selected groups are reported in Appendix 2.

3.1.2 Stage 2: Punishment

Two groups of different punishers were shown the corresponding contribution profiles: Cooperative or non-cooperative. The punishers were endowed with 100 points and had to decide how many points they wanted to sacrifice in order to reduce points from the participants in the previous stage (PGG). For each point the punishers used, 3 points were reduced from the contributors' accounts. Punishers could sacrifice any amount from 0 to 100 to punish each contributor, as long as the sum was or equal than 100. At the end of the experiment the punishers were paid for the points they kept.⁶

As the aim of this work is to study how the fact of participating in an electoral process may affect punishment, we need to compare punishment with and without a voting procedure. We also need to have the same contribution profile in order to compare both situations. So, once we have the contributions for each subject, we implement the punishment as follows. Each participant punished one round of the PGG.⁷ Therefore, if we have 24 punishers per treatment (*with and without voting*), we need 48 rounds to assure that each participant in the punishment stage can punish one of the rounds. As the contribution profile must be the same for all punishers, we told participants in the PGG that their decision would be valid for 48 rounds.

3.2 Treatment 2: Voting

Treatment 2 consists of five stages. The first stage of Treatment 2 coincides with that in Treatment 1. In Stage 2, punishers were presented the same contribution profiles (from cooperative and non-cooperative scenarios)

⁵The term “non-cooperative scenario” does not refer to the situation in which nobody contributes. We use the term non-cooperative rather than low contribution scenario to avoid confusion with low contributions throughout the text.

⁶The instructions for the punishment stage in the voting treatment are provided in Appendix 1. Instructions for other stages or treatments are available upon request.

⁷Punishers did not know the number of punishers.

as punishers in the non-voting Treatment. Thus, we can compare punishment of the *same* contribution profile with and without a voting procedure. The only difference with respect to Treatment 1 is that second-stage punishers in Treatment 2 were informed that the subsequent stages included an election process.

3.2.1 Stage 3: Voting

In Stage 3, a new group of participants (who were different from those in Stage 1) had to select punishers for a second PGG with punishment in which (i) they will be contributors themselves and (ii) the elected subjects from Stage 2 will perform the role of punishers. To do so, the second-stage punishers were matched in pairs to compete in elections using a simple majority rule. The reward was 200 experimental points (20 Euros), which would be given to the winners of the election process to perform the role of punishers in a second PGG with punishment. Voters had information about each candidate's punishment policy in Stage 2, together with the payoffs of contributors before the punishment had been implemented. There were 12 competing pairs that were randomly generated from the second-stage punishers and voters had to decide which candidate they preferred from each pair of punishers.

All the participants were fully informed of the details of the election process, as well as the amount provided (200 points) for the second PGG punishment.

It is important to note that the second-stage punishers had no information about the preferences of "voters". They only knew the contribution profile of the group of first-stage contributors they were about to punish.⁸

3.2.2 Stage 4: PGG II

In this stage, the voters from Stage 3 played a new PGG with punishment. They knew that their decisions would be observed by 12 elected representatives from Stage 3, who would have the opportunity to reduce their final points. The difference in this case with respect to stage 1 is that the contributors were punished with a probability of one. There were two groups of 11 subjects, one of which was punished by the punishers from the cooperative scenario and another which was punished by the punishers from the non-cooperative scenario. Participants in this PGG were endowed with 50 points and the conversion rate was 100:1 (100 points = 1€).

⁸Punishers were explicitly told that the information given to them concerned only the group they had to punish in Stage 1, rather than the voters or other participants in the experiment.

3.2.3 Stage 5: Punishment II

In the fifth stage, elected punishers repeated the role of punishers. They were shown the contributions from Stage 4 and were allowed to use the 200 points they had earned by winning the elections to punish the contribution behavior of participants in Stage 4.

Table 2 summarizes the game structure, treatment differences and the number of participants in the experiment.

Table 2. Summary of the experimental design

	Game	T1 (Non-Voting)	T2 (Voting)	Scenario	N (T1/T2)
Stage 1	PGG 1	Yes	Yes		80
Stage 2	Punish. 1	Yes	Yes	Coop.	22 / 26
				Non-coop.	24 / 24
Stage 3	Voting proc.	No	Yes	Coop.	- / 11
				Non-coop.	- / 11
Stage 4	PGG 2	No	Yes		- / 22(Stage 3)
Stage 5	Punish. 2	No	Yes		- / 24(Stage 2)
TOTAL					198 subjects

4 Hypotheses

In this section we describe the two main hypotheses that were tested in the experiment.

Hypothesis 1: *In the case of no electoral process, there is no punishment.*

The intuition behind Hypothesis 1 is coming from the equilibrium behavior of self-interested individuals. This hypothesis is related with Result 1 stated in the Theoretical Framework section. If policy designers are only interested in private consumption, they will not expend resources in public policy. In our experiment that means that under costly punishment a pure self-interested individual does not spend money in punishment if there is no material reward.

Hypothesis 2: *There may exist punishment when punishers are involved in an electoral process.*

The intuition of Hypothesis 2 stems from the idea that candidates have preferences for winning the election. Hence, we expect them to punish or not in order to maximize the probability of winning. If punishers anticipate that voters prefer a real threat of punishment they will punish free-riders (more than they would have punished them if they were not to be voted) in order to win the elections. However, if they expect that voters will favor the least severe punisher then they will not punish at all. An argument in favor of the former result comes from the fact that the most efficient outcome (although not a Nash equilibrium) is that everyone contributes the maximum and punishment is not necessary. If there is a real threat of punishment, voters will contribute more to the public good, achieving a more efficient outcome for the society. This hypothesis is related with Result 2 stated in the Theoretical Framework section.

5 Results

In this section, we report the results of the experiment. First, punishers' behavior is analyzed. As a secondary result, we focus on voters' performance.

5.1 Punishment policies in Stage 2

5.1.1 Descriptive Statistics

Table 3 lists the average amount of experimental currency points spent on punishment, providing an overall picture of punishment behavior in each treatment. The rows correspond to the contribution scenarios, while the columns represent the non-voting and voting treatments, respectively. As can be seen, subjects spent twice as many points in the voting treatment than in the non-voting treatment. The differences are highly significant, independently of the level of the punished contribution profile ($z = -2.900$, $p = 0.002$ and $z = -3.012$, $p = 0.001$ for non-cooperative and cooperative scenarios, respectively).⁹ On the other hand, there is no statistical difference between contribution profiles ($z = -0.204$, $p = 0.419$ and $z = -0.368$, $p = 0.357$ for voting and non-voting, respectively).

⁹All reported tests are Mann-Whitney one-tailed tests, unless stated otherwise.

Table 3: Average amount of points spent on punishment

	non-voting	N	voting	N
non-coop.	14.88	24	35.41	24
coop.	15.55	22	35.92	26

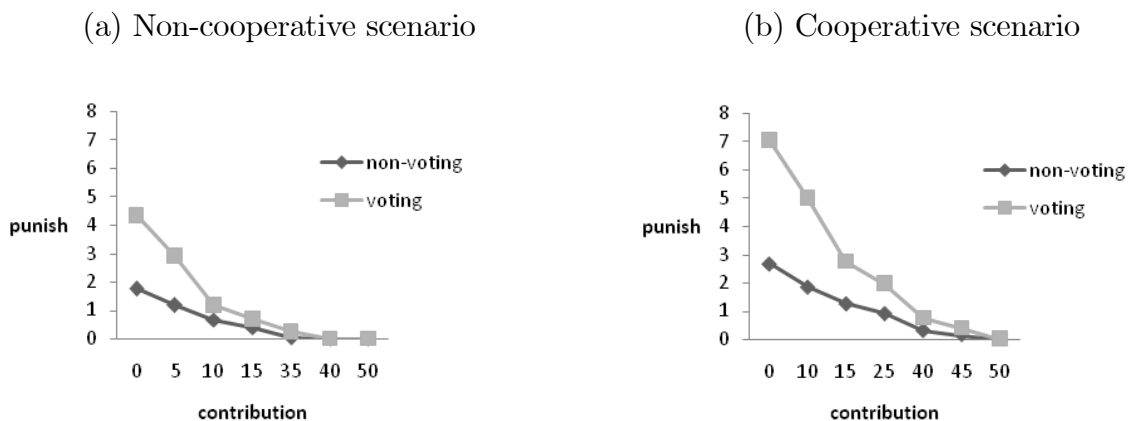
Table 4 shows the fraction of punishers spending zero. This behavior corresponds to the equilibrium behavior of self-interested individuals. These fractions are larger for the non-voting treatments ($z = -3.628$, $p = 0.000$ and $z = -3.318$, $p = 0.001$ for the non-cooperative and cooperative scenarios, respectively). Table 4 reveals some differences between the cooperative and the non-cooperative scenarios, although they are not statistically significant ($z = -0.661$, $p = 0.255$ and $z = -0.508$, $p = 0.306$ for voting and non-voting treatments, respectively).

Table 4: Fractions of punishers spending 0 points

	non-voting	N	voting	N
non-coop.	54.16%	24	8.33%	24
coop.	40.90%	22	3.80%	26

To provide further insight into the treatment effects, we have to take into account the punishment in relation to individual contributions. To do so, Figure 1 plots the average amount of money spent on punishment as a function of the corresponding contribution levels. The y -axis depicts the number of punishing points, while the x -axis lists the contribution levels. The left (right) panel of Figure 1 reports the results for non-cooperative (cooperative) scenarios.

Figure 1. Average punishment by contribution levels



In contrast to Tables 3 and 4, Figure 1 reveals more details about punishment behavior. First, the more individuals deviate from a certain cooperation norm, the more serious is their punishment on average. This effect is present under all treatment conditions and is consistent with the experimental evidence (see Fehr and Gächter, 2004).

Concerning the effect of the electoral process, Figure 1 confirms that there is considerably more punishment in the voting treatment. Again, this effect is statistically significant ($z = -2.140$, $p = 0.016$ and $z = -2.086$, $p = 0.018$ for non-cooperative and cooperative scenarios, respectively). However, we observe that this effect is larger for low contribution levels, while there seems to be only a negligible effect of the electoral process on the punishment of highly contributing individuals. The difference between the punishment behavior in the voting and non-voting treatments seems to increase as the contribution levels decrease. This suggests that the role elections plays in punishers' behavior increases with the deviation from the contribution norm.

5.1.2 Econometric analysis

In this section, we provide an econometric analysis of the above findings. We estimate eight econometric models. The variables used for all the analyses are the treatment dummies, *voting* and *coop*, and their interaction, *voting* × *coop*. Formally, $voting_i = 0(1)$ for the non-voting (voting) treatment subjects and $coop_i = 0(1)$ for the non-cooperative (cooperative) scenario. We also control

for individual heterogeneity.¹⁰ The results are summarized in Tables 5 and 6.

Table 5. OLS and Probit estimations

	[1]	[2]	[3]	[4]
Voting	61.63** (23.80)	36.90* (17.08)	0.41** (0.12)	0.27** (0.13)
Coop	2.01 (18.86)	-20.52 (15.61)	0.09 (0.10)	-0.01 (0.07)
Voting \times Coop	-0.49 (31.46)	9.95 (25.16)	0.01 (0.19)	0.04 (0.08)
Constant	44.63** (15.15)	63.88** (23.33)	- -	- -
Heterogeneity	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Prob $>$ F(χ^2)	0.003	0	0	0
(pseudo) R^2	0.138	0.514	0.227	0.603
N	96	96	96	96

[1] and [2] are OLS, dependent variables are # of points spent. [3] and [4] are Probit

(marginal effects reported), dependent variables are 0 for subjects who spent 0 points.

Robust standard errors are shown in parenthesis; ** and * indicate significance at the 1% and 5% level, respectively.

We first focus on estimations [1-4] reported in Table 5. These estimations do not take into account the structure of punishment. Rather, they analyze the global feature of punishment in the data. In estimations [1] and [2], the dependent variable is the amount of points each subject spent on punishment. In estimations [3] and [4], the dependent variable is a dummy variable which equals zero for individuals who have not spent any points on punishment, and takes the value of one for those who have punished a strictly positive amount. Given the nature of the variables, we estimate ordinary least squares and a probit model in the corresponding regressions.¹¹

Table 5 confirms that there is an increase in punishment and in the probability of punishing when individuals face elections, and that there is no

¹⁰We control for gender, altruism, risk aversion, life satisfaction and intelligence.

¹¹We have also conducted a tobit estimation to test the robustness of the OLS model, finding that the results are qualitatively the same. The coefficient for voting is in fact higher, but the significance level remains the same. For the second estimation model, logit regressions provide very similar results.

difference between the non-cooperative and cooperative scenario in terms of points spent on punishment. Quantitatively, we observe that voting increases the number of punishing points by around 37 (3.7€) in the voting treatment. In terms of the likelihood of punishing, people are 27% more likely to punish when they face an electoral process.

An interesting question is whether the total effect of voting differs across the cooperative and non-cooperative scenarios. We observe that this is not the case, since the interaction dummy $Voting \times Coop$ is never significant. As a result, the increase in punishment due to the presence of the election is alike in the two contribution scenarios.

Conditioning the analysis on corresponding contribution levels in line with Figure 1 provides a more detailed account of the data. Recall that there are 96 subjects in total in the punishment stage and that each of them had to make 20 decisions; one for each contributor. Hence, the data set constitutes a panel. In estimations [5-8] of Table 6, we provide the estimates of a random-effect panel-data model.¹² The dependent variable is the punishment level in [5] and [6] for each corresponding contribution. In [7] and [8], we estimate the probability of punishing a particular contribution profile, where the dependent variable is 0 if the corresponding contribution was not punished by individual i and 1 otherwise. The models contain the regressors from estimations [1-4] plus two contribution-related variables. The variable *contribution* corresponds to the punished contribution level and *contribution sq.* is the contribution squared. We added the latter because Figure 1 suggests that there is a non-linear relation between punishment and contribution.

¹²The Hausman test confirms that it is safe to use a random-effects model ($p = 1$).

Table 6. GLS and Probit random-effects estimations

	[5]	[6]	[7]	[8]
Contribution	-0.164** (0.014)	-0.164** (0.014)	-0.057** (0.011)	-0.057** (0.011)
Contribution sq.	0.002** (0.0002)	0.002** (0.0002)	-0.0004* (0.0002)	-0.0004* (0.0002)
Voting	1.033** (0.336)	0.623* (0.265)	1.337** (0.483)	1.447** (0.501)
Coop	1.104** (0.273)	0.729* (0.214)	1.384** (0.329)	1.327** (0.477)
Voting \times Coop	-0.014 (0.516)	0.159 (0.418)	-0.057 (0.674)	-0.255 0.672
Constant	2.500** (0.242)	2.821** (0.421)	-0.600* (0.329)	-0.903 (0.669)
Heterogeneity	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Prob $> \chi^2$ (overall) R^2	0 0.279	0 0.377	0 -	0 -
N	1920	1920	1920	1920

[5] and [6] are GLS random effects; dependent variable is # of points spent. [7] and [8] are Probit random-effects estimations; the dependent variable is 0 for subjects who spent 0.

Standard errors are shown in parenthesis, ** and * indicate significance at the 1 and 5% level, respectively.

The conclusions of these estimations differ only slightly from the "global" view above. Punishment is non-linearly decreasing in the contribution level. The presence of the electoral process elevates the punishment. Punishment is larger in the cooperative scenario than in the non-cooperative scenario when controlling for the contribution punished. However, the treatment effect of voting is not statistically different when comparing the two contribution scenarios.

5.2 Voters' behavior

To analyze voters' behavior, some statistical descriptors are shown in order to provide a general idea of how voters elected their candidates with the information they had about the punishment.

We report the average amount of points spent on punishing each of the contributions made by the winners and losers of the voting procedure. Recall

that candidates were matched in pairs for the electoral process. For both contribution scenarios, the average amount spent by winners is unambiguously lower than the amount spent by losers, as shown in Figure 2.

Figure 2a: Punishment by winners and losers in the low contribution scenario

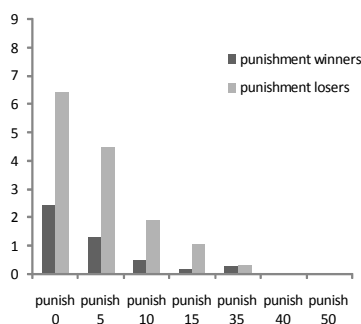
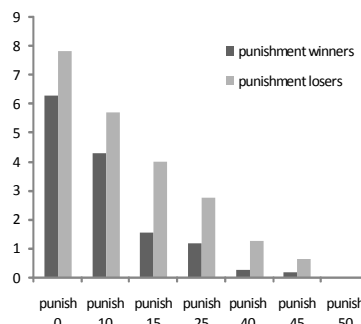


Figure 2b: Punishment by winners and losers in the high contribution scenario



Voters prefer candidates who punish less severely. Although this result seems to be contradictory to the intuition that voters will vote for candidates who punish more, it is common for participants in the first round of a game to choose people who do not punish.¹³ Only when subjects know other subjects’ behavior in the first stage they do realize that the threat of punishment will increase cooperation and vote for more severe punishers. As this experiment was designed as a one shot game, we only observe the first part of the behavior. Thus, we find that candidates who punish less win the election.

6 Concluding Remarks

In this paper we analyze the potential change in third-party punishment when punishers are elected democratically rather than being appointed exogenously. We do that by exploiting experimental methodology in a PGG with punishment. Candidates have to propose norm-enforcing policies in a

¹³Gürerk, Irlenbusch and Rockenbach (2006) analyze contribution behavior in a PGG where participants can choose to be in either a punishment or a “free” environment. They found that 63% of subjects chose not to be in the punishment condition in the first round. This sharply contrasts with the percentage (close to 100%) they observe in the final rounds.

social dilemma under two different conditions. In the first condition, candidates' policies are evaluated by the public via elections, while no evaluation takes place under the second condition.

We find that although people punish even in the absence of elections, the punishment is significantly higher when candidates face an electoral process. Moreover, this increase in punishment is larger for low contribution levels, while there is only a negligible effect on the punishment of highly contributing individuals. However, there are not significant differences when we compare the effect of elections on punishment in a more cooperative and a less cooperative group of contributors.

The results reported here support the standard political competition assumption that candidates care about winning the election. We are aware that this is a modest exercise. However, more recent models assume that candidates also care about the policy finally implemented, that is they care about ideology. Quantify the relative importance of these two factors in candidates' utility remains as the natural continuation of this work. By doing so we will compliment the existing field-data analyses such as the one in Levitt (1996) in which the estimated weight of ideology in elected officials' utility was around 60%.

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7 Appendix 1. Experimental Instructions (Stage 2. Punishment, Voting Treatment)

Welcome to our experiment.

- This sheet contains the instructions for the experiment.
- You are not allowed to speak with the rest of the participants during the experiment. If you need something, please raise your hand and wait in silence. We will attend to you as soon as possible.
- We are now going to show you the decisions made by participants in a previous experiment.
- The previous task was as follows. Each participant had an initial endowment of 50 tokens. The participants had to decide how many points they were going to keep and how many points they were going to put in a group account. Subjects' payoffs depended on their decisions and also on the decisions made by other members in their own group. The payoffs were the sum of two parts: i) the number of points the subjects decided to keep and ii) the profits obtained from the group account. We will now show you four different examples of how to compute payoffs in groups composed of four subjects.

EXAMPLE 1: Let's assume that we have a group of four subjects. Each subject has 50 tokens. The profits from the group account can be computed as $0.4 \times total$, where *total* represents the sum of the contributions to the group account by all members in a specific group. If the four subjects put 50 tokens in the group account, the final payoffs obtained by each subject will be as follows:

group account	tokens kept	total group account	profit group account	payoff
50	0	200	$0.4 \cdot 200 = 80$	80
50	0	200	$0.4 \cdot 200 = 80$	80
50	0	200	$0.4 \cdot 200 = 80$	80
50	0	200	$0.4 \cdot 200 = 80$	80

In this particular example, every subject makes money exclusively from the group account. As everybody contributes the same amount to the group account, the final payoffs are the same for everyone.

EXAMPLE 2: Imagine we have the same situation as above. The only difference is that one subject puts 50 tokens in the group account and the

other three subjects put 0 tokens. The final payoffs obtained by each subject are shown in the table below.

group account	tokens kept	total group account	profit group account	payoff
50	0	50	$0.4 \cdot 50 = 80$	20
0	50	50	$0.4 \cdot 50 = 80$	70
0	50	50	$0.4 \cdot 50 = 80$	70
0	50	50	$0.4 \cdot 50 = 80$	70

In this example, only the first participant contributes to the group account. So, the payoffs of the first subject are different from those of the other three.

EXAMPLE 3: In this case one subject puts 0 tokens in the group account and the other three subjects put 50 tokens. The final payoffs obtained by each subject are shown in the table below.

group account	tokens kept	total group account	profit group account	payoff
0	50	150	$0.4 \cdot 150 = 60$	110
50	0	150	$0.4 \cdot 150 = 60$	60
50	0	150	$0.4 \cdot 150 = 60$	60
50	0	150	$0.4 \cdot 150 = 60$	60

So, as you can see, individuals' payoffs depend on their decision and on the decisions made by other members of their group.

- Your task is as follows: You have 100 points. These points will be converted into euros at a rate of 10 points=1 euro. On your screen you will find the contributions made by each of the 20 members of a group to the group account in one period. You can use all, some or none of your points to reduce the points obtained by the participants in a round of the previous experiment.

- If you decide to deduct points from one of the participants in the previous experiment, for each point you spend, 3 points will be deducted from the points obtained by that participant. That is, if you use 4 points to reduce someone's points, 12 points will be deducted from their total number of points. If you use 8 points to reduce someone's points, 24 points will be

deducted from their total number of points. You can use your points to reduce anyone's points. You can reduce points from more than one participant in the previous experiment.

- Only one restriction applies: you cannot spend more than the 100 points you have.

- The final number of points for all participants will be calculated as follows:

- You will obtain: 100 points – the points you spent.

- The subject whose points you reduced will get: the points obtained in a period during the previous experiment – 3* the points you have spent in deducting his/her points.

- The subject whose points you have not reduced will get: the points obtained in a period during the previous experiment .

Second Stage.

- Once you have made your decision, you are going to participate in a different experiment.

- You will be randomly matched with some of the other participants in the room who have done the same task as you. We will show your decision and your partner's decision (anonymously) to a group of people.

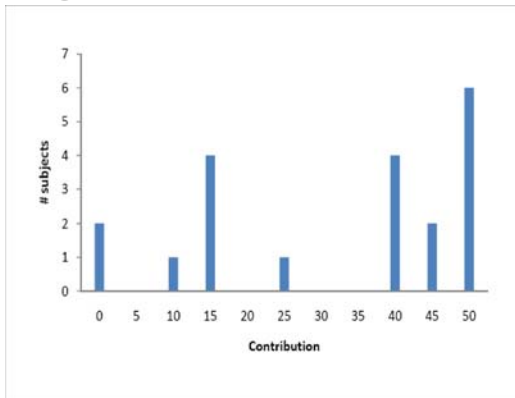
- These people are different from the subjects who participated in the previous experiment. These new subjects will vote for the person in the pair who they prefer to do the same task you have done but in a new experiment.

- That is, there is a group of people who are going to participate in a new experiment and they have to decide who is going to be the observer in the experiment they are going to play. The only information they have about you and your partner is your decision regarding how to spend your points. If you win the elections, then you will do the same task you have to do now but with different subjects. For the second task you will have 200 points instead of 100 points.

8 Appendix 2. Histograms of the contributions

Figure 3. Histograms of the contributions in the PGG.

Cooperative scenario



Non-cooperative scenario

