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DISCUSSION PAPER

// CARLO GALLIER

Democracy and Compliance in Public Goods Games

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Democracy and compliance in public goods games

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Abstract: I investigate if, how, and why the effect of a non-deterrent contribution rule in a public goods game depends on how it is implemented: endogenously chosen or externally imposed. At the aggregate level, my experimental design allows me to disentangle to what extent the total difference in participants' contribution behavior between the two endogenously chosen treatments, where the rule is either democratically chosen or rejected, is driven by the direct effect of the contribution rule, self-selection into institutions, information transmitted via democratic participation, and democracy per se. I find that contributions to the public good are higher if the non-deterrent contribution rule is democratically chosen than if it is democratically rejected. When the effects of self-selection and information transmitted by voting are taken into account, the total difference in contributions is not directly driven by democratic participation. At the individual level, heterogeneous treatment effects, which depend on whether participants have been overruled by their group members in the decision making process, affect participants' contribution behavior in ways that offset each other at the aggregate level. My findings suggest that participants are more willing to comply with a regulation that they themselves disapprove of if the majority of the group members has democratically decided in its favor.

Keywords: Laboratory experiment; public goods; contribution rule; endogenous institutions; democratic participation; compliance

JEL classification: C91; D02; D72; K42

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1 Introduction

In this paper, I investigate whether the effect of an institution that aims at fostering contributions to a public good depends on how it is implemented: endogenously chosen or exogenously imposed. My focus is on an institution that prescribes full contributions to a public good but is backed by a weak sanction for those who do not comply. Although there is a vast experimental literature showing that exogenously imposed punishment and sanctioning institutions are effective in increasing cooperation in social dilemma situations (see, e.g., Zelmer 2003; Chaudhuri 2011 for overviews), an external implementation of those institutions is in practice rarely a feasible or desirable option in certain situations. For instance, in international environmental treaties between sovereign nations, like the Kyoto protocol, no third-party mechanism exists to impose and enforce any regulations (e.g., Barrett 2010). Furthermore, even while small scale common property goods, like fisheries, do have formal authorities in most cases, the authorities often lack the capacities to monitor, sanction, and enforce (e.g., Ostrom 1990; Kroll et al. 2007). Therefore, not the institution itself but rather the process of how it is implemented is the focus of my paper.

I contribute to the economic literature investigating the endogenous choice of institutions in social dilemma situations.[1] While the majority of these studies investigate whether sovereign agents themselves are able to implement rules governing their behavior (e.g., Andreoni and Gee 2012; Grimm and Mengel 2009; 2011; Gürerk et al. 2006; 2013; 2014; Kosfeld et al. 2009; Gerber et al. 2013) and, if so, which institutions they prefer (e.g., Ertan et al. 2009; Sutter et al. 2010; Markusson et al. 2014; Kamei et al. 2015), there is growing interest in the effect of participation in itself. In this regard, first references are related to the *wisdom of the crowd* and emphasize the importance of local knowledge in devising effective institutions. For instance, one of Elinor Ostrom's design principles characterizing robust institutions for managing common-pool resources is that resource users affected by regulations should be authorized to participate in making and modifying the institutions (Ostrom 1990). Further - and most importantly - positive aspects of participation have been identified in several field studies postulating a positive *democracy premium*, i.e., that institutions are more effective in fostering cooperation if they are endogenously chosen via democratic decision-making rather than exogenously imposed. Participation is suggested to increase the willingness to follow rules or to avoid that externally imposed regulations crowd out voluntary cooperative behavior (e.g., Ostrom and Nagendra 2006). In this line, findings based on naturally occurring data by Pommerehne and Weck-Hannemann (1996) and

[1] For a survey of experimental research on the choice of institutions to solve cooperation problems, see Dannenberg and Gallier (forthcoming).

Frey (1998), for example, suggest that income tax compliance in Switzerland increases with democratic participation. Subsequent studies conducted in the controlled environment of laboratory experiments show that the democracy premium tends to be large when the institution does not changes the unique free-rider equilibrium of the game (e.g., Feld and Tyran 2002; Tyran and Feld 2006). Conversely, the premium is smaller for institutions that change the cooperation problem into a coordination problem (e.g., Dal Bó et al. 2010) or make cooperation the dominant strategy (e.g., Andreoni and Gee 2012; Dal Bó et al. 2018). Based on a prisoner's dilemma, Dal Bó et al. (2010), for instance, introduce the opportunity to democratically impose a deterrent sanction on mutual defection, which transforms their cooperation game into a coordination game. They find that the deterrent institution is more likely to be respected if it is democratically chosen as opposed to exogenously given. A stronger democracy premium arises for non-deterrent institutions that do not eliminate the unique free-riding equilibrium of the game (e.g., Feld and Tyran 2002; Tyran and Feld 2006).

However, there are also experiments that provide a more differentiated picture. Sutter and Weck-Hannemann (2003), for instance, find that democratic participation in determining asymmetric minimum contributions to a public good does not necessarily raise overall cooperation levels. Especially participants with relatively high obligations reduce contributions when these are democratically determined as opposed to when they are externally given. Tyran and Feld (2006) find that the effect of democratic participation can cut both ways. They find that a simple contribution rule which aims at fostering contributions to a public good is more effective when it is endogenously chosen than when the same rule is externally imposed. If, by contrast, the rule is endogenously rejected, the effect is negative. In this line, Sutter and Weck-Hannemann (2004) show that cooperation collapses if groups democratically reject minimum contribution levels. Drawing on the experiment by Tyran and Feld (2006) and using samples of students and workers in China, Vollan et al. (2017) find that participants cooperate the most if the rule is exogenously imposed. They conclude that the negative democracy premium can be explained by the long history and great importance of authoritarian norms in China. Similar results are provided by Kocher et al. (2016), who study the adoption of pre-specified minimum contribution levels. One reason that prevents us from deriving a coherent estimate for the effect of democratic participation based on these studies is that having a vote on whether to implement an institution to solve cooperation problems can affect behavior in multiple ways that are not equally considered, isolated, and quantified.

In this paper, I complement the growing literature on endogenous institutions by investigating whether democratic participation could be used to increase participants'

complinance with a non-deterrent institution. Most importantly, my experimental design allows me to identify, disentangle, and quantify the drivers of the effect of choosing a non-deterrent institution democratically. I focus on a non-deterrent institution for the following two reasons. First, the effect of democratic participation could be expected to be comparatively strong for non-deterrent compared to deterrent institutions. Dannenberg and Gallier (forthcoming), for instance, report that deterrent regulations, that make full cooperation the unique equilibrium, set strong incentives and achieve very high cooperation rates, even if they are exogenously implemented. These high cooperation rates in exogenously implemented treatment conditions limit the potential effect of participation in the choice of the institution. Cooperation rates are high in deterrent institutions, irrespective of how the institution is chosen. Non-deterrent institutions, in contrast, set comparatively weak incentives and also achieve lower cooperation rates when they are exogenously implemented. This leaves more room for increased cooperation rates and a substantial democracy premium when the institutions are endogenously chosen. Second, I believe it is important to examine non-deterrent institutions since many cooperation problems are subject to weak institutions, that do not eliminate free-riding incentives. In international treaties between sovereign nations, for example, no supranational authorities exist in order to impose, monitor, and sanction strong interventions (e.g., Barrett 2010). While such authorities sometimes exist at the small-scale to foster cooperation in more local situations, these external authorities often lack resources to enforce compliance (e.g., Kroll et al. 2007).
I start the decomposition at the aggregate level by analyzing the total difference in participants' contribution behavior between the two endogenously chosen conditions, where the non-deterrent contribution rule is either democratically chosen or rejected. When participants are exogenously assigned to treatments, the difference in behavior is only driven by the direct effect of the non-deterrent contribution rule. When participants have a vote on whether to implement the contribution rule, in contrast, multiple additional effects can affect their subsequent contribution behavior: self-selection into institutions, information transmitted via democratic participation, and democracy per se. A *selection effect* could arise because of self-selection into institutions. One cannot exclude the possibility that there are unobservable factors that explain both participants' choice of institutions and their responses to the corresponding rules (e.g., Dal Bó et al. 2010). The *information effect* captures that democratic decision-making could also affect behavior because it reveals information to agents about their partners' likelihood to favor a specific institution, affecting both the agents' beliefs about the partners' future behavior, and thus their own behavior (e.g., Tyran and Feld 2006). Finally, a genuine *democracy effect* is purely caused by the process of democratically

choosing the institution. Theory on procedural utility (e.g., Frey et al. 2004; Frey and Stutzer 2005), for instance, suggests that people not only value outcomes but also processes. This could indicate that being aware of the fact that the group itself imposed the institution may directly affect agents' behavior.

To the best of my knowledge, my paper is the first that disentangles and quantifies the total difference in participants' contribution behavior between the two endogenously chosen conditions, where the non-deterrent contribution rule is either democratically chosen or rejected, into the direct effect of the contribution rule, the effects of self-selection into institutions, information transmitted via democratic participation, and democracy per se. Based on the experimental design by Tyran and Feld (2006), the rule in my experiment prescribes full contributions to a public good and a mild sanction for those participants who do not comply. The sanction is non-deterrent, and free-riding remains the unique Nash equilibrium in dominant strategies. As an extension to Tyran and Feld (2006), my experiment allows me to separate the effect of the endogenously chosen contribution rule into its different components. To do so, I adapt a randomization technique by Dal Bó et al. (2010). Participants choose in a referendum whether to impose the contribution rule. Then, the experimental software randomly decides whether to consider the votes. If the software considers the votes, the majority wins. If the software does not consider the votes, it randomly chooses whether to reveal the information regarding the outcome of the referendum and whether to impose the contribution rule exogenously. This procedure allows me to compare decisions made by participants who vote in the same way, receive the same information about the outcome of the referendum, and are assigned to the same institutions but differ as to whether the institution was endogenously chosen or exogenously imposed. While Dal Bó et al. (2010) investigate the effect of a deterrent sanction on mutual defection, which transforms their social dilemma game into a coordination problem, I focus on a non-deterrent intervention, which is of fundamental importance because it mirrors many interactions outside the laboratory and provides the opportunity to study how participants follow rules even when facing incentives not to do so.

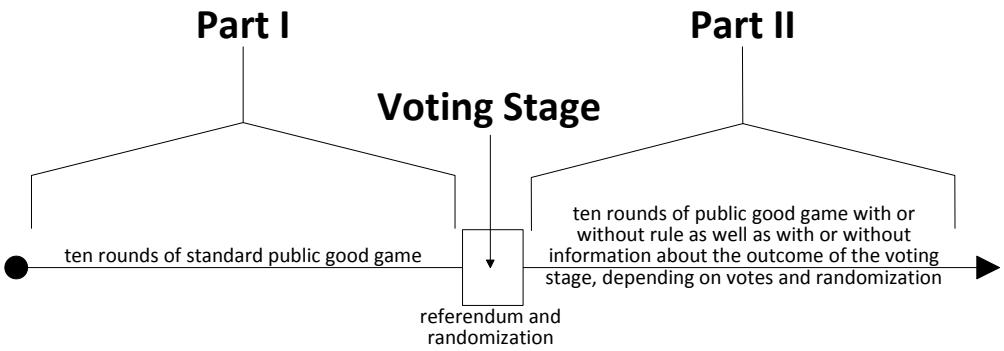
I find that contributions to the public good are significantly higher if the non-deterrent contribution rule is democratically chosen than if it is democratically rejected. To disentangle and quantify the different drivers of the total difference in participants' contributions between the endogenously chosen conditions, my experimental design allows me to differentiate between to what extent it is driven by the effect of the non-deterrent contribution rule, self-selection into treatments, the information transmitted by voting, and democratic participation. At this aggregate level, the total difference is to a great extent driven by the direct effect of the non-deterrent contribution rule. By taking into

account the direct effect of the contribution rule as well as the effects of self-selection into treatments and the information transmitted via voting, my findings suggest that democratic participation does not drive the total difference in participants' willingness to comply with a rule which is for the common good, but at odds with individual free-riding incentives. What the decomposition analysis does not show is that there are heterogeneous individual level effects, depending on the type of participants, i.e., yes- and no-voters, and, especially, on whether participants have been overruled by their group members in the voting stage of the experiment. While these heterogeneous effects offset each other at the aggregate level, they reveal two insights: participants tend to reduce their contribution levels if they are only informed about having been overruled by their group members in the referendum. This negative information effect is counteracted by a democratic premium if the institution is endogenously chosen.
The remainder of this paper is organized as follows. Section 2 presents the experimental design of the study. Results are presented in Section 3. A concluding discussion is provided in Section 4.

2 Experimental design and procedure

My experiment is based on a linear public goods game with subjects randomly and anonymously matched into groups of three for the entire experiment. The experiment consists of two parts (Part I and II) and a timeline for the experiment is provided in Figure 1.
In Part I, subjects participate in ten rounds of a standard public goods game. Each subject i receives an initial endowment of $e = 20$ LabDollar (LD) in each round. Of this endowment an amount q_i is contributed to a public good, while the rest, $e - q_i$, goes to a private account. Subject i's payoff (π_i) is given by the private account plus the benefit from the group's contributions to the public good multiplied by the marginal per capita return of $\beta = 0.5$, i.e., $\pi_i = e - q_i + 0.5 \sum_{j=1}^{3} q_j$. Since $\beta < 1 < n\beta$, complete free-riding ($q_i = 0$) is the dominant strategy for all subjects, according to the standard game theoretic prediction of purely selfish subjects. Full contributions to the public good ($q_i = 20$) are, in contrast, socially optimal.
Right after the first ten rounds of this standard public goods game (Part I) has been completed, the voting stage starts. Subjects vote in a referendum on whether to establish a contribution rule in Part II of the experiment. The main focus of my experiment is to investigate whether and, if so, how the effect of the rule depends on the procedure of implementation. Therefore, I decided to keep the rule as simple and non-strategic as possible and abstain from introducing rather complex centralized (e.g., Cardenas

Figure 1: Timeline for the experiment



Note: In Part I, subjects play ten rounds of a standard public good game. Depending on votes and randomization, subjects are assigned to treatments in Part II of the experiment.

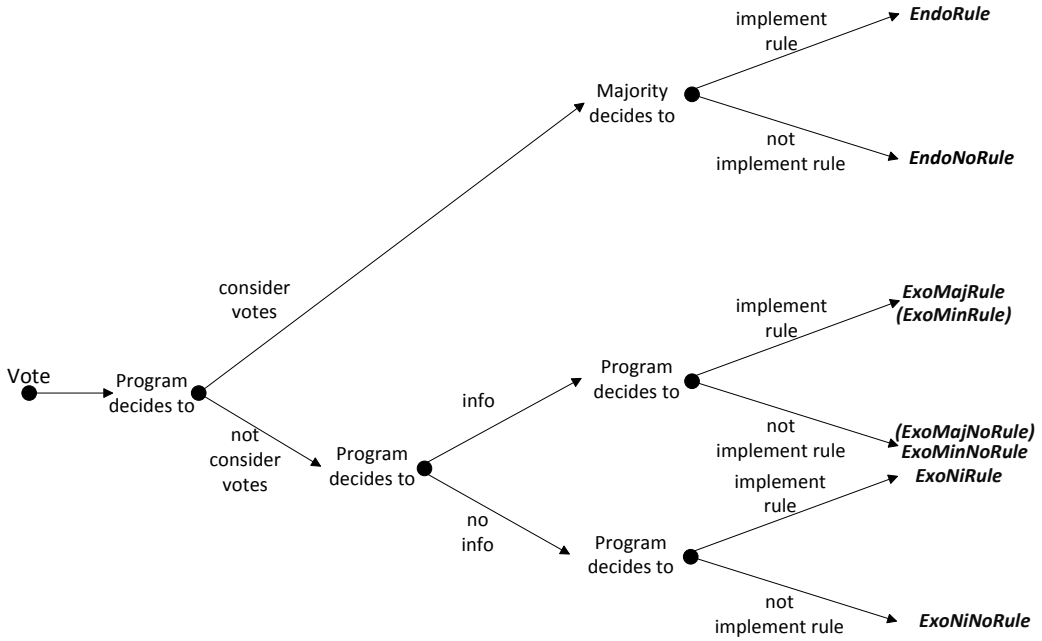
et al. 2000) or decentralized sanctioning mechanisms (e.g., Carpenter 2007). Following Tyran and Feld (2006), the rule aims at fostering contributions by prescribing full contributions to the public good backed by a fixed and automatically imposed sanction of $s = 4$ for subjects who do not comply, i.e., $q_i < 20$. In case the rule is imposed, subject i's payoff is given by:

$$\pi_i = \begin{cases} 20 - q_i + 0.5 \sum_{j=1}^{3} q_j - 4 & if\ q_i < 20 \\ 20 - q_i + 0.5 \sum_{j=1}^{3} q_j & if\ q_i = 20. \end{cases}$$

With $s = 4$ the penalty for violating the proposed contribution is rather low and zero contributions to the public good remain the unique Nash equilibrium in dominant strategies. Since $\beta = 0.5$, partial contribution is never optimal. Complete free-riding yields a payoff of $\pi_i(q_i = 0|q_{-i}) = 20 + 0.5 \sum_{j \neq i} q_j - 4$. Compliance, in contrast, yields $\pi_i(q_i = 20|q_{-i}) = 10 + 0.5 \sum_{j \neq i} q_j$. Compliance is rational if and only if $\pi_i(q_i = 0|q_{-i}) < \pi_i(q_i = 20|q_{-i})$. This would require a sanction of $s > 10$. Thus, for $s = 4$ full free-riding is the unique Nash equilibrium in dominant strategies, i.e., $\pi_i(q_i = 0|q_{-i}) > \pi_i(q_i = 20|q_{-i})\ \forall i$.

I complement the existing literature by combining the experiment by Tyran and Feld (2006) with a randomization technique adapted from Dal Bó et al. (2010) to test whether the effect of a weak and non-deterrent contribution rule in a public goods game depends on how it has been implemented. The corresponding randomization technique is summarized in Figure 2. First, all three participants per group vote simultaneously

Figure 2: Illustration of the randomization technique



Note: Randomization technique adapted from Dal Bó et al. (2010). After all participants have voted, the program decides randomly whether to consider the votes. In case the votes are not considered, it randomly decides whether to reveal the information about the outcome of the voting stage and thereafter whether to implement the rule. Consequently, participants could be assigned randomly to eight different treatments. However, only six out of all eight treatments are of primary interest, i.e., *EndoRule*, *EndoNoRule*, *ExoMajRule*, *ExoMinNoRule*, *ExoNiRule*, and *ExoNiNoRule*. The two remaining treatments *(ExoMinRule* and *ExoMajNoRule*) are not considered in the following analysis and, therefore, placed in parentheses.

and anonymously in a referendum on whether to enact the contribution rule. Second, the experimental software randomly chooses whether to consider the votes in each group. If the software considers the votes, the majority wins. If the software does not consider the votes, it randomly chooses whether to reveal the information regarding the outcome of the referendum and, in a second step, whether to impose the rule exogenously. While subjects were informed that the experimental software chooses randomly, they were not informed about the exact probabilities.[2] This randomization

[2]Following the protocol by Dal Bó et al. (2010), the instructions make clear that the computer will randomly choose whether to consider the votes in your group, that the computer will randomly choose whether to reveal the outcome of the voting stage, and that the computer will randomly choose whether to implement the contribution rule. Instructions and screenshots are provided in the supplementary material. The uneven distribution of yes-voters (73%) and no-voters (27%) in combination with the experimental design that allows participants to self-select into some of the treatments causes a very uneven distribution of participants across treatments. To balance the sample across treatments, I adjusted the randomization procedure over the course of the 26 experimental sessions. Initially, the experimental software was set to consider the votes with a probability of 40 percent and both reveal the outcome of the referendum as well as implement the contribution rule with a probability of around 50 percent. From session 18 onwards, I then reduced the probability

procedure allows me to compare decisions of participants who vote the same way, receive exactly the same information about the outcome of the voting stage, and are assigned to the same treatments. The only difference lies in how the treatments are implemented: endogenously chosen by the participants, or exogenously imposed by the experimental software.

After the voting stage, subjects are assigned to treatments. Depending on votes and the randomization technique, they are informed whether the computer randomly chose to consider votes and about whether the rule is implemented. In case participants do receive the information about the outcome of the voting stage, they do not learn the exact distribution of votes. They learn whether at least two subjects or at the most one subject per group voted for the rule. The eight possible treatments are denoted as *EndoRule, EndoNoRule, ExoMajRule, ExoMinRule, ExoMajNoRule, ExoMinNoRule, ExoNiRule, and ExoNiNoRule* (see Figure 2). *Endo* denotes that the votes of the group were considered and *Exo* denotes that the computer overrode the votes. *Rule* denotes that the contribution rule is implemented versus *NoRule*. In case the information regarding the outcome of the referendum is available, *Maj* denotes that the majority of the group supported the rule, and *Min* denotes that only a minority supported the rule. *Ni* denotes that this information is not available.[3]

My experiment differs from Tyran and Feld (2006) and Dal Bó et al. (2010) in three important ways. Participants in Tyran and Feld (2006) vote in a referendum on whether to enact the rule right at the beginning of the experiment. In order to enhance the understanding of the game and give participants the opportunity to gain experiences, participants in my experiment play ten rounds of a standard public goods game before they vote. With respect to the methodological approach to test for a democracy premium, Tyran and Feld (2006) use a within-subject design that relies on the strategy method. Subjects make contingent decisions for all possible outcomes of the referendum, in order to avoid confounding effects of self-selection into treatments and the

that the votes are considered (to around 15 percent), increased the probability that the information is revealed (to 80 percent) and decreased the probability of the contribution rule being implemented (90 percent).

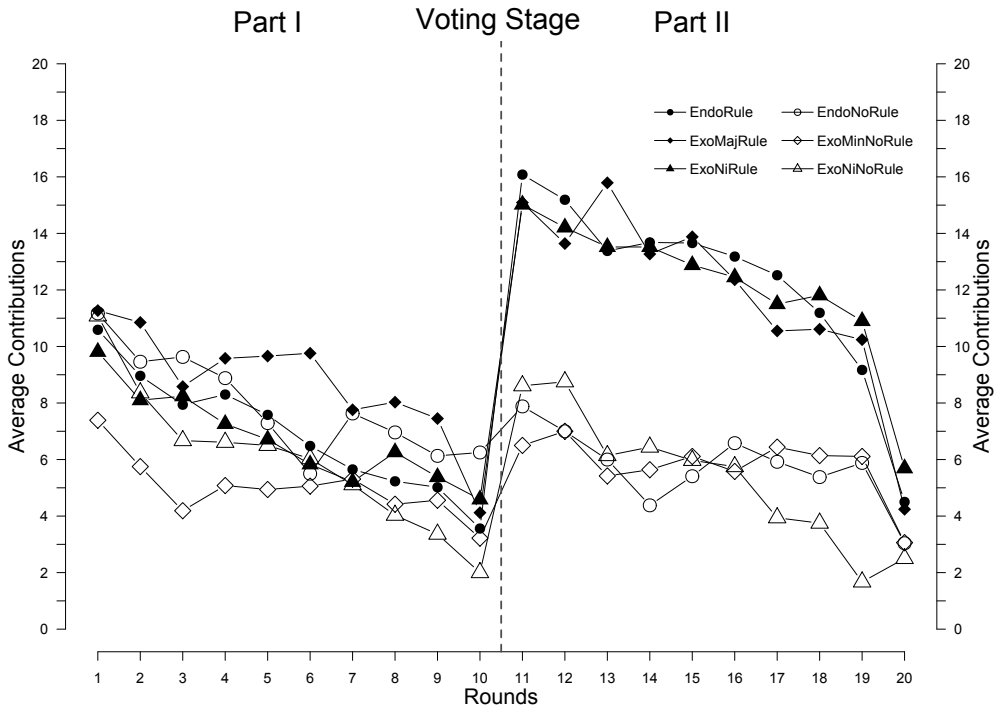
[3]Only six *(EndoRule*, *EndoNoRule*, *ExoMajRule*, *ExoMinNoRule*, *ExoNiRule*, *ExoNiNoRule*) out of all eight treatments are of central importance for the following analysis. The experimental software, however, decides randomly whether to consider votes, and in case the votes are not considered, whether to reveal the information of the voting stage and thereafter implement the rule. It is thus possible that the votes are not considered, the rule is exogenously implemented (not implemented) and participants are informed that a majority of their group members are against (in favor of) the rule, i.e., *ExoMinRule*, *ExoMajNoRule*. The function of the information treatments is to provide the necessary intermediate steps between the exogenously imposed and democratically chosen treatments. This is done by comparing participants with the same information on the outcome of the referendum across treatments, i.e., *EndoRule* vs. *ExoMajRule* and *EndoNoRule* vs. *ExoMinNoRule*. Following this logic, there is no equivalent for *ExoMinRule* and *ExoMajNoRule* under democracy. Therefore, both treatments (*ExoMinRule* and *ExoMajNoRule*) are not considered in my analysis.

information transmitted via voting. According to standard game theoretic predictions, the strategy method should yield the same decisions as the direct-response method. However, the literature suggests that subjects make different decisions in contingent responses relative to situations where they face given and known decisions (e.g., Falk et al. 2005; Brandts and Charness 2011; Jordan et al. 2016). Moreover and most importantly, their design precludes disentangling the total difference in participants' contribution behavior between the endogenously chosen treatments, where the rule is either democratically chosen or rejected, into its components. In this experiment, I rely on a direct-response method and adapt a randomization technique suggested by Dal Bó et al. (2010). They use a prisoner's dilemma with mutual defection as unique Nash equilibrium and introduce the opportunity to impose a sanction on unilateral defection. The sanction is comparatively strong and both mutual defection and cooperation are Nash equilibria. I investigate the effect of a non-deterrent rule. This is of fundamental importance because strong and deterrent rules set strong incentives, thus cooperation and compliance are easier anyway. This limits the potential effect of democratic participation. Furthermore, many situations related to cooperation are subject to rather non-deterrent interventions that do not eliminate free-riding incentives. Either no supra authorities exist in order to monitor, enforce, and sanction any policy, or, in case authorities exist, they lack the resources to enforce compliance.

The experiment was conducted at the mLab of the University of Mannheim, Germany. I used the experimental software z-Tree developed by Fischbacher (2007) for programming, and participants were recruited via ORSEE (Greiner 2015). In total, I conducted 26 sessions with a total of 402 participants.[4] Subjects were assigned to one of the eight possible treatments. Since the two treatments *ExoMinRule* and *ExoMajNoRule* are irrelevant for the decomposition, they are not considered in my primary analysis, and the main results are based on the 267 participants in the six treatments of primary interest, i.e., *EndoRule*, *EndoNoRule*, *ExoMajRule*, *ExoMinNoRule*, *ExoNiRule*, and *ExoNiNoRule*. A session consists of 20 rounds and on average lasted slightly more than 60 minutes. Before the first round of the game started, participants played two practice rounds. At the end of each session, one non-practice round was randomly selected to determine earnings for each participant, who earned on average 11.80 euros. At the end of each session, participants fill in a post-questionnaire on socio demographic characteristics as well as attitudes and values adapted from established value surveys (World Value Survey 2014). Table 6 in the supplementary material displays the sample characteristics. In all, 50% of participants are women. On average, participants are about 23 years old and from different fields of study at the University of Mannheim.

[4] Panel A of Table 2 summarizes the number of participants by treatment and vote in the six treatments of primary interest. Participants by vote in all eight treatments are summarized in Table 7 in the supplementary material.

Figure 3: Contributions by treatment



Note: Average contributions to the public good in LabDollar (LD) by round and treatment. In Part I, all participants play a voluntary contribution mechanism. After Part I participants vote in a referendum on whether to enact the contribution rule. Depending on individual votes and the randomization strategy described in Section 2, participants are assigned to treatments in Part II. *EndoRule* (*EndoNoRule*): contribution rule is democratically chosen (rejected). *ExoMajRule* (*ExoMinNoRule*): contribution rule is externally imposed (not imposed) and participants receive the information that the majority (minority) of their group supported the rule. *ExoRule* (*ExoNoRule*): contribution rule is externally imposed (not imposed). Two (*ExoMinRule* and *ExoMajNoRule*) of the eight possible treatments are not considered in my analysis and not considered in Figure 3. Average contributions in all eight treatments are shown in Figure 7 in the supplementary material.

3 Results

Average contributions to the public good across treatments in both parts of the experiment are shown in Figure 3.[5] In the first part of the experiment, both the level of average contributions as well as the contribution patterns are comparable to other voluntary contribution mechanisms (e.g., Ledyard 1995; Zelmer 2003; Chaudhuri 2011). Participants contribute on average 6.81 LD to the public good and contributions decrease over rounds with an average of 10.24 LD in round 1 and 3.78 LD in round 10. Since subjects self-select into some of the treatments in Part II of the experiment, there might already be differences in participants' contribution behavior across treatments

[5]Table 2 summarizes the number of observations by vote and treatment as well as average contribution levels in Part I, at the end of Part I (round 10), at the beginning of Part II (round 11), and in Part II. In addition, contribution levels by round, treatment, and individual vote are illustrated in Figure 6 in the appendix.

in Part I. Pairwise comparisons of contribution levels across all treatments in Part I reveal that there are only small differences before the voting stage. In fact, the differences are not statistically significant and participants can be considered identical in terms of their contribution levels, especially at the end of the first part of the experiment.[6]
In line with previous evidence on the restart effect in prisoner's dilemma games (e.g., Andreoni and Miller 1993) and public goods games (e.g., Andreoni 1988), contributions increase at the beginning of the second part of the experiment (see Figure 3). The increase is much larger in case the rule is implemented, which leads to significant differences in contribution levels across treatments in Part II (see Table 8 in the supplementary material, Panel C and D). In order to estimate and disentangle the aggregate effect of democratic participation, I follow Dal Bó et al. (2010) by initially focusing on participants' contribution behavior in the first round of Part II and using contributions levels in round 11 as the primary outcome variable.[7]

3.1 Voting behavior

The vast majority of the 402 participants choose the contribution rule in the voting stage of the experiment. More precisely, significantly more participants vote in favor of the rule than against it: 292 (72.64%) yes-voters versus 110 (27.36%) no-voters (p-value < 0.000). This first observation can be summarized by establishing the following result

Result 1. Participants vote for the contribution rule in the majority of all cases.

The approximately 73% of participants voting for the rule are clearly above the 50% obtained by Tyran and Feld (2006) and the 53% by Dal Bó et al. (2010). While I use the same contribution rule as Tyran and Feld (2006), the experiments differ in their protocols. In the experiment by Tyran and Feld (2006), participants do not interact before they vote on whether to impose the contribution rule. In my experiment, in contrast, participants play ten rounds of a standard public goods game before they vote. The experience they have made with their group members in the first part of the

[6] Average contribution levels in Part I as well as at the end of Part I (round 10) by treatment and individual vote are shown in Table 2, Panel B and C, respectively. Test statistics for all pairwise comparisons across treatments are summarized in Table 8 in the supplementary material. To address multiple hypothesis testing, I follow the procedure suggested by List et al. (2016) and p-values are adjusted for multiple comparisons.

[7] Contribution levels in round 11 and on average in Part II are provided in Table 2, Panel D and E, respectively. Corresponding test statistics for all pairwise comparisons across treatments are summarized in Table 8 (in Panel C and D) in the supplementary material.

Table 1: Determinants of voting behavior

	Dependent variable: Yes	
	Coefficients	Average marginal effects
Coop. Part I: Own	0.032	0.010
	(0.029)	(0.009)
Coop. Part I: Others	-0.002	-0.001
	(0.015)	(0.005)
Trust	-0.012	-0.004
	(0.088)	(0.028)
Locus of control	0.226	0.073
	(0.141)	(0.045)
Obey authority	0.084	0.027
	(0.128)	(0.041)
Democrat	0.038	0.012
	(0.048)	(0.015)
Pol. commitment	-0.130	-0.042
	(0.114)	(0.037)
Female	-0.123	-0.040
	(0.143)	(0.046)
Age	0.001	0.000
	(0.016)	(0.005)
Constant	0.031	
	(0.574)	
Observations	381	381
Log likelihood	-216.717	

Note: Probit regression. Coefficients and average marginal effects with robust standard errors in parentheses in column 1 (2). $^{*}p < 0.1$, $^{**}p < 0.05$ and $^{***}p < 0.01$. Dependent variable (*Yes*): 1 if participant votes for rule and 0 otherwise. *Coop. Part I: Own* (*Others*): average own contributions (contributions of others) in Part I. *Trust:* standardized index for participants stated trust level. *Locus of control:* stated locus of control on a scale between 1 (low) and 10 (high). *Obey authority:* standardized index for stated respect for authorities. *Democrat:* stated importance of living in a democratic system on a scale between 1 (low) and 10 (high). *Pol. commitment:* stated index for stated political commitment.

experiment as well as the enhanced understanding of the experiment could stress the urgency to implement a contribution rule which aims at fostering contributions.

One potential explanation for the relatively high level of support for the institution in my experiment compared to Dal Bó et al. (2010) could lie in the costs associated with implementing the institutions. In both experiments, selfish participants have an in-

centive to vote in favor of the rule if they belief that there are conditional cooperators in their group who take a yes-vote as signal for their cooperative intentions, when in reality they plan to free-ride. The costs for signalling their cooperative intentions are reflected by the penalty on uncooperative behavior if the institution is implemented and the other group members are cooperating. In Dal Bó et al. (2010), the penalty reduces defectors' payoffs by 20% and is therefore twice as high as in my experiment. Consequently, strategically voting for the rule as signal for cooperative intentions comes at a relatively low cost in my experiment, which could potentially explain the relatively high level of support of the institution.[8]

I define the variable *Yes*, which is a binary variable for whether participants vote in favor of the rule, in order to analyze participants voting behavior in more detail via estimating a regression model. Results are shown in Table 1. In line with other experiments on the endogenous choice of institutions in social dilemma situations (e.g., Sutter and Weck-Hannemann 2003; 2004; Dal Bó et al. 2010; Vollan et al. 2017; Fehr and Williams 2018) my results suggest that participants own contributions to the public good in Part I of the experiment (*Coop. Part I: Own*) are positively correlated with voting for the rule. More cooperative participants are more likely to vote for enacting the rule. Voting for the rule is also negatively correlated with the average contributions of the other group members in Part I (*Coop. Part I: Others*). Participants who have experienced low contribution levels are more likely to vote in favor of the institution. However, these effects do not reach conventional levels of significance. In addition, I measure how far participants believe that they have control over events that affect their personal lives, and relate this internal *Locus of control* to their voting behavior. The effect is nearly significant and suggests that participants who believe that they have control over events that affect their lives are more likely to vote for the rule. An intuition could be that these participants are more likely to believe that they can actually change the group outcome by changing the institution.

[8] This argumentation is in line with Dannenberg and Gallier (forthcoming). Based on a review of 39 experimental papers on the endogenous choice of institutions to solve social dilemma situations they show a relationship between the costs of an institution and its frequency of being implemented, with cheaper institutions being more frequently chosen.

3.2 Endogenous vs. exogenous treatments effects: aggregated analysis

The main results of Part II of the experiment are summarized in Table 2.[9] Panel A shows the number of observations by vote and treatments. Participants' contribution levels in the first round of Part II (round 11) and on average in Part II are summarized in Panel D and E, respectively. To start the aggregated analysis I derive the total difference ($TotalDiff$) in participants' contribution behavior by comparing the contribution to the public good between the two endogenously chosen treatments, where the non-deterrent contribution rule is either democratically chosen ($EndoRule$) or rejected ($EndoNoRule$). Based on the randomization strategy outlined in Section 2 and conditioning on the proportion of yes- and no-voters in case the rule is endogenously chosen, I can decompose this total difference in participants' contribution behavior into four components: the exogenous treatment effect ($ExoTrE$) of the non-deterrent contribution rule, the effect of revealing the information about the outcome of the referendum ($InfoE$), the effect of self-selection into treatments ($SelE$), and the direct effect of democratic participation ($DemoE$).[10]

In order to structure the analysis, I extend the analysis of Dal Bó et al. (2010) by explicitly addressing the effect of information transmitted via the results of the referendum. In this sense, I denote as $g(v|M, I, R)$ the proportion of subjects who vote $v \in \{Y, N\}$ (in favor or against the rule) given the procedure of implementation $M \in \{Endo, Exo\}$ (democratically chosen or randomly by the computer), the information available about the outcome of the voting stage $I \in \{Maj, Min, Ni\}$ (majority or minority support the rule or no information available), structure of the experiment $R \in \{Rule, NoRule\}$ (rule imposed or not), and let $q(v|M, I, R)$ be the contributions levels in the first round of Part II (i.e., round 11) of participants who voted v given the procedure of implementation M, the information available I, and the structure of the experiment R.[11]

By construction, the decomposition analysis at this aggregate level is especially suitable to quantify the effects of revealing the outcome of the referendum or democratic

[9] The two treatments *ExoMinRule* and *ExoMajNoRule* are not required to estimate and disentangle the effect of democracy and therefore not considered in my analysis and Table 2. A summary of all individual contributions in all eight treatments in Part I and Part II of the experiment is given in Table 7 in the supplementary material.

[10] A graphical illustration of the decomposition strategy is provided in Figure 5 in the supplementary material.

[11] Given the random assignment into groups and that participants have no information about others' voting decisions at the time of voting, votes should be independent per group. In an extension to the analysis of participants' voting behavior (see, Section 3.1), I do not find evidence that voting decisions are dependent within groups. Participants' voting decision is not significantly correlated with the decisions of their group members (p-value = 0.486).

Table 2: Summary statistics - individual level data

	Considering votes		Not considering votes			
			Information available		Information not available	
Vote	EndoRule	EndoNoRule	ExoMajRule	ExoMinNoRule	ExoNiRule	ExoNiNoRule
Panel A. Votes						
No	17	16	4	25	13	7
Yes	79	8	29	11	29	29
Total	96	24	33	36	42	36
Panel B. Contributions in Part I						
No	5.64	7.73	7.65	5.02	5.90	4.76
Yes	7.20	8.20	8.85	4.93	7.12	6.27
Total	6.93	7.89	8.71	4.99	6.74	5.98
Panel C. Contribution at the end of Part I (round 10)						
No	2.82	7.69	2.50	3.04	4.23	1.43
Yes	3.72	3.38	4.34	3.64	4.76	2.14
Total	3.56	6.25	4.12	3.22	4.60	2.00
Panel D. Contribution at the beginning of Part II (round 11)						
No	14.71	7.75	2.00	6.04	9.77	6.71
Yes	16.38	8.13	16.90	7.55	17.38	9.38
Total	16.08	7.88	15.09	6.50	15.02	8.86
Panel E. Contribution in Part II						
No	11.54	5.78	4.45	5.76	8.26	3.57
Yes	12.41	5.73	13.00	5.89	13.90	5.81
Total	12.25	5.76	11.97	5.80	12.15	5.38

Note: Panel A summarizes the number of observations by vote and result of the voting state across treatments. Average contributions in Part I of the experiment are summarized in Panel B. Individual contributions in the last round of Part I (i.e., round 10) and the first round of Part II (i.e., round 11) are shown in Panel C and D, respectively. Panel E summarizes average contributions in Part II of the experiment.

participation if these effects homogeneously affect yes- and no-voters within a treatment condition, i.e., when the contribution rule is implemented or not, but differently across treatment conditions. If there is, for instance, a positive effect of democratic participation on yes- and no-voters if the rule is endogenously chosen and a negative one if it is democratically rejected. In this section, I focus on the aggregate analysis before investigating potential differences at the individual level in more detail in Section 3.3.

The statistical inference in this section is based on a series of linear regression models.[12] Since my decomposition relies on ex-post estimates of linear combinations of regression coefficients, all regressions are estimated separately with indicator variables for the different treatments for yes- and no-voters and without a constant. To ease interpretation, results are illustrated in Figure 4 and summarized in Table 3.

Total Difference - The first two columns in Panel D of Table 2 show that public good contributions at the beginning of Part II are substantially higher if the rule is democratically chosen rather than democratically rejected: 16.08 LD vs. 7.88 LD. Following Dal Bó et al. (2010), I can calculate this total difference in participants' contribution behavior as weighted average of individual contributions by participants' voting behavior if I use the proportion of participants who vote for and against the rule as weights in the respective treatments.

$$\begin{aligned} TotalDiff &= \textstyle\sum_{v\in\{Y,N\}}[g(v|Endo,Maj,Rule)q(v|Endo,Maj,Rule) \\ &\quad -g(v|Endo,Min,NoRule)q(v|Endo,Min,NoRule)]. \end{aligned}$$

At the aggregate level, this shows that participants contribute on average 8.21 LD more to the public good when the rule is democratically chosen compared to democratically rejected (p-value < 0.000, Table 3 - row 1).[13] This is summarized in

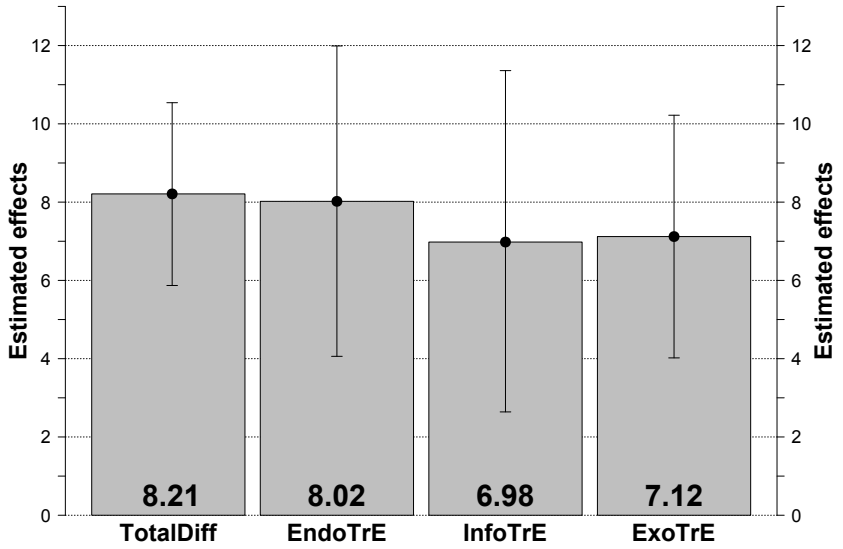
Result 2. Contributions are significantly higher if the rule is democratically chosen than if it is democratically rejected.

This total difference in participants' contribution behavior between the two endogenously chosen treatments, where the non-deterrent contribution rule has been either endogenously chosen or rejected, captures at least four different components: the direct treatment effect of the exogenously implemented contribution rule, the effect of revealing the outcome of the voting stage, the effect of a change in the proportion of yes- and no-voters across treatments, and, finally, the effect of democratic participation per se. To disentangle these four components at the aggregated level, I start by separating the $TotalDiff$ into an endogenous treatment effect ($EndoTrE$) and the effect of self-selection into treatment conditions ($SelE$).

[12] Detailed regression results are provided in Table 9 in the supplementary material.

[13] $TotalDiff = (\frac{17}{96} * 14.71 + \frac{79}{96} * 16.38) - (\frac{16}{24} * 7.75 + \frac{8}{24} * 8.13) = 8.21$. If not mentioned otherwise, the statistical analysis in this section is based on linear regression models presented in Table 9 in the supplementary material. Test statistics and p-values correspond to Wald tests based on respective linear combinations of regression coefficients presented in Table 9 and are summarized in Table 3.

Figure 4: Decomposition analysis



Note: Estimated total difference ($TotalDiff$), endogenous treatment effect ($EndoTr$E), information treatment effect ($InfoTrE$), and exogenous treatment effect ($ExoTrE$). Confidence intervals at the 90%-level. The information effect ($InfoE$) is given by the difference between $InfoTrE$ and $ExoTrE$. The selection effect ($SelE$) is given by the difference between the $TotalDiff$ and the the $EndoTrE$. The democracy effect ($DemoE$) is given by the difference between $EndoTrE$ and $InfoTrE$.

Endogenous Treatment Effect - The $EndoTrE$ leaves the proportion of yes- and no-voters constant across treatment conditions and captures only the endogenous change in treatments.

$$\begin{aligned} EndoTrE \;=\; & \textstyle\sum_{v\in\{Y,N\}} g(v|Endo,Maj,Rule)[q(v|Endo,Maj,Rule) \\ & -q(v|Endo,Min,NoRule)]. \end{aligned}$$

In other words, it measures the effect of endogenously changing treatments assuming that the proportion of yes- and no-voters is the same in both treatment conditions. With 8.02 LD the effect loses some of its strength, but contributions are still significantly higher when the rule is democratically chosen instead of being rejected (p-value = 0.001, Table 3 - row 1).[14] That the $EndoTrE$ is de facto slightly below the $TotalDiff$ indicates a positive but weak effect of self-selection into treatments.

Selection Effect - The $SelE$ is given by the difference between the $TotalDiff$ and the $EndoTrE$. It captures the effect of the change in the proportion of yes- and no-voters in $EndoRule$ and $EndoNoRule$, leaving the contributions constant.

[14] $EndoTrE = \frac{17}{96} * (14.71 - 7.75) + \frac{79}{96} * (16.38 - 8.13) = 8.02$.

Table 3: Aggregated effects

		$TotalDiff$	$EndoTrE$	$InfoTrE$	$ExoTrE$	$SelE$	$InfoE$	$DemoE$
(1)	Contributions	8.21***	8.02***	6.98**	7.12***	0.19	-0.14	1.04
	in round 11	(1.405)	(2.385)	(2.635)	(1.865)	(1.862)	(3.229)	(3.555)
(2)	Contributions	6.49***	6.52***	5.62**	7.48***	-0.02	-1.86	0.90
	in Part II	(1.725)	(1.696)	(2.190)	(2.315)	(0.360)	(3.187)	(2.770)

Note: Estimated effects with standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$ and $^{***}p < 0.01$. Estimates are based on public good contribution levels in round 11 (row 1) and average contributions in Part II of the experiment (row 2). Estimates and standard errors are based on coefficients and weighted linear combinations of coefficients of regressions presented in column (1) and (2) of Table 9 in the supplementary material, respectively.

$$SelE = \sum_{v \in \{Y,N\}} [g(v|Endo, Maj, Rule) - g(v|Endo, Min, NoRule)]q(v|Endo, Min, NoRule).$$

The effect of self-selection is given by 0.19 LD.[15] In line with Dal Bó et al. (2010) this indicates that yes-voters show a slight tendency to contribute more to the public good than no-voters. However, the selection effect is statistically indistinguishable from zero (p-value = 0.922, Table 3 - row 1).

Exogenous Treatment Effect - The $ExoTrE$ captures the change in contributions to the public good due to an exogenous change in treatments in case participants do not receive any information about the outcome of the voting stage. As in the endogenous treatment effect, it leaves the proportion of yes- and no-voters constant in order to take into account the effect of self-selection into treatments.

$$\begin{aligned} ExoTrE \quad = \quad & \textstyle\sum_{v \in \{Y,N\}} g(v|Endo, Maj, Rule)[q(v|Exo, Ni, Rule) \\ & -q(v|Exo, Ni, NoRule)]. \end{aligned}$$

The $ExoTrE$ is given by 7.12 LD and statistically significant different from zero (p-value < 0.000, Table 3 - row 1).[16] The non-deterrent contribution rule affects participants' contribution behavior even if participants are exogenously assigned to treatments and without any information about the results of the voting stage. This is summarized in the following result.

Result 3. If treatments are exogenously imposed and the information about the out-

[15] $SelE = (\frac{17}{96} - \frac{16}{24}) * 7.75 + (\frac{79}{96} - \frac{8}{24}) * 8.13 = 0.19$.
[16] $ExoTrE = \frac{17}{96} * (9.77 - 6.71) + \frac{79}{96} * (17.38 - 9.38) = 7.12$.

come of the voting stage is not revealed, the rule significantly increases contributions.

Information Treatment Effect - Analogous to the $ExoTrE$, the information treatment effect ($InfoTrE$) captures the change in contributions due to an exogenous change in treatment conditions and leaves the proportion of yes- and no-voters constant. In addition, the information about the outcome of the voting stage is revealed.

$$InfoTrE = \sum_{v \in \{Y,N\}} g(v|Endo, Maj, Rule)[q(v|Exo, Maj, Rule) - q(v|Exo, Min, NoRule)].$$

I can calculate this effect as 6.98 LD.[17] If treatments are exogenously given and the information about the outcome of the referendum is revealed, the rule significantly affect participants' contribution behavior (p-value = 0.010, Table 3 - row 1). This is summarized in the next result.

Result 4. If treatments are exogenously imposed and the information about the outcome of the voting stage is revealed, the rule significantly increases contributions.

Information Effect - In order to isolate the effect of the information transmitted by the voting stage, I use the difference between the information treatment effect ($InfoTrE$) and the exogenous treatment effect ($ExoTrE$). Therefore, the information effect ($InfoE$) leaves the proportion of yes- and no-voters, the treatments - including how they have been imposed - constant and only captures the effect of revealing the outcome of the voting stage.

$$\begin{aligned} InfoE \quad = \quad & \textstyle\sum_{v \in \{Y,N\}} g(v|Endo, Maj, Rule) \\ & [(q(v|Exo, Maj, Rule) - q(v|Exo, Min, NoRule)) \\ & -(q(v|Exo, Ni, Rule) - q(v|Exo, Ni, NoRule))]. \end{aligned}$$

It is given by -0.14 LD and statistically not different from zero (p-value = 0.964, Table 3 - row 1).[18]

Democracy Effect - Finally, the democracy effect ($DemoE$) captures the effect of choosing treatments democratically. It is measured by the difference between the endogenous treatment effect ($EndoTrE$) and the information treatment effect ($InfoTrE$). It leaves the

[17] $InfoTrE = \frac{17}{96} * (2.00 - 6.04) + \frac{79}{96} * (16.90 - 7.55) = 6.98$.
[18] $InfoE = (\frac{17}{96} * (2.00 - 6.04) + \frac{79}{96} * (16.90 - 7.55)) - (\frac{17}{96} * (9.77 - 6.17) + \frac{79}{96} * (17.38 - 9.38)) = -0.14$.

proportion of yes- and no-voters, the information available, and respective treatments constant. Only the procedure on how treatments have been implemented changes.

$$\begin{aligned} DemoE \;=\; & \sum_{v\in\{Y,N\}} g(v|Endo,Maj,Rule) \\ & [(q(v|Endo,Maj,Rule) - q(v|Endo,Min,NoRule)) \\ & -(q(v|Exo,Maj,Rule) - q(v|Exo,Min,NoRule))]. \end{aligned}$$

The $DemoE$ is given by 1.04 LD and statistically indistinguishable from zero (p-value = 0.769, Table 3 - row 1).[19] This test is summarized in

Result 5. By taking into account the direct effect of the contribution rule as well as the effects of self-selection into treatments and the information transmitted via voting, democratic participation does not drive the total difference in contributions between the two endogenously chosen treatments, where the rule has been either democratically chosen or rejected.

Decomposition - Having calculated all these different elements, I can decompose the total difference in participants' contribution behavior between the two endogenously chosen treatment conditions of 8.21 LD into four different components. It can be rewritten as $TotalDiff = ExoTrE + InfoE + SelE + DemoE$. The $TotalDiff$ is given by the effect of the rule if treatments are exogenously imposed ($ExoTrE = 7.12$), the effect of revealing the outcome of the referendum ($InfoE = -0.14$), the effect of self-selection into treatments under democracy ($SelE = 0.19$), and, finally, the effect of democratic participation itself ($DemoE = 1.04$). At the aggregate level, the total difference in participants' contribution levels between the two endogenously chosen treatment conditions, where the rule has been either endogenously chosen or rejected, can be mainly attributed to the exogenous treatment effect. Especially the democracy effect explains only about 13% of the total difference and is statistically not different from zero.
The absence of a direct effect of democratic participation is robust to expanding the analysis to average contributions in all ten rounds of the second part (see Table 3 - row 2).[20] By expanding the analysis to all ten rounds of Part II of the experiment, the $TotalDiff$ amounts to 6.49 LD (p-value < 0.001). This effect can be decomposed into an $ExoTrE$ of 7.48 LD (p-value < 0.000), an $InfoE$ of -1.86 LD (p-value = 0.561), a $SelE$ of -0.02 LD (p-value = 0.946), and a $DemoE$ of 0.90 LD (p-value = 0.747).
To sum up, at the aggregate level, neither the information about the outcome of the referendum nor democratic participation directly explain the total difference in par-

[19] $DemoE = (\frac{17}{96} * (14.71 - 7.75) + \frac{79}{96} * (16.38 - 8.13)) - (\frac{17}{96} * (2.00 - 6.04) + \frac{79}{96} * (16.90 - 7.55)) = 1.04$.
[20] Contributions in all ten rounds of Part II are shown in Table 2 in Panel B. A summary of all estimated aggregated effects is given in Table 3 in row 3.

ticipants' contribution behavior between the two endogenously chosen treatments, where the non-deterrent contribution rule has been either democratically chosen or rejected. The decomposition is, however, especially suitable to identify and quantify amplifying effects, namely effects that homogeneously affect yes- and no-voters within a treatment condition, i.e., when the contribution rule is implemented or not, but differently across treatment conditions. For instance, if there is a positive democracy effect on both yes- and no-voters if the rule is democratically chosen and a negative one if it is democratically rejected. These effects could also differ for the different types of participants within the treatment conditions and depend, for example, on whether participants have been overruled by their group members in the voting stage of the experiment. Potentially heterogeneous individual treatment effects differently affecting yes- and no-voters within treatment conditions, but homogeneously across treatment conditions, might cancel each other out at the aggregate decomposition and are analysed in more detail in Section 3.3.

3.3 Endogenous vs. exogenous treatments effects: individual level analysis

A concern about the results of the decomposition analysis in Section 3.2 could be that potentially opposing individual effects might offset each other at the aggregate level. Especially the effect of democratic participation could vary across different types of participants, i.e., yes- and no-voters, and could also depend on the different treatment conditions, i.e., whether participants are overruled by their group members in the referendum, or choose in line with their group members. To control for self-selection into treatments and take such differences at the individual level into account, I estimate a series of linear regression models separately for yes- and no-voters, controlling for the different treatment conditions and the information available (see Table 4). In addition, contribution levels by round, treatment, and individual vote are shown in Figure 6 in the supplementary material. To ease ex-post comparisons of coefficients across the procedure of implementation (*Endo* vs. *Exo*), the information available (*Maj* vs. *Min* vs. *Ni*), and the structure of the experiment (*NoRule* vs. *Rule*), all regressions are estimated with indicator variables for all six treatments and without a constant. More precisely, I can estimate the information effect by comparing contributions under externally imposed treatments with treatments under exogenously imposed treatments where the outcome of the election is revealed, i.e., *ExoNiRule* vs. *ExoMajRule* if the rule is implemented and *ExoNiNoRule* vs. *ExoMinNoRule* if it is not imposed. Following this logic, I estimate the democracy effect by comparing contributions when the rule is democratically chosen or rejected with contributions when treatments are

Table 4: Individual contributions

	Dependent variable: Contribution in round 11			
	Yes-voter		No-Voter	
	(1)	(2)	(3)	(4)
EndoRule	16.38***	18.52***	14.71***	12.16**
	(0.788)	(6.381)	(2.143)	(5.846)
EndoNoRule	8.13***	11.48	7.75***	1.91
	(2.841)	(6.926)	(1.715)	(5.876)
ExoMajRule	16.90***	18.62***	2.00	-2.10
	(1.164)	(6.308)	(1.804)	(5.526)
ExoMinNoRule	7.55***	9.90	6.04***	2.79
	(2.613)	(6.544)	(1.774)	(6.071)
ExoNiRule	17.38***	19.66***	9.77***	7.11
	(1.238)	(6.524)	(2.857)	(6.825)
ExoNiNoRule	9.38***	11.99*	6.71***	4.24
	(1.469)	(6.781)	(2.455)	(5.612)
Coop. Part I: Own		0.30		0.96***
		(0.228)		(0.336)
Coop. Part I: Others		-0.02		-0.10
		(0.116)		(0.165)
Trust		0.88		-0.36
		(0.883)		(1.118)
Locus of control		-0.15		0.39
		(0.440)		(0.586)
Obey authority		1.99		0.26
		(1.217)		(1.787)
Democrat		-0.39		-0.16
		(0.535)		(0.452)
Pol. commitment		0.15		0.02
		(1.016)		(1.520)
Female		0.65		0.44
		(1.180)		(1.675)
Age		0.00		-0.10
		(0.104)		(0.131)
Observations	185	171	82	75
Adj. R^2	0.807	0.824	0.605	0.736

Note: OLS regressions. Standard errors, in parentheses, are clustered at the group level. $^{*}p < 0.1$, $^{**}p < 0.05$ and $^{***}p < 0.01$. In order to ease the ex-post comparisons of coefficients, all regressions are estimated without a constant. Regressions are done for yes-voters (column 1, 2) and no-voters (column 3,4) separately. Individual contribution levels in round 11 are the dependent variable. The independent variables are indicator variables for all the different treatments. Further control variables, see Section 3.1. The two treatments *ExoMinRule* and *ExoMajNoRule* are not required to estimate and disentangle the effect of democracy and therefore not considered in the regressions in Table 4. Regressions considering all eight treatment variables are summarized in Table 10 in the appendix.

externally imposed and the information about the referendum is available, i.e., *EndoRule* vs. *ExoMajRule* if the rule is implemented and *EndoNoRule* vs. *ExoMinNoRule* if it is not. The main effects are summarized in Table 5. This individual level analysis reveals that the information about the outcome of the referendum as well as democratic participation affect participants' contribution behavior in several ways, depending on their own decisions in the voting stage of the experiment as well as on the decisions of their group members. Participants tend to reduce their contribution levels if they are only informed that they have been overruled by their group members in the voting stage of the experiment. Furthermore, this effect is slightly counteracted under democracy.
When the rule is externally imposed, no-voters reduce their individual contribution levels from 9.77 LD in *ExoNiRule* to 2.00 LD in *ExoMajRule* (see Table 4 - model 3), if they are informed about having been overruled by their group members in the referendum. Informing no-voters that the majority of their group members actually voted in favor of the contribution rule significantly reduces their individual contributions by -7.77 LD (p-value = 0.025, Table 5 - row 3). Informing yes-voters that the majority of their group is against implementing the contribution reduces their contribution levels from 9.38 LD in *ExoNiNoRule* to 7.55 LD in *ExoMinNoRule* (see Table 4 - model 1). With -1.83 LD also in this case, the information effect is negative but it is not statistically significantly different from zero (p-value = 0.543, Table 5 - row 1). By contrast, revealing the information that the majority of the group votes in line with their individual choice in the voting stage does not affect participants' contribution behavior: there is no significant information effect in this case, neither for yes-voters (17.38 vs. 16.90, p-value = 0.777, Table 4 - model 1 and Table 5 - row 1), nor for no-voters (6.71 vs. 6.04, p-value = 0.825 , Table 4 - model 3 and Table 5 - row 3). These findings are robust to regressions controlling for additional individual characteristics (Table 4 - model 2 and 4, Table 5 - row 2 and 4) and summarized in the next result.

Result 6. At the individual level, participants tend to reduce their contributions, if they are only informed about having been overruled by their group members in the voting stage of the experiment.

Since no-voters decrease their contribution levels if they are informed that the majority of their group members are in favor of the rule and yes-voters also reduce their contributions if they are informed that the majority of the group members are against implementing the rule, effects cancel out each other in the aggregated analysis.
If the treatments are democratically chosen, individual contribution levels increase compared to when they are exogenously imposed and participants only informed that they have been overruled at the voting stage of the experiment. No-voters increase

Table 5: Summary of individual effects

			Information effect		Democracy effect	
			Rule	No Rule	Rule	No Rule
			ExoMajRule *vs.* *ExoNiRule*	*ExoMinNoRule* *vs.* *ExoNiNoRule*	*EndoRule* *vs.* *ExoMajRule*	*EndoNoRule* *vs.* *ExoMinNoRule*
Yes-voters	(1)	Without controls	-0.48 (1.699)	-1.83 (2.998)	-0.52 (1.405)	0.58 (3.860)
	(2)	With controls	-1.04 (1.923)	-2.09 (2.698)	-0.10 (1.589)	1.58 (3.774)
No-voters	(3)	Without controls	-7.77** (3.379)	-0.67 (3.029)	12.71*** (2.801)	1.71 (2.468)
	(4)	With controls	-9.21* (4.681)	-1.45 (2.599)	14.27*** (3.325)	-0.88 (2.064)

Note: Estimated effects with standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$ and $^{***}p < 0.01$. Estimations are based on contribution levels in round 11. Estimates and standard errors in row 1 (2, 3, 4) are based on the comparison of coefficients of regressions presented in column 1 (2, 3, 4) of Table 4, respectively, and shown separately for yes- and no-voters with and without consideration of control variables.

their public good contributions from 2.00 LD in *ExoMajRule* to 14.71 LD in *EndoRule* (see Table 4 - model 3) if the contribution rule is democratically chosen. This implies a substantial and statistically significant democracy premium of 12.71 LD (p-value < 0.000, Table 5 - row 3). Yes-voters increase their contribution levels from 7.55 LD in *ExoMinNoRul*e to 8.13 LD in *EndoNoRule* (see Table 4 - model 1) if the contribution rule has been democratically rejected. The democracy effect also has a positive sign, but is not statistically significantly different from zero (p-value = 0.881, Table 5 - row 1). These findings are robust to regressions controlling for additional individual characteristics (Table 4 - model 2 and 4, Table 5 - row 2 and 4). The result of all this is that participants tend to decrease their individual contribution levels if they are only informed about having been overruled. A democracy premium slightly counteracts the negative effect of being overruled, if treatments are endogenously chosen. This leads to my final result:

Result 7. At the individual level, the negative effect of being overruled by their group members in the voting stage of the experiment is counteracted by a democratic premium if treatments are democratically chosen.

In the context of the decomposition analysis in Section 3.2, the effect of democratic participation equally affects yes- and no-voters who have been overruled by their group members in the referendum, consequently offsetting each other at the aggregate level where both types of participants are simultaneously considered. No-voters tend to increase their contributions if the rule is democratically chosen and yes-voters tend to increase their contribution levels if the rule is democratically rejected. Finally, I do not find democratic participation to have an effect on yes- or no-voters if they have been voting in line with the majority of their group members in the voting stage of the experiment. When the rule is not imposed, there is no effect of democratic participation on no-voters (6.04 vs. 7.75, p-value = 0.491, Table 4 - model 3 and Table 5 - row 3). The same goes for yes-voters if the rule is implemented (16.90 vs. 16.38, p-value = 0.714, Table 4 - model 1 and Table 5 - row 1).

4 Summary and concluding remarks

This experiment contributes to the growing economic literature on endogenous formation of institutions in social dilamma situations by investigating if, how, and why democratic participation increases participants' willingness to comply with a non-deterrent institution which aims at fostering contributions to a public good. Most importantly, this experiment enables me to identify, separate, and quantify the different drivers of the effect of democratic participation. By combining key elements of the experiments by Tyran and Feld (2006) and Dal Bó et al. (2010), I test whether the effect of a non-deterrent contribution rule in a public goods game depends on whether it has been endogenously chosen via a democratic decision-making process or whether it has been exogenously imposed by an external authority. As an extension to Tyran and Feld (2006), I disentangle to what extent the effect of the endogenously implemented institution is driven by self-selection into the institution, information transmitted by democratic decision-making, and democracy per se. Compared to Dal Bó et al. (2010), I analyze the effect of a non-deterrent contribution rule, which enables me to investigate the willingness of participants to follow a rule that is for the common good but at odds with their individual free-riding incentives. This is a central characteristic of many interactions in social dilemmas subject to policies which do not affect underlying incentive schemes. In an environmental policy context, for instance, either no supranational authorities exist in order to enforce international environmental policies (e.g., Barrett 2010), or, in case authorities exist at the local level, they lack capacities and resources to actually enforce compliance (e.g., Ostrom 1990; Kroll et al. 2007). Furthermore, deterrent rules set strong incentives and, thus, there is no conflict between

cooperation and compliance which increases participants' willingness to follow the rule.

In line with the existing literature, I find that contributions to the public good are significantly higher if the rule is democratically chosen than if it is democratically rejected. This total difference in participants' contribution behavior between two endogenously chosen conditions captures a variety of different effects: the direct effect of the contribution rule, the effect of self-selection into treatments, the effect of revealing the outcome of the referendum, and the effect of democratic participation. At the aggregate level, my decomposition analysis reveals that the total difference is driven to a great extent by the direct effect of the contribution rule, which explains more than 80% of the difference in public good contribution levels. Moreover, democratic participation does not drive the total difference in participants' willingness to comply with a rule that is for the common good, but at odds with individual free-riding incentives. The effect of democratic participation explains only slightly more than 10% of the total difference and is statistically indistinguishable from zero. The analysis on the individual level, however, reveals that both the information about the outcome of the referendum as well as democratic participation affect participants' contribution decisions, depending on whether they have been overruled by their group members in the referendum. These heterogeneous individual level effects reveal two findings: participants tend to decrease their contribution levels if they are only informed about that they have voted differently from the majority in their group in the referendum. This negative information effect is counteracted by a democratic premium if institutions are endogenously chosen. Both effects equally affect yes- and no-voters who have been overruled by their group members, therefore offsetting each other in the decomposition analysis at the aggregate level. These findings suggest an interesting behavior pattern: participants tend to be more willing to comply with a regulation that they themselves disapprove of if the majority of the group members has democratically decided in its favor.

Finally, abstracting from important aspects of democratic decision-making such as, for instance, direct communication, deliberation, and different decisions rules, I follow the experimental literature and reduce democratic participation to voting. It is not the purpose of this paper to capture democratic decision-making in all this facets, but this is certain an interesting and important route for further research.

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Democracy and compliance in public goods games

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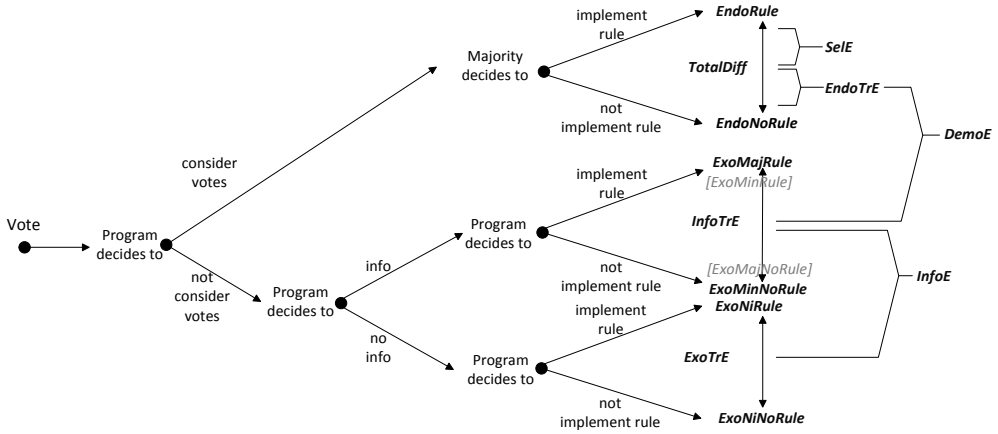
Supplementary material

The supplementary material includes additional graphs (supplementary material A), tables (supplementary material B), and the experimental protocol (supplementary material C).

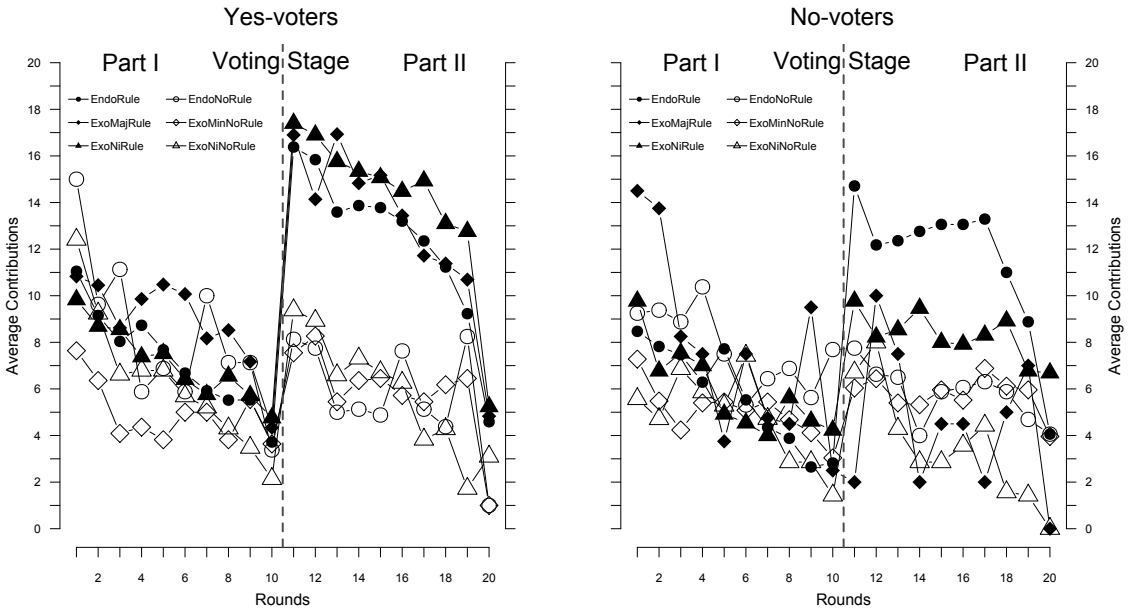
Supplementary material A: Figures

Figure 5: Illustration of the decomposition analysis



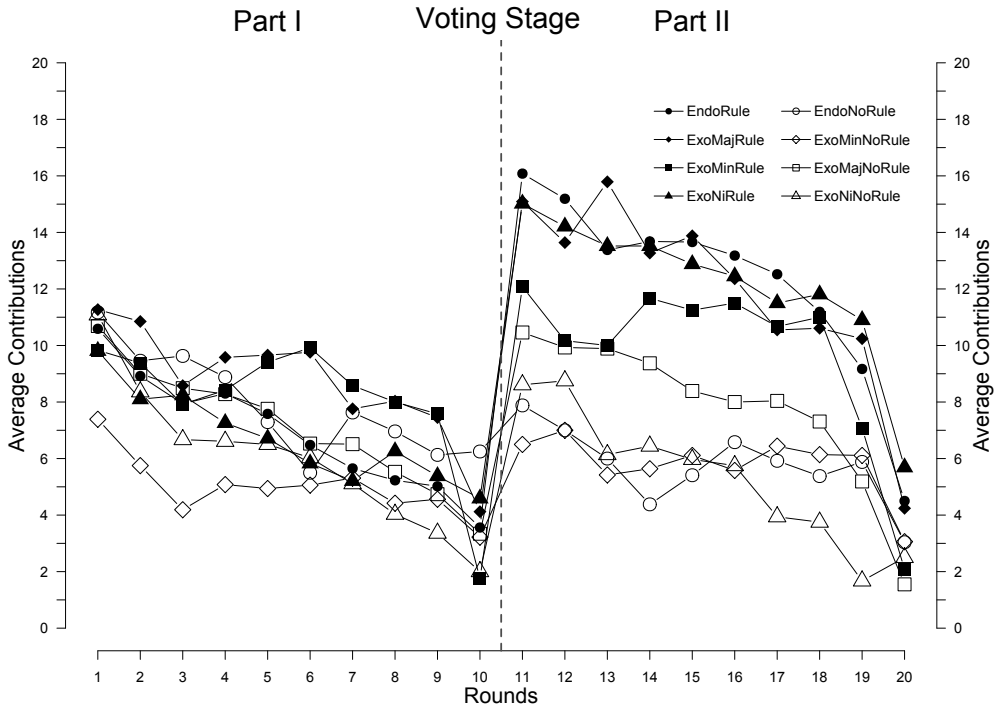
Note: The total difference in participants' contribution behavior ($TotalDiff$) captures the difference in contributions in $EndoRule$ and $EndoNoRule$. The information treatment effect ($InfoTrE$) is derived by comparing contributions in $ExoMajRule$ and $ExoMinNoRule$ and the exogenous treatment effect ($ExoTrE$) by comparing contributions in $ExoNiRule$ and $ExoNiNoRule$. The information effect ($InfoE$) captures the difference between $InfoTrE$ and $ExoTrE$. The $TotalDiff$ can be decomposed into a selection effect ($SelE$) and the endogenous treatment effect ($EndoTrE$). The democracy effect ($DemoE$) captures the difference between $EndoTrE$ and $InfoTrE$.

Figure 6: Contributions by treatment and individual vote



Note: Average contributions to the public good in LabDollar (LD) by round, vote stage results, and individual vote. Yes-voters (no-voters) on the left (right). In Part I, all participants play a voluntary contribution mechanism. After Part I participants vote in a referendum on whether to enact the contribution rule. Depending on individual votes and the randomization strategy described in Section 2 participants are assigned to treatments in Part II. *EndoRule* (*EndoNoRule*): contribution rule is democratically chosen (rejected). *ExoMajRule* (*ExoMinNoRule*): contribution rule is externally imposed (not imposed) and participants receive the information that the majority (minority) of their group supported the rule. *ExoRule* (*ExoNoRule*): contribution rule is externally imposed (not imposed).

Figure 7: Contributions by treatment (all)



Note: Average contributions to the public good in LabDollar (LD) by round and vote stage results. In Part I, all participants play a voluntary contribution mechanism. After Part I participants vote in a referendum on whether to enact the contribution rule. Depending on individual votes and the randomization strategy described in Section 2 participants are assigned to treatments in Part II. *EndoRule* (*EndoNoRule*): contribution rule is democratically chosen (rejected). *ExoMajRule* (*ExoMinNoRule*): contribution rule is externally imposed (not imposed) and participants receive the information that the majority (minority) of their group supported the rule. *ExoMinRule* (*ExoMajNoRule*): contribution rule is externally imposed (not imposed) and participants receive the information that the minority (majority) of their group supported the rule. *ExoRule* (*ExoNoRule*): contribution rule is externally imposed (not imposed).

Supplementary Material B: Tables

Table 6: Sample characteristics

	Mean	Standard deviation	Min	Max
Demographics				
Female	0.50	0.50	0	1
Age	22.55	4.48	17	58
Field of study				
Business administration	0.28	0.45	0	1
Computer sciences	0.04	0.19	0	1
Economics	0.33	0.47	0	1
Law	0.13	0.34	0	1
Medicine	0.03	0.18	0	1
Social sciences	0.11	0.32	0	1
Others	0.08	0.27	0	1
Factors				
Trust	0.00	0.85	-1.37	1.85
Locus of control	0.54	0.50	0	1
Obey authority	0.00	0.63	-2.49	0.73
Democrat	8.79	1.65	1	10
Pol. commitment	0.00	0.65	-2.15	1.46

Note: *Trust:* standardized index for participants stated trust level based on a combination of commonly used questions to measure trust. *Locus of control*: stated locus of control an a scale between 1 and 10. *Obey authority*: standardized index for stated respect for authorities based on a combination of questions to measure acceptance of authorities. *Democrat:* stated importance of living in a democratic system on a scale between 1 and 10. *Pol. commitment*: standardized index for stated political commitment based on a combination of questions to measure political commitment.

Table 7: Summary statistics - individual level data (all)

	Considering votes		Not considering votes					
			Information available				Information not available	
Vote	EndoRule	EndoNoRule	ExoMajRule	ExoMinRule	ExoMajNoRule	ExoMinNoRule	ExoNiRule	ExoNiNoRule
Panel A. Votes								
No	17	16	4	9	19	25	13	7
Yes	79	8	29	3	104	11	29	29
Total	96	24	33	12	123	36	42	36
Panel B. Contributions in Part I								
No	5.64	7.73	7.65	7.41	5.50	5.02	5.90	4.76
Yes	7.20	8.20	8.85	10.27	7.38	4.93	7.12	6.27
Total	6.93	7.89	8.71	8.13	7.09	4.99	6.74	5.98
Panel C. Contribution at the end of Part I (round 10)								
No	2.82	7.69	2.50	0.56	2.53	3.04	4.23	1.43
Yes	3.72	3.38	4.34	5.33	3.49	3.64	4.76	2.14
Total	3.56	6.25	4.12	1.75	3.34	3.22	4.60	2.00
Panel D. Contribution at the beginning of Part II (round 11)								
No	14.71	7.75	2.00	12.78	6.95	6.04	9.77	6.71
Yes	16.38	8.13	16.90	10.00	11.10	7.55	17.38	9.38
Total	16.08	7.88	15.09	12.08	10.46	6.50	15.02	8.86
Panel E. Contribution in Part II								
No	11.54	5.78	4.45	8.92	5.76	5.76	8.26	3.57
Yes	12.41	5.73	13.00	12.23	8.19	5.89	13.90	5.81
Total	12.25	5.76	11.97	9.75	7.81	5.80	12.15	5.38

Note: Panel A summarizes the number of observations by vote and result of the voting state across treatments. Average contributions in Part I of the experiment are summarized in Panel B. Individual contributions in the last round of Part I (i.e., round 10) and the first round of Part II (i.e., round 11) are shown in Panel C and D, respectively. Panel E summarizes average contributions in Part II of the experiment.

Table 8: Pairwise comparisons across treatments

Treatment	ExoNiRule	ExoMinNoRule	ExoMajRule	EndoNoRule	EndoRule
Panel A. Contributions in Part I					
ExoNiNoRule	<	>	<	<	<
ExoNiRule		>	<	<	<
ExoMinNoRule			<*	<	<
ExoMajRule				>	>
EndoNoRule					>
Panel B. Contributions at the end of Part I (round 10)					
ExoNiNoRule	<	<	<	<	<
ExoNiRule		>	>	<	>
ExoMinNoRule			<	<	<
ExoMajRule				<	>
EndoNoRule					>
Panel C. Contributions at the beginning of Part II (round 11)					
ExoNiNoRule	<***	>	<**	>	<***
ExoNiRule		>***	<	>**	<
ExoMinNoRule			<***	<	<***
ExoMajRule				>**	<
EndoNoRule					<***
Panel D. Contributions in Part II					
ExoNiNoRule	<***	<	<***	<	<***
ExoNiRule		>***	<	>***	<
ExoMinNoRule			<***	>	<***
ExoMajRule				>***	<
EndoNoRule					<***

Note: Summarized test statistics of all pairwise comparisons across treatments in Part I (Panel A), at the end of Part I (round 10) (Panel B), at the beginning of Part II (round 11) (Panel C), and in Part II (Panel D). I follow the procedure suggested by List et al. (2016) and p-values are adjusted for multiple comparisons.$^{*}p < 0.1$, $^{**}p < 0.05$ and $^{***}p < 0.01$.

Table 9: Estimates for aggregated effects

	Dependent variable:	
	(1)	(2)
	Contributions in round 11	Average contributions in Part II
EndoRule-Y	16.38***	12.41***
	(0.794)	(1.018)
EndoNoRule-Y	8.13***	5.73***
	(2.862)	(1.377)
ExoMajRule-Y	16.90***	13.00***
	(1.172)	(1.506)
ExoMinNoRule-Y	7.55***	5.89***
	(2.632)	(1.823)
ExoNiRule-Y	17.38***	13.90***
	(1.247)	(1.771)
ExoNiNoRule-Y	9.38***	5.81***
	(1.480)	(1.539)
EndoRule-N	14.71***	11.54***
	(2.113)	(1.654)
EndoNoRule-N	7.75***	5.78***
	(1.691)	(1.476)
ExoMajRule-N	2.00	4.45**
	(1.779)	(1.936)
ExoMinNoRule-N	6.04***	5.76***
	(1.750)	(1.538)
ExoNiRule-N	9.77***	8.26***
	(2.818)	(2.500)
ExoNiNoRule-N	6.71***	3.57***
	(2.421)	(2.047)
Observations	267	267
Adj. R^2	0.770	0.762

Note: OLS regressions. Standard errors, in parentheses, are clustered at the group level. $^{*}p < 0.1$, $^{**}p < 0.05$ and $^{***}p < 0.01$. Individual contributions at the beginning of Part II (round 11) are the dependent variable in column (1). In column (2), average contributions in all ten round of Part II are the dependent variable. In order to ease the ex-post estimates of weighted linear combinations of coefficients, all regressions are estimated without a constant and indicator variables for the different treatments that are separated for yes- and no-voters. Indicator variables for yes-voters (no-voters) receive the corresponding suffix -*Y* (-*N*).

Table 10: Individual contributions

	Dependent variable: Contribution in round 11			
	Yes-voter		No-Voter	
	(1)	(2)	(3)	(4)
EndoRule	16.38***	16.32***	14.71***	15.93**
	(0.785)	(4.479)	(2.140)	(6.096)
EndoNoRule	8.13***	8.99*	7.75***	5.29
	(2.831)	(5.402)	(1.713)	(6.036)
ExoMajRule	16.90***	15.95***	2.00	1.61
	(1.160)	(4.479)	(1.802)	(5.649)
ExoMinRule	10.00**	8.73	12.78***	11.91**
	(4.790)	(5.600)	(2.033)	(5.640)
ExoMajNoRule	11.10***	11.01**	6.95***	6.27
	(1.072)	(4.405)	(1.984)	(6.194)
ExoMinNoRule	7.55***	8.15*	6.04***	7.26
	(2.604)	(4.714)	(1.772)	(6.071)
ExoNiRule	17.38***	16.77***	9.77***	10.51
	(1.234)	(4.682)	(2.854)	(7.043)
ExoNiNoRule	9.38***	9.61*	6.71***	7.76
	(1.464)	(4.878)	(2.452)	(5.731)
Coop. Part I: Own		0.472***		0.98***
		(0.179)		(0.274)
Coop. Part I: Others		0.03		-0.10
		(0.092)		(0.137)
Trust		0.48		0.23
		(0.593)		(0.921)
Locus of control		-0.13		0.39
		(0.309)		(0.508)
Obey authority		1.28*		-1.20
		(0.741)		(1.686)
Democrat		-0.07		-0.31
		(0.331)		(0.460)
Pol. commitment		0.24		1.12
		(0.696)		(1.312)
Female		-0.03		-0.26
		(0.899)		(1.483)
Age		-0.10		-0.19
		(0.093)		(0.139)
Observations	292	278	110	103
Adj. R^2	0.807	0.810	0.590	0.721

Note: OLS regressions. Standard errors, in parentheses, are clustered at the group level. $^{*}p < 0.1$, $^{**}p < 0.05$ and $^{***}p < 0.01$. In order to ease the ex-post comparisons of coefficients, all regressions are estimated without a constant. Regressions are done for yes-voters (column 1, 2) and no-voters (column 3,4) separately. Individual contribution levels in round 11 are the dependent variable.

Supplementary Material C: Experimental protocol

Instructions

[Translated from German][†]

Welcome!

Thank you for taking part in this experiment. Please do not talk to other participants and turn off all electronic devices such as phones for the whole course of this session. Please read the instructions carefully and raise your hand if you have any questions.
This experiment regards individual decision behaviour. At the end of the experiment, you will receive an individual payment anonymously and in cash. Your payment will be based on the decisions you and your fellow participants will have taken as well as a random component. During the experiment, your payment will be calculated in so-called LaborDollar (LD). After the experiment, the total sum of LD will be converted into euros. The exchange rate is:

2 LD = 1 euro.

During the experiment, you will take your decisions **anonymously**. Only the experimenter will know about your identity. Of course, all provided information will be treated in strict confidence.

Rules of the experiment

The experiment consists of **two parts** (**Part I** and **Part II**). For the whole course of the experiment, all participants are divided into groups of three. The group constellations do not change and every participant inside their respective group will face the same decision scenarios.

Part I

In Part I, we will ask you and your fellow participants to take decisions in ten separate rounds. At the beginning of each round, you and your fellow group members will be endowed with 20 LD, respectively. You (as well as your fellow group members) will then have to decide on the amount of LD that you wish to contribute to a joint project. Your contribution, q, can be between be 0 and 20 LD.
The individual payment (in LD) for all three participants is calculated as follows:

Payment = (20 – Contribution of the participant) + 0.5·(Total sum of contributions)

As an example, if the other two group members contribute together 40 LD while your contribution is 10 LD, your individual payment will be calculated as follows:

$$\text{Payment} = (20 - 10) + 0.5 \cdot (40 + 10) = 35$$

If on the other hand, both group members contribute 40 LD in total and you refrain from paying by entering 0 LD, your individual payment will be calculated as follows:

[†]Explanatory notes are given in square brackets.

$$\text{Payment} = (20 - 0) + 0.5 \cdot (40 + 0) = 40$$

Part I consists of ten separate rounds. In each round, you will face the same decision task and interact with the same two group members. After each decision, you will be informed on the average values as well as the contributions and payments regarding the other two group members. At the beginning, there will be two test rounds. They are not relevant for disbursement.

Part II

As in Part I, we will ask you and your fellow participants to take decisions in ten separate rounds. You will be part of the same group, which remains unchanged in its constellation. Again, at the beginning of each round, you and your fellow group members will be endowed with 20 LD, respectively. The decision tasks are the same as in Part I. You (as well as your fellow group members) will have to decide on the amount of LD that you wish to contribute to a joint project. Your contribution, q, can be between be 0 and 20 LD. Contrary to Part I, it is now possible to introduce a contribution rule. It stipulates that all group members shall contribute the total sum of LDs endowed at the beginning (q = 20) to the joint project. Participants who do not abide by this rule shall pay a fee of 4 LD.

If a participant adheres to the rule (q = 20), their individual payment will be calculated as follows:

$$\text{Payment} = (20 - 20) + 0.5 \cdot (20 + \text{Total sum of contributions made by all the other group members.})$$

If a participant refrains from adhering to the rule (q < 20), their individual payment will be calculated as follows:

$$\text{Payment} = (20 - \text{Contribution of the participant}) + 0.5 \cdot (20 + \text{Total sum of contributions made by all the other group members}) - 4$$

As an example, if the other two group members contribute a total sum to the tune of 40 LD while your contribution is 10 LD, your individual payment will be calculated as follows:

$$\text{Payment} = (20 - 10) + 0.5 \cdot (40 + 10) - 4 = 31$$

If on the other hand, both group members contribute 40 LD in total and you refrain from paying by entering 0 LD, your individual payment will be calculated as follows:

$$\text{Payment} = (20 - 0) + 0.5 \cdot (40 + 0) - 4 = 36$$

Whether the rule is introduced or not depends on the following: Firstly, the group decides on introduction of the rule by majority vote. Secondly, it is decided at random, whether the group's decision will be taken into account. After the voting, you will be informed on whether the group's decision will be taken into consideration.

- If the group's decision is taken into account, you will be informed on the voting results. The decision will be taken based on the group's majority. For example, if two out of the three group members vote in favour of the rule, it will be introduced. If only one group member is in favour, the rule will not be introduced.

- If the group's decision is not taken into account, the decision on introducing the contribution rule will be taken at random. Furthermore, it is decided at random, whether you will be informed about the voting results.

In total, the experiment is made up of 20 separate rounds (10 rounds for Part I and 10 rounds for Part II). At the end of the experiment, you will receive the payment of one of the 20 rounds in euros. The round which will serve as the basis of your payment will be selected at random. For this reason, we recommend you to decide for each round as if it was the basis of your payment.

Control Questions (please fill in)

1. Suppose that in Part I, your contribution to the joint project amounted to 15 LD. The other two group members payed 15 LD in total. What is your individual payment?
   My payment is _____
2. Suppose that in Part I, your contribution to the joint project amounted to 5 LD. The other two group members payed 15 LD in total. What is your individual payment? My payment is _____
3. Suppose that in Part I, the two other group members contributed their total initial sum to the joint project. Which contribution would produce the maximum individual payment (please tick)? O 0 LD O 5 LD O 10 LD O 15 LD O 20 LD
4. Suppose that in Part I, the two other group members contributed their total initial sum to the joint project. Which contribution would produce the maximum payment for your group (please tick)? O 0 LD O 5 LD O 10 LD O 15 LD O 20 LD
5. Suppose that in Part II, the contribution rule was implemented and your contribution to the joint project amounted to 20 LD. The other two group members payed 20 LD in total. What is your individual payment? My payment is: _____
6. Suppose that in Part II, the contribution rule was implemented and your contribution to the joint project amounted to 10 LD. The other two group members payed 20 LD in total. What is your individual payment? My payment is: _____
7. Suppose that in Part II, the contribution rule was implemented and the two other group members contributed their total initial sum to the joint project, respectively. Which contribution would produce the maximum individual payment (please tick)? O 0 LD O 5 LD O 10 LD O 15 LD O 20 LD

8. Suppose that in Part II, the contribution rule was implemented and the two other group members contributed their total initial sum to the joint project, respectively. Which contribution would produce the maximum payment for your group (please tick)? O 0 LD O 5 LD O 10 LD O 15 LD O 20 LD

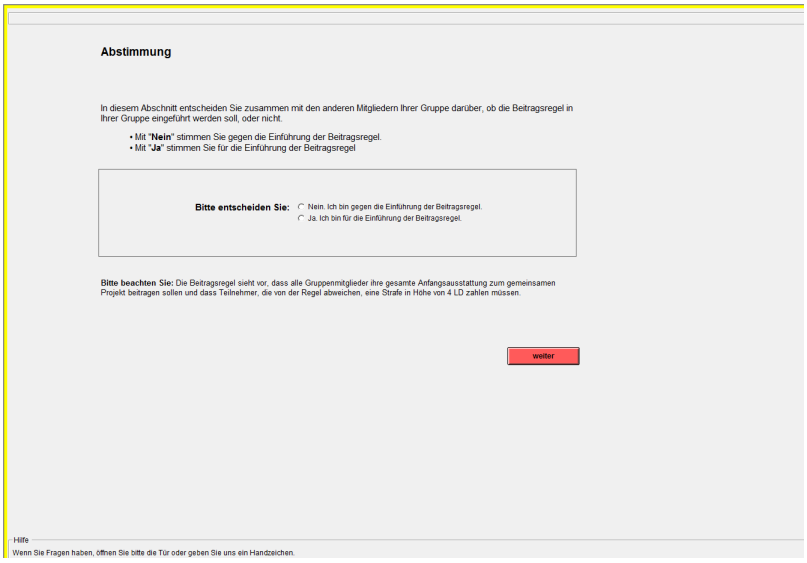
Please raise your hand after you finished answering all questions. We will then check your answers. The experiment will start once all participants have successfully completed this test.

Good luck!

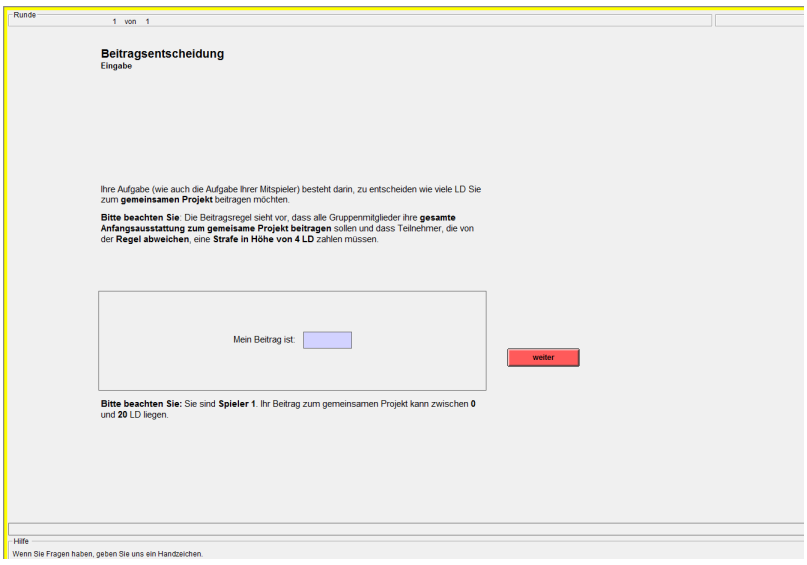
Screenshots

[In German][†]

Screenshot of the voting stage



Screenshot of the contribution stage [*In Part II of the experiment with contribution rule implemented*]



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