Institutions and Behavior:
Experimental Evidence on the Effects of Democracy

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Abstract

We present results from a novel experiment on the effect of a policy designed to encourage cooperation in a prisoner's dilemma game. We find that the effect of this policy on the level of cooperation is greater when it was chosen democratically by the subjects than when it was exogenously imposed. This difference remains after controlling for selection (those that choose the policy may be more likely to be affected by it). We conclude that the treatment effect of policies may depend on whether they are endogenous or exogenous to the society on which they are imposed. Therefore, democratic institutions may have an effect on behavior in addition to the effect in terms of policy choice. More generally, our findings have implications for empirical studies of treatment effects in other contexts: the effect of a treatment may depend on whether it is endogenous or exogenous.

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Introduction

The study of institutions is key to our understanding of the determinants of economic performance (see North 1981, La Porta et al. 1998, Acemoglu, Johnson and Robinson 2001, and Easterly and Levine 2003 among others). The focus of this paper is democratic institutions. The central idea is that democratic institutions may have a direct or intrinsic effect on behavior in addition to their instrumental effect by helping choose different policies. The same policy may have different effects depending on whether it was democratically selected or not.

While the idea that democracy may influence the effect of policies can be traced back at least to Tocqueville (1838),[2] our contribution consists on identifying this effect of democracy. We present results from a series of experiments designed to determine whether a policy that was exogenously imposed has the same effect as the same policy when it is democratically (that is, endogenously) chosen. In these experiments, subjects participate in several prisoners' dilemma games and may choose, by simple majority, to establish a policy that could encourage cooperation. This policy consists of a fine on unilateral defection, which transforms the game into a coordination game in which both mutual defection and mutual cooperation are Nash equilibria. In some cases the experimental software randomly overrides the votes of the subjects and randomly imposes, or not, the policy. Before proceeding to play again with either the original or the modified payoffs, the subjects are informed both of whether payoffs are modified and whether it was decided by their vote or by the computer. This setup allows us to compare the behavior of individuals and groups that voted in the same way and were presented with the same game (coordination versus prisoner's dilemma) but differed by whether the game was chosen endogenously (democratically chosen by the subjects) or exogenously (randomly chosen by the computer).

The results show that the effect of the policy (i.e., the fine) on the percentage of cooperative actions is greater when it is democratically chosen by the subjects (endogenous) than when it is imposed by the computer (exogenous). This difference remains even after accounting for selection; that is, subjects that choose the policy may, for example, be more likely to value cooperative behavior and cooperate after a modification. Our results suggest that the treatment effect of a policy (that is its causal impact on behavior) may depend on whether it is democratically chosen or not. This

[2] "It is not always feasible to consult the whole people, either directly or indirectly, in the formation of the law; but it cannot be denied that, when such a measure is possible, the authority of the law is much augmented. This popular origin, which impairs the excellence and wisdom of legislation, contributes prodigiously to increase its power." Tocqueville (1838), pag. 228. On other theories stating that political participation is intrinsically beneficial see Pateman (1970), Thompson (1970), and Finkel (1985).

implies that the same policy may have different effects depending on whether it was democratically selected or autocratically imposed.

The observed difference in experimental outcomes between exogenous and endogenous policies is consistent with evidence from field settings. Bardhan (2000) finds that farmers are less likely to violate irrigation rules when they themselves have crafted those rules. Frey (1998) finds that Swiss cantons with greater democratic participation face lower tax evasion. A literature on worker participation in workplace decisions finds that such participation positively affects productivity provided that some of the material gains also accrue to the workers (see Levine and Tyson 1990, and Bonin, Jones and Putterman 1993). While these findings from the field suggest that democratic institutions may affect cooperative behavior, they can also be explained by unobservable characteristics of the actors that affect both the degree of democratic decision making and individual behavior. In contrast, our experimental design allows us to control for potential unobservable characteristics by comparing groups and individuals that were both exogenously formed and who voted in the same way. An emergent literature in development economics on the effects of local democracy (e.g., Foster and Rosenzweig 2005, and Besley, Pande and Rao 2005) has also paid attention to plausibly exogenous sources of variation in democracy but has largely ignored the possible intrinsic effects of democratic institutions.[3]

There are extensive literatures considering the role of rewards and punishments in games[4] and exploring the effect of voting on the availability of rewards and punishments in voluntary contribution games.[5] This second literature studies the *total* effect of democratically allowing for rewards and punishments. For example, Sutter, Haigner and Kocher (2005) find that rewards and punishments are more effective when they are allowed democratically, and call this a "democratic participation rights premium." However, their results could be due to unobservable characteristics affecting both how groups vote and their response to rewards and punishments. In contrast, our experimental design allows us to separate the total effect of a policy into a selection effect (due to differences across groups that vote differently) and a treatment effect (the real causal

[3] Our results are also related to the social psychology literature on procedural justice (see for example Thibaut and Walker 1975 and Lind and Tyler 1988). This literature has shown that subjects' evaluation of a given outcome may depend on the fairness of the procedures that have led to that outcome. An important element studied in this literature is whether subjects have an opportunity to express their opinions during the procedure (on "voice" see Folger 1977 and van den Bos 1999). Our work contributes to this literature by showing that procedural justice can help us understand the effects of democracy.

[4] See e.g. Fehr and Gächter (2000), Falkinger et al. (2000), and Andreoni, Harbaugh and Vesterlund (2003).

[5] See e.g., Botelho, et al. (2005), Ertan, Page and Putterman (2005), and Sutter, Haigner and Kocher (2005); see also the related work by Charness, Fréchette and Qin (2006).

effect) and to study how the treatment effect varies depending on whether the policy was democratically chosen or exogenously imposed. There is also an extensive experimental literature on the issue of cooperation and its determinants. Many experimental studies have focused on the conditions that affect cooperation (see Kagel and Roth 1995 for a survey of the literature). Palfrey (2005) provides a useful survey of the experimental literature on voting.

Our findings have two main implications. The first is that democratic institutions may affect not only the types of policies adopted but also the impact of a given policy, so that a policy democratically selected by one group of people will not have the same effect when imposed on another group. The second implication relates to the study of treatment effects more generally. Much applied work in economics seeks to identify the treatment effect of policies, institutions, or products. Since people usually choose their policies, institutions and purchases, it is necessary to account for selection into treatment to measure the "true" treatment effect (i.e. one that does not reflect selection). Based on such estimates, policy recommendations may be made that involve assigning the treatment without choice (that is, exogenously). If the treatment effect differs based on whether it is exogenously or endogenously determined such policy recommendations may be unwarranted.

2. Experimental Design

In each experimental session, subjects participate anonymously through computers.[6] The subjects are randomly divided into groups of four for the entire session. Groups consist of four subjects so as to maximize the probability of a tie in the voting stage that is described below. Each session consist of two parts. In part 1, subjects play 10 rounds of the prisoner's dilemma game in Table 1 (Initial Payoffs).[7] The exchange rate is 50 points for one dollar. After each round each subject is randomly matched with another subject in his or her group for the next round. In part 2 of the experiment the subjects play 10 rounds as in part 1 but the payoffs can be modified to the payoffs in Table 1 (Modified Payoffs). The modification of payoffs consists of imposing a tax or fine on unilateral defection. While under the initial payoffs the unique Nash equilibrium is mutual defection, under the modified payoffs both mutual defection and mutual cooperation are Nash equilibria.

[6] we adapted the Multistage software by SSEL-Caltech/CASSEL-UCLA.
[7] For neutrality, the actions C and D are denoted as 1 and 2 in the experimental sessions.

Table 1: Stage Game Payoffs (in points)

Initial Payoffs

Own action \ Other's action	C	D
C	50	10
D	60	40

Modified Payoffs

Own action \ Other's action	C	D
C	50	10
D	48	40

Whether the payoffs are modified in the policy selection stage was determined as follows. First, subjects vote on whether to modify payoffs. Second, the computer randomly chooses whether to consider the votes in each group. If the computer considers the votes, then the majority wins and in case of a tie the computer breaks the tie. If the computer does not consider the votes in a group, it randomly chooses whether to modify payoffs or not in that group. The voting stage is summarized in Figure 1. The subjects' computer screens inform them whether the computer randomly chose to consider the votes and whether payoffs were modified. The subjects do not learn the exact distribution of votes, including whether the computer needed to break a tie. We denote the four possible outcomes of the voting stage as **GroupMod**, **GroupNot**, **CompMod** and **CompNot**, where Group denotes that the votes of the group were considered, Comp denotes that the computer overrode the group and Mod denotes that payoffs were modified versus Not. After the voting stage, the subjects play 10 more rounds with other subjects in their group, with the payoff matrix depending on the results from the policy selection stage.

After the ten rounds in part 2, the subjects answer a series of questions that allow us to assess the subjects' understanding of the experimental design and their reasoning in the voting stage and after. In addition we ask them for personal characteristics such as: academic major, class, math and verbal SAT scores,[8] political philosophy. These questions allow us to study how personal characteristics affect the voting decisions and the impact of the policy. Finally, the subjects participate in a "beauty contest" game in order to gauge their strategic sophistication.[9]

[8] We believe that the self reported SAT scores can be trusted since Palacios Huerta (2003) found no misreporting of SAT scores among Brown undergraduates in a previous experiment.

[9] Each subject chose a number between zero and one hundred and the subject with the closest number to two thirds of the average of all numbers in the group earns 100 points. The unique Nash equilibrium of this game is to choose zero. See Bosch-Domènech, et al. (2002) and reference therein.

We present next a short theoretical analysis of the game subjects play in this experiment. First, note that under the initial payoffs (prisoner's dilemma game) there is a unique Nash equilibrium in the stage game which is inefficient: both players play D. Second, under the modified payoffs (coordination game) there are two Nash equilibria in pure strategies, an efficient and an inefficient one: CC and DD. Since in the experiment there are a finite number of repetitions and in addition subjects are randomly re-matched after each round we expect that predictions from the one-shot games are valid also for the finite repetition (see Duffy and Ochs 2003).

How should subjects vote? While modified payoffs allow subjects to cooperate in equilibrium, mutual defection remains an equilibrium outcome. As such, if subjects expect to coordinate in mutual defection under modified payoffs, they have no incentive to vote for modification. Sub-game perfection does not provide a prediction regarding vote behavior. The optimal vote depends on subjects' expectation of behavior under the modified payoffs game. Subjects that expect to achieve mutual cooperation under modified payoffs should vote for modification. On the contrary, subjects that expect no change in behavior under modified payoffs have little incentives to vote for modification.[10]

Will subjects coordinate in the efficient outcome under modified payoffs? While under the modified payoffs the efficient outcome is an equilibrium, subjects may not necessarily coordinate on it. Previous experimental literature has shown the difficulty of coordinating on the efficient equilibrium in coordination games. For example Cooper et al. (1990) and Van Huyck et al. (1990), among others, have shown that in experimental coordination games subject may coordinate on the "safer" equilibrium over the efficient one. In our experiment, cooperation is optimal for a subject only if the partner cooperates with a probability higher than 30/32. Mutual cooperation is not very robust to uncertainty over others' behavior. For this reason, we may observe that subject coordinate on mutual defection under modified payoffs. However, prior behavior may affect behavior in the current game.[11] In this case, having the subjects choose to modify payoffs may affect the equilibrium selection process in the resulting coordination game. Knowing that the coordination game was chosen by the group may increase the probability that the efficient equilibrium becomes focal.

[10] Off equilibrium reasoning can justify voting for modification even for a defector. The reason is that if modification results in an increase in cooperation, a defector will obtain a higher profit. As such, voting for modification may be part of a "bait" strategy.

[11] See the literature on forward induction (Kohlberg and Mertens 1986, and van Damme 1989) and related experimental literature (Cooper et al. 1992, Van Huyck, Battalio and Beil 1993, and Cachon and Camerer 1996). Note however that forward induction, as defined, has no bite in the game we analyze.

3. Experimental Results

We conducted 18 experimental sessions from May to November 2006 in a computer lab at Brown University. A total of 276 subjects participated in the experiment, with an average of 15 subjects per session. The subjects were Brown University undergraduates recruited through advertisement in university web pages and signs posted on campus. Table 2 shows some data on the characteristics of subjects. Of the subjects, 13% indicated that they were majoring in economics. The class distribution in the experiment is somewhat younger than on campus with the mode on sophomore. The average self reported SAT scores are 725 and 723, for math and verbal respectively. The reported political philosophy of the subjects is on average "liberal." A high number of subjects correctly answered the questions regarding the experiment suggesting that the experimental design was clear to the subjects. For example, more than 90% of the subjects remembered correctly the result from the voting stage. The subjects earned an average of $24.57, with a maximum of $29.40 and a minimum of $17.60.

The level of cooperation was 18% in the first part of the experiment. The level of cooperation was decreasing with experience, with a maximum of 31.9% in round 1 and a minimum of 6.9% in round 10 (the last round of part 1). Both the level and evolution of cooperation in this experiment are similar to those on other experiments on prisoner's dilemma games (see for example Cooper et al. 1996, Bereby-Meyer and Roth 2006, Dal Bó 2005, and Aoyagi and Fréchette 2003); they also resemble those in the voluntary contributions mechanism literature (Ledyard 1995).

3.1. Results from the voting stage

Of the 276 subjects, 147 (53.26%) voted to modify payoffs and 129 (46.74%) voted not to modify payoffs in the second part of the experiment. Voting for modification (**votemod**) is positively and significantly correlated with the math SAT scores and negatively and significantly correlated with the number provided in the "beauty contest" game – see Table 3. This suggests that both cognitive ability and strategic sophistication are related to voting for modification of payoffs. Surprisingly neither the class, the political philosophy nor the major are correlated with the voting decisions. Voting depends on the subjects' experience in the first part of the experiment. Subjects that cooperated more and those that faced little cooperation are more likely to vote for modification.

The fact that a large proportion of subjects (46%) voted to remain in a prisoner's dilemma game is of interest and has implications for the large political economy literature on inefficient polices and delayed reforms.[12] This experiment shows that subjects will not necessarily vote for reforms that may make efficient behavior incentive compatible. On the one hand, it may be that some subjects fail to understand the structure of incentives in the game and how the modification of payoffs would change the set of equilibrium actions. On the other hand, subjects may believe that making mutual cooperation an equilibrium is not enough for it to arise.

We define the variable **voteshare** as the number of votes in favor of modification of payoffs in a group. This variable ranges from 0 to 4. The mode of the distribution of this variable is 2, which is optimal for the analysis of the effects of modifications. Figure 2 shows the observed cumulative distribution function of voteshare (solid line) and the distribution that would arise if subjects decide their votes independently of each other (binomial, depicted as a dashed line). As Figure 2 shows there is little difference between the two distributions. In fact the difference is not statistically significant (p-value=0.32).[13] A random-effects analysis of voting does not reject that there are no random-effects at the group level suggesting that voting decision are independent within groups (p-value=0.368 without controls and p-value=0.181 when controlling by behavior in first part).

Table 4 shows the distribution of the 69 groups in the experiment across the four possible vote stage results: GroupMod, GroupNot, CompMod and CompNot. Of the 69 groups in the experiment, 38 had their votes considered and 31 did not. Of the 38 groups that had their votes considered, 18 voted to modify payoffs and 20 voted not to modify payoffs (14 groups of these 38 groups had even split votes and the computer broke the tie 6 times in favor of modification and 8 in favor of no modification). Of the 31 groups whose votes were not considered, the computer modified payoffs for 16 and did not modify payoffs for 15. Table 4 also presents this information by voteshare. Note that for voteshares from 1 to 3, there are at least four groups for each possible vote stage result, and that given the voting rules there can be no groups with GroupMod and voteshare less than 2 or groups with GroupNot and voteshare greater than 2.

[12] See Coate and Morris (1995), and Dixit and Londregan (1995) on inefficient redistribution, and Fernandez and Rodrik (1991) and Alesina and Drazen (1991) on reform delays.

[13] Since the theoretical distribution is not continuous we do not use the usual Kolmogorov-Smirnov test but a modification proposed by Pettitt and Stephens (1977). The p-value is calculated by Monte Carlo simulation under the null that voteshare follows a binomial distribution with probability of success equal to the observed one (0.5326).

3.2. Exogenous versus endogenous treatment effect: group level analysis

In this section we examine the difference in outcomes between endogenous and exogenous policies. We refer to a policy as exogenous if it was imposed regardless of the votes of the subjects and we refer to it as endogenous if it was democratically chosen by the subjects. In this section we consider the group as the unit of analysis. This has the advantage that groups that voted in the same fashion (i.e. they have the same voteshare) should not systematically differ on unobservables but may differ in the result from the voting stage given the intervention of the computer. Of course, groups that had only one vote in favor of modification will never have an endogenous modification, but groups with even split vote (voteshare=2) may have any of the four vote stage results. Therefore, for the rest of this section we focus on groups with even split votes since they allow us to estimate the difference between exogenous and endogenous modification controlling for underlying characteristics of the groups since they are essentially the same. The evidence we present is consistent with the idea that that effect of the payoff modifications depends on whether the modification was endogenous or exogenous to the group. However, the result is not conclusive due to the statistical power of the analysis.

Table 5 shows the level of cooperation by the result of the voting stage and the vote share of the groups. There is little difference in the cooperation rates of groups with vote share 2 in part 1 (see panel A of Table 5). If anything, the groups with exogenous modification (CompMod) cooperated more in the first part of the experiment than those with endogenous modification (GroupMod) but this difference, as Table 6 shows, is not statistically significant (p-value 0.24).[14] Therefore, before the voting stage all groups were basically identical in terms of cooperation levels.

Focusing on groups with evenly split votes (voteshare=2), we observe first that the cooperation levels without modification are very similar between groups whose votes were considered (GroupNot) and those that were not (CompNot) after the voting stage: 8.44% and 9.38% for endogenous and exogenous non-modification, respectively (panel B of Table 5). Second, groups with endogenous modification (GroupMod) had 51.67% cooperation after voting against 43.50% for the groups with exogenous modification (CompMod). The statistical significance of these differences is provided in Table 6. Third, there are no significant differences between GroupNot and CompNot. Therefore, to calculate the difference in treatment effects we can focus on the difference between GroupMod and CompMod. The difference of 8% in favor of endogenous modification

[14] For all the statistical tests in this section we only consider one observation per group. In this case the observation is the average cooperation rate in the group in the first ten rounds of the experiment.

(GroupMod) versus exogenous modification (CompMod) is not always statistically significant. It is only significant at the 10% level if we eliminate from the analysis groups with subjects that did not remember the vote stage result. Finally, the payoff modification has a large effect on cooperation rates: a 43% and 34% increase for endogenous and exogenous modification. While this increase is always significant for endogenous modification (p-values less than 0.002, see Table 6) it is not significant for exogenous modification under all specifications.

Figure 3 shows the evolution of cooperation by round, voteshare and vote stage result. For groups with evenly split votes we see that cooperation rates for groups with payoff modification is always greater than for groups without modification. However, the difference between groups with endogenous and exogenous modification disappears after round 16. This suggests that we can learn about the difference in treatment effects by disaggregating the data by round.

If we focus on round 11 (the first round of the second part) we find a difference of 16% in favor of endogenous modification (GroupMod) versus exogenous modification (CompMod) that is statistically significant at the 10% level without controls and at the 5% level with controls or focusing on groups with subjects that remembered the vote stage result (see Table 7). In rounds 11 to 15 the difference between GroupMod and CompMod is also 16%. This difference is significant at the 10% levels with controls and at the 5% level if we focus on groups with subjects that remembered the vote stage result. However, there is no significant difference in rounds 16 to 20.

In the previous paragraphs, as in much of the paper, we focus on the effect of modification on behavior. But it is also interesting to study the effect over payoffs. Table 8 shows the average payoffs by vote share, vote stage results and part of the experiment. Before the voting stage, payoffs are close to the mutual defection payoff (40) for all cells, as could be expected given the very low levels of cooperation (see Panel A). Note that payoffs are not monotonic in the percentage of cooperation as some cooperation may result in off the diagonal outcomes which add to less than the sum of payoffs under mutual defection. This explains why in Part 1 most cells have average payoffs slightly below 40 points.

After the voting stage, payoffs remain below or close to 40 for most cells. The exception is the groups with all votes in favor of modification and which were considered. These groups achieved payoffs which are significantly greater than 40 and not significantly different from 50 (the mutual cooperation payoff). Figure 4, left panel, shows the average payoff by group and their cooperation rate after the voting stage (the

two curves show the expected payoff by cooperation rate under modified and initial payoffs). It is clear that some groups with modification manage to reach levels of cooperation high enough for the payoffs to be greater than the payoffs under mutual defection. This is especially the case for groups with endogenous modification. Figure 4, right panel, shows the average payoffs by group before and after the voting stage. It is interesting to note that modification of payoffs results in an increase in the variance of average group payoffs and this effect is somewhat larger for endogenous modification. When the attempt to coordinate in mutual cooperation is successful, the modification of payoffs results in large payoffs. However, when this attempt fails, it results in payoffs well below the mutual defection payoffs.

If we focus on groups with evenly split votes we find that groups with endogenous modification, in average, tend to have somewhat lower payoffs than groups with exogenous modification (see Table 8, panels B to E). In average the increase in cooperation due to endogenous modification is not enough to result in an increase in payoffs for these groups.

3.3. Exogenous versus endogenous treatment effect: individual level analysis

Studying the differences between the endogenous and the exogenous treatment effect with data at the group level has two disadvantages. First, only one observation is available per group and, second, only groups with vote shares 2 or greater can be used to look at the effects of the policy. In this section we study the experimental data at the individual level to assess the difference between endogenous and exogenous policies. Of course, the problem with individual data is that the subjects in groups with endogenous modification may be different from those in groups with exogenous modification because the former may have preferences for cooperative behavior that affect both cooperation and the decision to modify payoffs. In the presence of this type of selection, comparisons of cooperation levels between subjects in groups with endogenous and exogenous modifications can be misleading.

To make this point explicit, and learn how to overcome it, we develop a simple formal framework. In particular, we consider a simplified game in which individuals are matched, they vote, they learn the mechanism used to select payoffs, they learn the payoffs, and then they play the stage game.[15] An individual *i*'s action in the stage game

[15] In particular we abstract from the fact that players may have learned something about people in their group from the pre-play period. This creates a potential inference problem, which we discuss below.

depends on the information available to him at that time. This information includes the mechanism $M \in \{Group, Comp\}$ that selected payoffs (group versus computer), the payoffs chosen $P \in \{Mod, Not\}$ (modified and non-modified), his or her vote $v_i \in \{Y, N\}$, and his type μ_i. Thus we may write the probability that subject *i* cooperates as

(1) $C_i(M, P, v_i, \mu_i)$.

The type μ_i includes any personal characteristic that is unobserved to the researcher but that may be correlated with both the subject's probability of cooperation and his or her voting decisions. For example, may have preferences for cooperative behavior that affect both cooperation and the decision to modify payoffs. In addition, subjects may differ on their expectations on how a modification of payoffs would results on mutual cooperation and hence may have different propensities to vote for modification and cooperate after a modification.

The individual's voting can only depend on his type, as he is randomly matched with the others and does not know their type or how they will vote

(2) $v_i = v(\mu_i)$.

Further, (2) may be substituted into (1) to give, abusing notation,

(3) $C_i(M, P, \mu_i)$.

To test for differences in outcomes between endogenous and exogenous modification, we test whether, given *P*, actions are different by mechanism *M* (Group versus Comp). Consider, then the expected difference in behavior by selection mechanism and payoff structure:

(4) $E(C_i|Group, P) - E(C_i|Comp, P) =$
$\int [C_i(Group, P, \mu_i) f(\mu_i|Group, P) - C_i(Comp, P, \mu_i) f(\mu_i|Comp, P)] d\mu_i$

where $f(\mu_i|M, P)$. is the conditional density of the type given the selection mechanism and the payoff matrix. Note further that *P* is informative about μ when payoffs are determined by voting but not when payoffs are determined by the computer and thus

(5) $f(\mu_i) = f(\mu_i|Comp, P) \neq f(\mu_i|Group, P)$.

Thus the difference (4) may be non-zero even if there are no differences in behavior by mechanism ($C_i(Comp, P) = C_i(Group, P)$). This inference problem is addressed in the

group analysis by picking the case where the vote is tied, in which case these densities in (5) are equal—but at a considerable loss of data as noted.

This problem can be solved using individual-level data conditioning on both P and v_i. This approach works because $f(\mu_i|Group, P, v_i) = f(\mu_i|Comp, P, v_i) = f(\mu_i|P, v_i)$: once one knows how somebody votes, the payoffs are no longer informative about type under either computer or voter regimes. Thus,

$$E(C_i|Group, P, v_i) - E(C_i|Comp, P, v_i) = \int [C_i(Group, P, v_i, \mu_i) - C_i(Comp, P, v_i, \mu_i)] f(\mu_i|P, v_i) d\mu_i \quad (5)$$

can only be non-zero if, for some positive measure set of types, behavior is different by mechanism.[16] Table 9 provides the data necessary to make this comparison.

In the analysis of the experimental data we focus on the behavior in round 11 (the first round of part 2), because after this round the impact of the payoff modification on cooperation is not independent across subjects given that the actions of one player will affect the actions of the other players. Panel A in Table 9 shows the number of observations (subjects) by vote stage result and vote. The minimum number of observations in a cell is 17 and the maximum is 55.

Panel B in Table 9 shows the percentage of cooperation at the beginning of part 2 (round 11) by voting stage result and individual vote. Aggregating over the votes of the individuals we observe that subjects under endogenous modification cooperated more than subjects under exogenous modification: 72% against 50%. This difference is statistically significant at the 1% level (p-value 0.003 – see Table 10). However, as discussed before, this difference is not an unbiased estimate of the difference in treatment effects. First, groups with endogenous modification have a larger share of subjects that voted for modification than groups with exogenous modification (see Table 9, panel A). Second, subjects who voted for modification are more likely to cooperate under modification than those who did not vote for modification (see Table 9, panel C). This may imply that there is an unobservable variable affecting both the vote of the individual,

[16] The key condition here is that the votes of the other players are not correlated with a player's type or with his vote. This is true given random assignment as long as individuals have no information about each other at the time of voting—something ruled out in our simplified example but possible in the actual experiment because of the pre-vote stages played by participants. We have shown using the same analytic methods that this problem can be addressed by conditioning on individual histories of play and payoffs in the pre-vote stages. Our analysis of the preliminary experimental data shows that, first, votes are statistically independent across members of each group and, second, our estimates are not affected by controlling for individual histories.

which affects the voting stage result of his or her group, and his or her behavior in part 2. Fortunately, we can obtain an unbiased estimate by controlling for how the individuals voted.

Among individuals who voted for modification, those who experienced an endogenous modification of payoffs (GroupMod) had levels of cooperation of 82% while those who experienced an exogenous modification of payoffs (CompMod) only had 58%. This difference is statistically significant at the 1% level (p-value 0.009 – Table 10, column 4). Among individuals who did not vote for modification, these levels are 41% and 42%, respectively and the difference is not statistically significant. These results are robust to controlling for own and observed behavior before the vote stage and eliminating subjects who did not remember the result of the voting stage.

The effect of having your vote count (as in a democracy) can also be seen in Figure 5. Figure 5 shows the percentage of cooperation by vote stage result, round and individual vote. It is interesting to note that in round 11 cooperation generally increases. This result is presumably reflective of the well-known re-start effect in prisoner's dilemma games (see Andreoni and Miller 1993). This jump tends to be larger for subjects that voted for modification, when payoffs are modified, and even larger when they are modified endogenously. Interestingly, the difference in cooperation rates between individuals under endogenous modification (GroupMod) and exogenous modification (CompMod) is not limited to round 11.

Therefore, our experimental results show that there is an effect of democratic institutions in addition to the instrumental effect.

The analysis at the individual level also allows us to separate the total effect of an endogenous modification of payoffs into a selection effect and an endogenous treatment effect. In addition we can separate this endogenous treatment effect into an exogenous treatment and an endogeneity premium (the part of the endogenous treatment effect that cannot be explained by the exogenous treatment effect).

From the totals in the first two columns in panel C of Table 9 we can calculate the difference between the cooperation rates for GroupMod and GroupNot and find that the total effect of an endogenous modification on cooperation is of 55%. Note that the totals of these columns can be calculated as weighted averages of the cooperation rates by type of vote if we use as weights the proportion of subjects that voted for and against modification. If we denote the proportion of subjects that voted for $v \in \{Y, N\}$ given the payoff structure $P \in \{Mod, Not\}$ and the mechanism $M \in \{Group, Comp\}$ as $f(v|P, M)$

and $C(v|P,M)$ as the proportion of cooperation, the total effect is:

$$TE = \sum_{v\in\{Y,N\}} f(v|Group,Mod)C(v|Group,Mod) - f(v|Group,Not)C(v|Group,Not).$$[17]

The selection effect must capture the changes in cooperation that arise not from the change in treatment but from the change in the proportion of types of subjects. Thus, the selection effect can be measured as:

$$SE = \sum_{v\in\{Y,N\}} \left(f(v|Group,Mod) - f(v|Group,Not)\right)C(v|Group,Not).$$

From Table 9 we can calculate the selection effect as a 4% increase in the cooperation rate.[18]

The endogenous treatment effect must correspond to changes in cooperation due to an endogenous change in the payoff matrix and not due to changes in the proportion of the different types of voters. In addition the endogenous treatment effect must be equal to the difference between the total effect and the selection effect. Thus, the endogenous treatment effect is:

$$EndoTrE = \sum_{v\in\{Y,N\}} f(v|Group,Mod)\left(C(v|Group,Mod) - C(v|Group,Not)\right).$$

From Table 9 we can calculate the endogenous treatment effect as almost 51%.[19]

The data on the effect of exogenously imposing the modification of payoffs allow us to calculate the *exogenous* treatment effect. In this way we are able to separate the endogenous treatment effect into the exogenous part and an endogenous premium. The exogenous treatment corresponds to the change in cooperation due to an exogenous modification of payoffs. As such we must leave the weights of the average constant. Moreover, these weights must be consistent with the ones used to calculate the endogenous treatment effect. Thus, we can calculate the exogenous treatment effect as:

$$ExoTrE = \sum_{v\in\{Y,N\}} f(v|Group,Mod)\left(C(v|Comp,Mod) - C(v|Comp,Not)\right).$$

From Table 9 we can calculate the exogenous treatment effect as 35%.[20] Therefore, the difference between the exogenous and endogenous treatment effect, the endogeneity premium, is 16%.

[17] The total effect can be calculated from Table 8 as follows: TE=((17/72)41.18+(55/72)81.82)-((55/80)14.55+(25/80)24)=55.
[18] SE=(17/72-55/80)14.55+(55/72-25/80)24=4.
[19] EndoTrE=(17/72)(41.18-14.55)+(55/72)(81.82-24)=51.
[20] ExoTrE=(17/72)(41.94-3.85)+(55/72)(57.58-23.53)=35.

The total effect from endogenous modification of payoffs can be separated in three components: one, the selection effect; two, the exogenous treatment effect; and three, the endogeneity premium. Our estimates show that in this case the selection effect explains 8% of the change in behavior, the exogenous treatment explains 64% and the endogeneity premium explains 28%. Our results show that the difference between the two types of treatment effects is of importance: first, the endogeneity premium is more than three times the size of the selection effect and more than 40% of the exogenous treatment effect. These calculations suggest the importance of distinguishing the source of treatment effect when studying the impact of institutions or policies on behavior.

Conclusions

Previous literature has suggested that democratic institutions could have an intrinsic effect in addition to their instrumental effect. However, it has been empirically difficult to provide unambiguous evidence for such an effect. In this paper we present results from an experiment in which we can measure the intrinsic effect of democracy. We show that the effect of a given policy (a tax on unilateral defection in a social dilemma) on behavior depends on whether it was democratically chosen or not. This experimental result supports the idea that democracy may have an intrinsic effect on behavior in addition to the effect that democracy may have due to the choice of different policies. More generally, our results stress that a treatment effect may depend on whether the treatment is endogenous or exogenous –what we refer to as the "endogeneity premium."

Understanding the forces that generate this "endogeneity premium" in our experiments remains for future work. One hypothesis is that an endogenous modification affects behavior because it reveals to the subjects that the group voted for modification, affecting the subjects' beliefs about others' future behavior, and thus affecting their behavior. A second hypothesis is that it is the endogeneity itself which affects behavior. Knowing that the policy was imposed by the decision of the group may directly affect subjects' behavior. For example, endogenous modification may strengthen the establishment of a cooperative social norm. Future experimental work will help us distinguish between these two hypotheses and provide an explanation for the difference between endogenous and exogenous treatment effects in our social dilemma experiments.

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Table 2: Summary statistics of sessions

Session	1	2	3	4	5	6	7	8	9	
Date	3/5/06	10/5/06	12/5/06	15/5/06	15/5/06	13/7/06	18/9/06	18/9/06	13/10/06	
Subjects	20	16	16	20	12	12	12	16	24	
Econo	10.00%	6.25%	12.50%	15.00%	16.67%	16.67%	33.33%	25.00%	8.33%	
Class	1.90	1.63	2.19	2.45	2.42	3.25	2.08	2.13	2.08	
Political Philosophy	2.26	2.00	2.36	2.11	1.91	2.09	1.91	2.43	2.21	
SAT Math	730.79	697.33	736.88	734.00	662.73	706.36	743.33	711.88	720.87	
SAT Verbal	723.16	728.67	720.00	736.00	689.00	720.91	717.50	681.25	723.48	
Guess Number	39.20	37.94	39.50	38.75	42.25	44.00	38.08	49.63	31.92	
Questions										
Vote stage	80.00%	81.25%	93.75%	100.00%	100.00%	91.67%	100.00%	81.25%	91.67%	
Initial Payoffs	90.00%	93.75%	81.25%	85.00%	100.00%	91.67%	83.33%	81.25%	95.83%	
Modified Payoffs	65.00%	75.00%	62.50%	70.00%	91.67%	58.33%	91.67%	93.75%	100.00%	
Earnings										
Maximum	29.00	28.20	29.40	28.20	28.20	28.60	26.40	28.20	28.68	
Average	24.44	24.23	24.86	24.42	24.78	24.35	24.16	23.62	25.51	
Minimum	20.60	20.40	20.60	20.80	21.80	20.40	19.20	17.60	20.80	

Session	10	11	12	13	14	15	16	17	18	All Sessions
Date	20/10/06	23/10/06	27/10/06	30/10/06	06/11/06	10/11/06	17/11/06	20/11/06	27/11/06	
Subjects	12	20	8	16	16	12	12	12	20	276
Econo	33.33%	10.00%	12.50%	18.75%	0.00%	8.33%	0.00%	16.67%	10.00%	13.41%
Class	2.00	1.85	1.88	1.50	1.81	2.00	1.83	1.75	1.80	2.02
Political Philosophy	2.25	2.00	1.86	2.00	2.00	1.91	2.08	1.92	1.95	2.09
SAT Math	732.50	746.67	733.75	734.00	722.00	758.33	662.73	764.17	728.00	724.91
SAT Verbal	721.67	718.89	736.25	737.33	724.67	728.33	750.00	730.83	729.50	723.21
Guess Number	35.92	37.10	28.63	37.56	30.44	28.67	47.25	37.00	35.30	37.68
Questions										
Vote stage	91.67%	95.00%	100.00%	87.50%	87.50%	100.00%	91.67%	100.00%	95.00%	92.03%
Initial Payoffs	100.00%	100.00%	100.00%	81.25%	81.25%	100.00%	66.67%	75.00%	95.00%	89.13%
Modified Payoffs	75.00%	85.00%	100.00%	75.00%	68.75%	100.00%	41.67%	100.00%	95.00%	80.43%
Earnings										
Maximum	26.40	28.40	26.80	27.60	27.60	26.60	27.64	28.20	29.36	29.40
Average	24.50	24.41	25.49	24.36	24.15	24.45	24.17	25.83	24.75	24.57
Minimum	21.80	19.80	23.40	20.20	20.76	21.48	20.56	22.00	19.60	17.60

Note: Econ: percentage of Econ majors in the session, Class: 1=Freshmen to 4=Senior, Political Philosophy: 1=Verly Liberal to 5=Very Conservative.

Table 3: Determinants of Voting

Dependent Variable: Votemod

	(1)	(2)	(3)	(8)	(7)	(6)	(5)	(4)	(9)
Own Part 1 Coop.	0.46992								0.6727
	[0.16149]***								[0.16978]***
Partners' Part 1 Coop.		-0.41933							-0.76222
		[0.21150]**							[0.22159]***
Class			-0.02868						-0.01922
			[0.02723]						[0.02777]
Number				-0.00331					-0.00369
				[0.00152]**					[0.00157]**
Verbal					0.00073				0.00021
					[0.00046]				[0.00049]
Math						0.00117			0.0017
						[0.00045]***			[0.00050]***
Econ							0.07158		-0.00098
							[0.08836]		[0.08941]
Political								0.0032	0.02922
								[0.04093]	[0.03982]
Constant	0.44816	0.60797	0.59049	0.65725	0.01006	-0.31198	0.52301	0.51694	-0.73271
	[0.04152]***	[0.04838]***	[0.06264]***	[0.06477]***	[0.33377]	[0.32411]	[0.03235]***	[0.09101]***	[0.45382]
Observations	276	276	276	276	265	266	276	254	246
R-squared	0.03	0.01	0	0.02	0.01	0.03	0	0	0.15

Standard errors in brackets

*** significant at 10%; ** significant at 5%; *** significant at 1%**

Table 4: Number of Groups by Vote Stage Results and Vote Share

	Consider Votes		Not Consider Votes		
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)	Total
0	X	3	0	0	3
1	X	9	5	4	18
2	6	8	5	4	23
3	5	X	6	6	17
4	7	X	0	1	8
Total	18	20	16	15	69

Table 5: The effect of democracy - Group Level Data

Panel A: Cooperation Percentage in Part 1

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	19.17%		
1	X	21.39%	31.00%	11.25%
2	11.25%	16.88%	16.50%	16.88%
3	12.00%	X	17.92%	19.58%
4	20.36%	X		10.00%

Panel B: Cooperation Percentage in Part 2

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	21.67%		
1	X	11.67%	24.50%	12.50%
2	51.67%	8.44%	43.50%	9.38%
3	48.00%	X	32.50%	12.50%
4	88.93%	X		7.50%

Panel C: Cooperation Percentage in Round 11

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	16.67%		
1	X	19.44%	50.00%	12.50%
2	66.67%	15.63%	50.00%	0.00%
3	55%	X	50.00%	25.00%
4	89.29%	X		25.00%

Panel D: Cooperation Percentage in Rounds 11 to 15

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	26.67%		
1	X	15.56%	30.00%	18.75%
2	62.50%	11.88%	47.00%	10.00%
3	52%	X	40.83%	17.50%
4	90.00%	X		15.00%

Panel E: Cooperation Percentage in Rounds 16 to 20

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	16.67%		
1	X	7.78%	19.00%	6.25%
2	40.83%	5.00%	40.00%	8.75%
3	44%	X	24.17%	7.50%
4	87.86%	X		0.00%

Table 6: The effect of democracy - Group level data - Voteshare=2

Dependent Variable: Cooperation rate

	(1)	(2)	(3)	(4)	(5)
	Part 1	**Part 2**	**Part 2**	**Part 2**	**Part 2**
GroupMod	0.1125	0.51667	0.40392	0.5375	0.44952
	[0.02933]***	[0.09036]***	[0.11692]***	[0.09405]***	[0.12261]***
GroupNot	0.16875	0.08438	-0.08475	0.07857	-0.04712
	[0.02540]***	[0.07825]	[0.13857]	[0.07109]	[0.13374]
CompMod	0.165	0.435	0.26963	0.3	0.19002
	[0.03213]***	[0.09898]***	[0.14859]*	[0.09405]***	[0.13635]
CompNot	0.16875	0.09375	-0.07538	0.10833	-0.01484
	[0.03593]***	[0.11066]	[0.15805]	[0.10860]	[0.15495]
Part 1 Cooperation			1.00223		0.70387
			[0.68652]		[0.63633]
Exclude did not remember vote result	No	No	No	Yes	Yes
Observations	23	23	23	18	18
R-squared	0.85	0.74	0.77	0.76	0.78

Standard errors in brackets

*** significant at 10%; ** significant at 5%; *** significant at 1%**

Tests of differences of cooperation rates by mechanism (Group versus Comp) and payoffs (Mod versus Not)

	p-values				
GroupNot=CompNot	1	0.9456	0.944	0.822	0.806
GroupMod=CompMod	0.2424	0.5495	0.3334	0.0958	0.0738
GroupMod=GroupNot	0.1635	0.0018	0.0009	0.0016	0.0013
CompMod=CompNot	0.9388	0.0331	0.0279	0.2035	0.1756
GroupMod-GroupNot = CompMod-CompNot	0.4068	0.6384	0.4562	0.1724	0.1402

Note: GroupNot: endogenous modification, GroupNot: endogenous non-modification, CompMod: exogenous modification, ComNot: exogenous non-modification.

Table 7: The effect of democracy - Group level data - Voteshare=2

Dependent Variable: Cooperation rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Round 11	**Round 11**	**Round 11**	**Round 11**	**Round 11-15**	**Round 11-15**	**Round 11-15**	**Round 11-15**	**Round 16-20**	**Round 16-20**	**Round 16-20**	**Round 16-20**
GroupMod	0.66667	0.55736	0.6875	0.57233	0.625	0.49734	0.6375	0.52175	0.40833	0.31049	0.4375	0.37729
	[0.06286]***	[0.07668]***	[0.07629]***	[0.09164]***	[0.08306]***	[0.10413]***	[0.08969]***	[0.11184]***	[0.10467]***	[0.13892]**	[0.11146]***	[0.14979]**
GroupNot	0.15625	-0.00772	0.14286	-0.02167	0.11875	-0.07274	0.11429	-0.05108	0.05	-0.09676	0.04286	-0.04316
	[0.05444]***	[0.09087]	[0.05767]**	[0.09996]	[0.07193]	[0.12341]	[0.06780]	[0.12200]	[0.09065]	[0.16463]	[0.08425]	[0.16339]
CompMod	0.5	0.33968	0.4375	0.29354	0.47	0.28277	0.35	0.20531	0.4	0.2565	0.25	0.17473
	[0.06886]***	[0.09744]***	[0.07629]***	[0.10191]**	[0.09099]***	[0.13234]**	[0.08969]***	[0.12438]	[0.11466]***	[0.17654]	[0.11146]**	[0.16658]
CompNot	0	-0.16397	0	-0.16124	0.1	-0.09149	0.1	-0.06206	0.0875	-0.05926	0.11667	0.03237
	[0.07699]	[0.10365]	[0.08809]	[0.11581]	[0.10172]	[0.14076]	[0.10356]	[0.14134]	[0.12819]	[0.18778]	[0.12870]	[0.18930]
Part 1 Cooperation		0.97165		0.92136		1.13476		0.92603		0.8697		0.4817
		[0.45023]**		[0.47558]*		[0.61144]*		[0.58045]		[0.81568]		[0.77742]
Exclude did not remember vote result	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Observations	23	23	18	18	23	23	18	18	23	23	18	18
R-squared	0.9	0.92	0.9	0.92	0.82	0.85	0.83	0.86	0.6	0.62	0.61	0.62

Robust standard errors in brackets

*** significant at 10%; ** significant at 5%; *** significant at 1%**

Tests of differences of cooperation rates by mechanism (Group versus Comp) and payoffs (Mod versus Not)

	p-values											
GroupNot=CompNot	0.1139	0.0871	0.1963	0.1708	0.882	0.8748	0.9098	0.927	0.8138	0.8133	0.6388	0.6392
GroupMod=CompMod	0.0898	0.0244	0.0361	0.0152	0.2236	0.0914	0.0398	0.022	0.9578	0.7405	0.254	0.236
GroupMod=GroupNot	0	0	0.0001	0	0.0002	0.0001	0.0004	0.0002	0.018	0.0118	0.0135	0.0143
CompMod=CompNot	0.0001	0	0.0021	0.0009	0.0139	0.0093	0.0894	0.0612	0.085	0.082	0.4466	0.4299
GroupMod-GroupNot = CompMod-CompNot	0.9382	0.6255	0.4889	0.3341	0.4464	0.259	0.1455	0.0946	0.8378	0.6879	0.2552	0.2421

Note: GroupNot: endogenous modification, GroupNot: endogenous non-modification, CompMod: exogenous modification, ComNot: exogenous non-modification.

Table 8: The effect of democracy - Group Level Data

Panel A: Payoffs in Part 1

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	39.08		
1	X	38.97	39.70	38.88
2	39.04	38.69	39.15	38.56
3	39.20	X	39.38	39.54
4	39.25	X		40.00

Panel B: Payoffs in Part 2

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	38.50		
1	X	39.06	35.89	38.75
2	37.43	39.28	40.67	39.06
3	40.64	X	38.45	38.75
4	46.72	X		39.25

Panel C: Payoffs in Round 11

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	38.33		
1	X	39.17	32.20	38.75
2	38.67	38.44	35.40	40.00
3	37.50	X	39.67	37.50
4	47.79	X		37.50

Panel D: Payoffs in Rounds 11 to 15

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	38.00		
1	X	38.67	34.68	38.13
2	37.98	39.06	39.90	39.00
3	39.44	X	36.88	38.25
4	46.26	X		38.50

Panel E: Payoffs in Rounds 16 to 20

	Consider Votes		Not Consider Votes	
Vote Share	Modify (GroupMod)	Not Modify (GroupNot)	Modify (CompMod)	Not Modify (CompNot)
0	X	39.00		
1	X	39.44	37.10	39.38
2	36.88	39.50	41.44	39.13
3	41.84	X	40.02	39.25
4	47.19	X		40.00

Table 9: The effect of the democracy - Individual Level Data

Panel A: Number of observations

	Consider Votes		Not Consider Votes	
Vote for Modify	**Modify (GroupMod)**	**Not Modify (GroupNot)**	**Modify (CompMod)**	**Not Modify (CompNot)**
No	17	55	31	26
Yes	55	25	33	34
Total	72	80	64	60

Panel B: Cooperation Percentage in Round 11

	Consider Votes		Not Consider Votes	
Vote for Modify	**Modify (GroupMod)**	**Not Modify (GroupNot)**	**Modify (CompMod)**	**Not Modify (CompNot)**
No	41.18%	14.55%	41.94%	3.85%
Yes	81.82%	24.00%	57.58%	23.53%
Total	72.22%	17.50%	50.00%	15.00%

Table 10: The effect of the democracy - Individual Level Data

Dependent Variable: Cooperation rate

	(1) Round 11	(2) Round 11	(3) Round 11	(4) Round 11	(5) Round 11
GroupMod	0.72222				
	[0.05035]***				
GroupNot	0.175				
	[0.04776]***				
CompMod	0.5				
	[0.05340]***				
CompNot	0.15				
	[0.05515]***				
GroupModn		0.41176	0.36246	0.4	0.3528
		[0.10090]***	[0.10152]***	[0.10584]***	[0.10642]***
GroupNotn		0.14545	0.05037	0.13725	0.05754
		[0.05610]**	[0.06740]	[0.05740]**	[0.06892]
CompModn		0.41935	0.31401	0.4	0.31579
		[0.07472]***	[0.08560]***	[0.07484]***	[0.08626]***
CompNotn		0.03846	-0.01583	0.04545	-0.00122
		[0.08159]	[0.08364]	[0.08739]	[0.08960]
GroupMody		0.81818	0.71881	0.84906	0.76254
		[0.05610]***	[0.06299]***	[0.05631]***	[0.06370]***
GroupNoty		0.24	0.08966	0.27273	0.13353
		[0.08320]***	[0.09006]	[0.08739]***	[0.09494]
CompMody		0.57576	0.43065	0.63333	0.50218
		[0.07242]***	[0.08241]***	[0.07484]***	[0.08547]***
CompNoty		0.23529	0.11202	0.22581	0.12062
		[0.07135]***	[0.07856]	[0.07362]***	[0.08011]
Own Part 1 Coop.			0.6176		0.56907
			[0.13941]***		[0.14074]***
Partners' Part 1 Coop.			-0.03396		-0.06618
			[0.17930]		[0.18074]
Exclude did not remember vote result	No	No	No	Yes	Yes
Observations	276	276	276	254	254
R-squared	0.54	0.57	0.6	0.6	0.62

Standard errors in brackets

*** significant at 10%; ** significant at 5%; *** significant at 1%**

Tests of differences of cooperation rates by mechanism (Group versus Comp) and payoffs

	p-values				
GroupNot=CompNot	0.7321				
GroupMod=CompMod	0.0027				
GroupMod=GroupNot	0				
CompMod=CompNot	0				
GroupMod-GroupNot = CompMod-CompNot	0.0577				
GroupNotn=CompNotn		0.2808	0.4941	0.3808	0.5663
GroupModn=CompModn		0.9518	0.6938	1	0.7717
GroupModn=GroupNotn		0.0218	0.0059	0.03	0.0128
CompModn=CompNotn		0.0007	0.0026	0.0023	0.0055
GroupModn-GroupNotn = CompModn-CompNotn		0.4742	0.9106	0.582	0.8951
GroupNoty=CompNoty		0.9658	0.8336	0.6817	0.9078
GroupMody=CompMody		0.0086	0.0014	0.0221	0.005
GroupMody=GroupNoty		0	0	0	0
CompMody=CompNoty		0.0009	0.0014	0.0001	0.0002
GroupMody-GroupNoty = CompMody-CompNoty		0.0972	0.0266	0.2544	0.0892

Note: GroupNot: endogenous modification, GroupNot: endogenous non-modification, CompMod: exogenous modification, ComNot: exogenous non-modification, n and y denote the individual vote of the subject (against or for modification).

Figure 1: Voting Stage

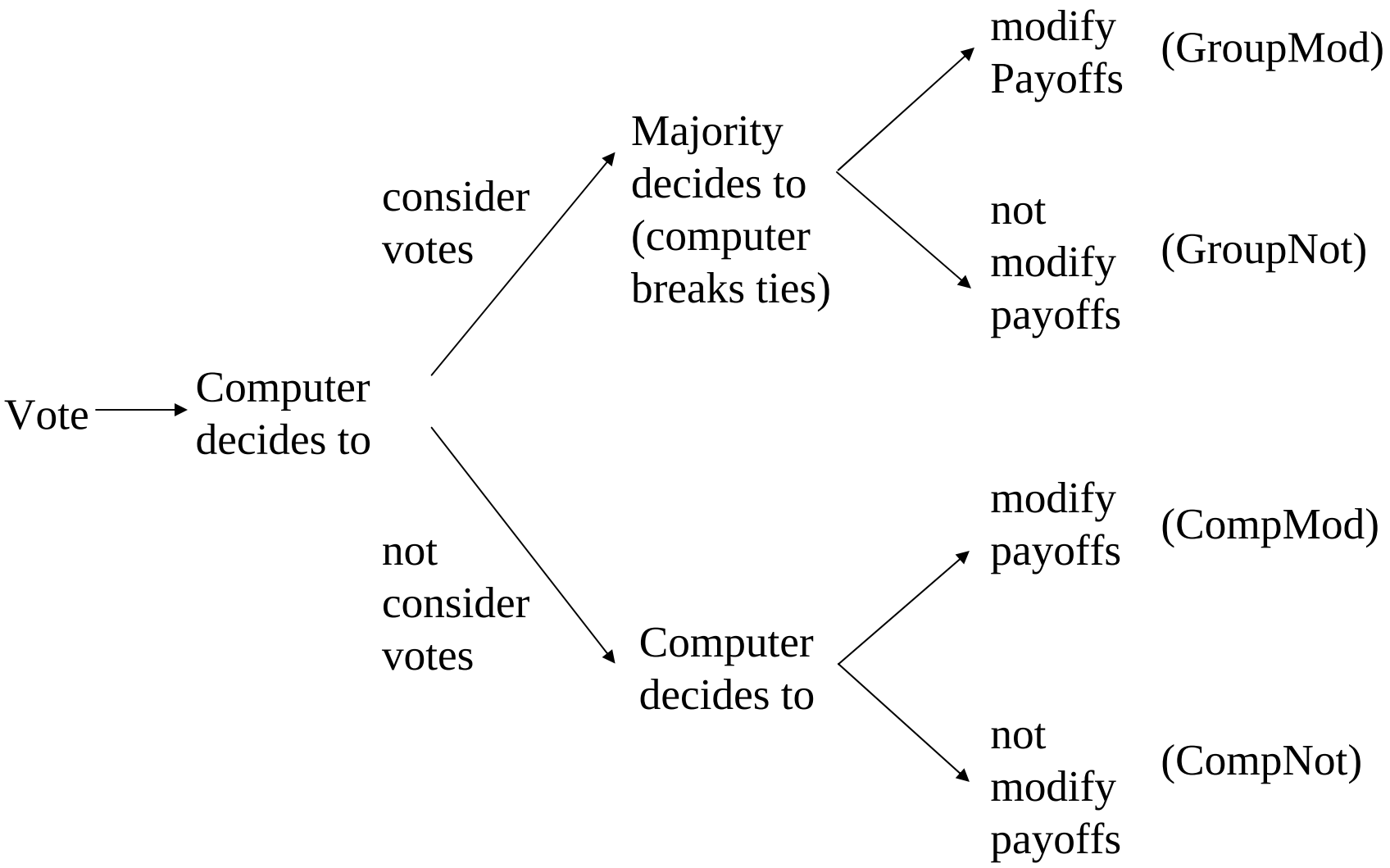


Figure 2: Cumulative Distribution of Vote Share

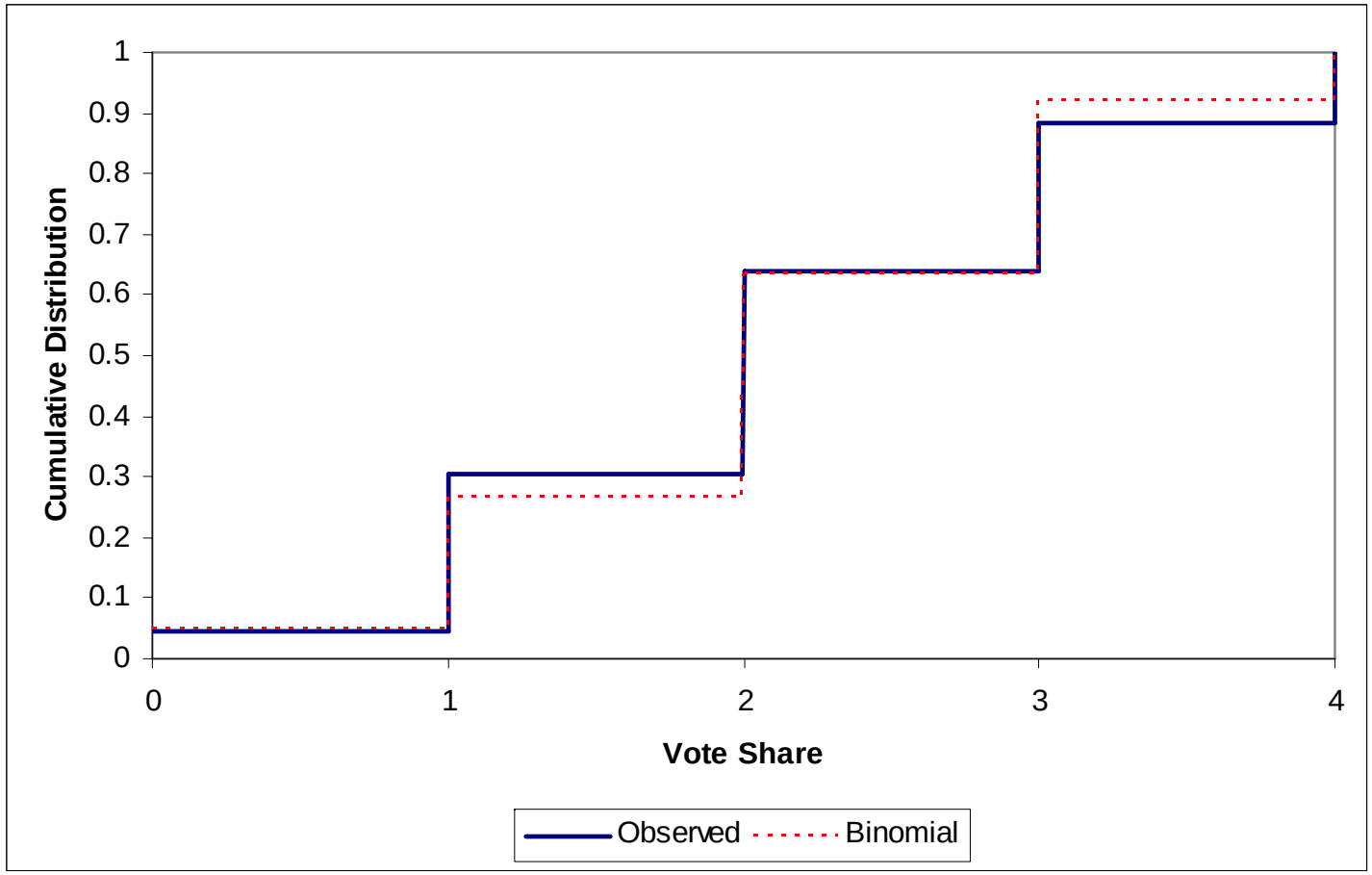


Figure 3: Cooperation by Round, Vote Stage Results and Vote Share

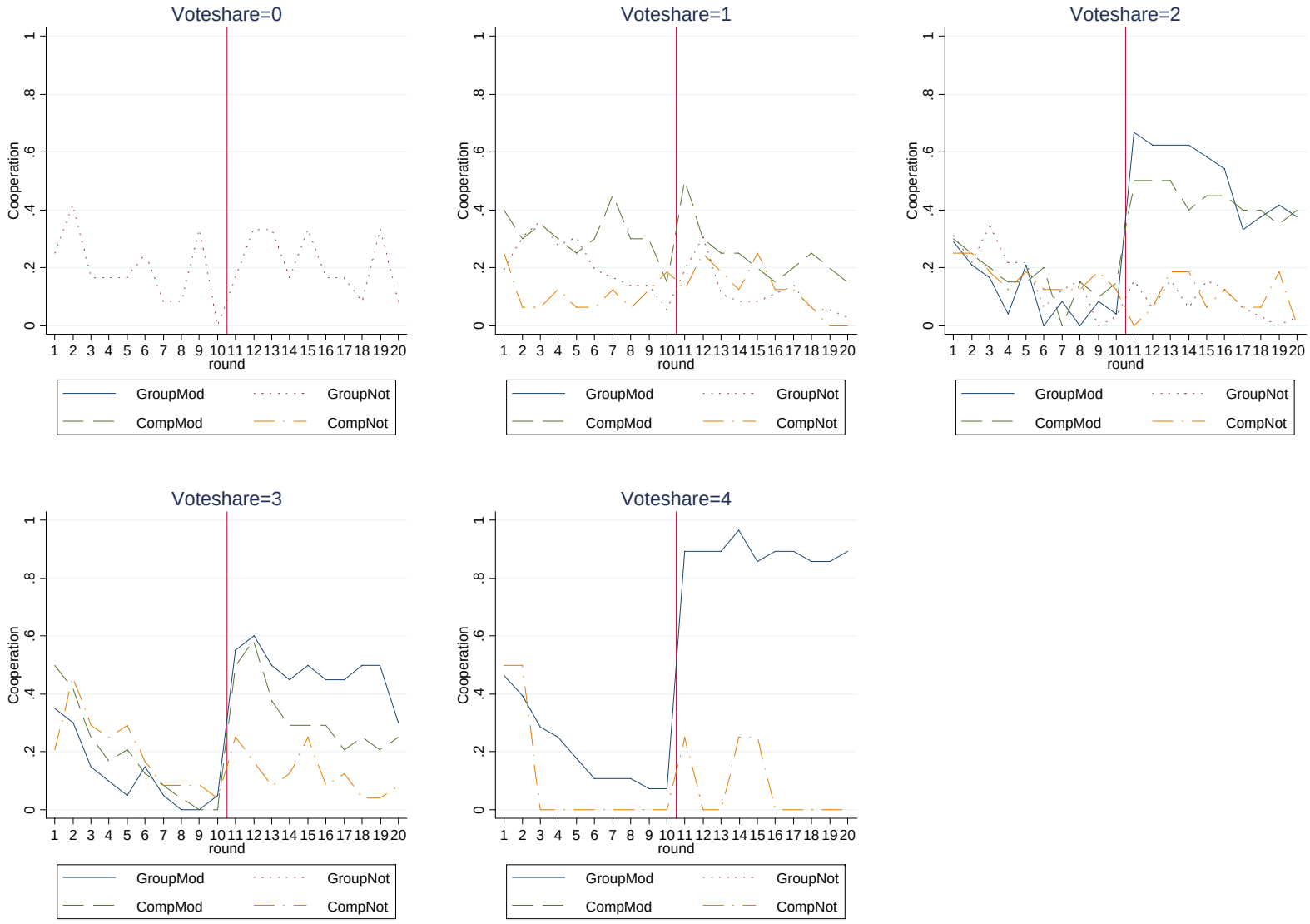
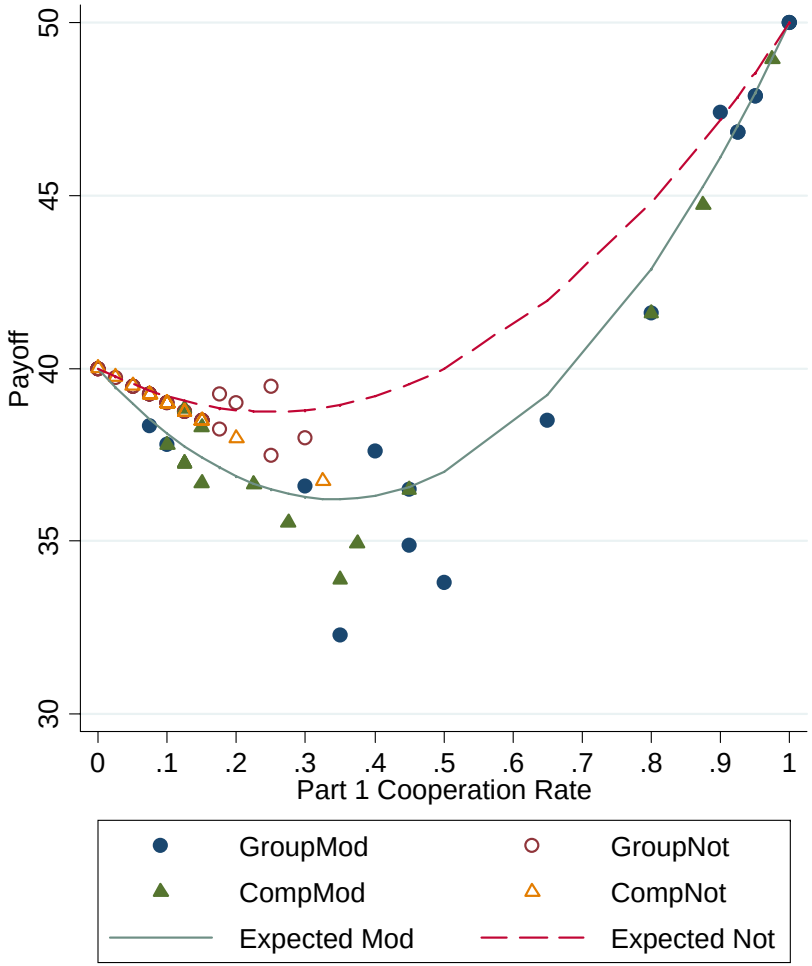


Figure 4: Part 2 Payoffs



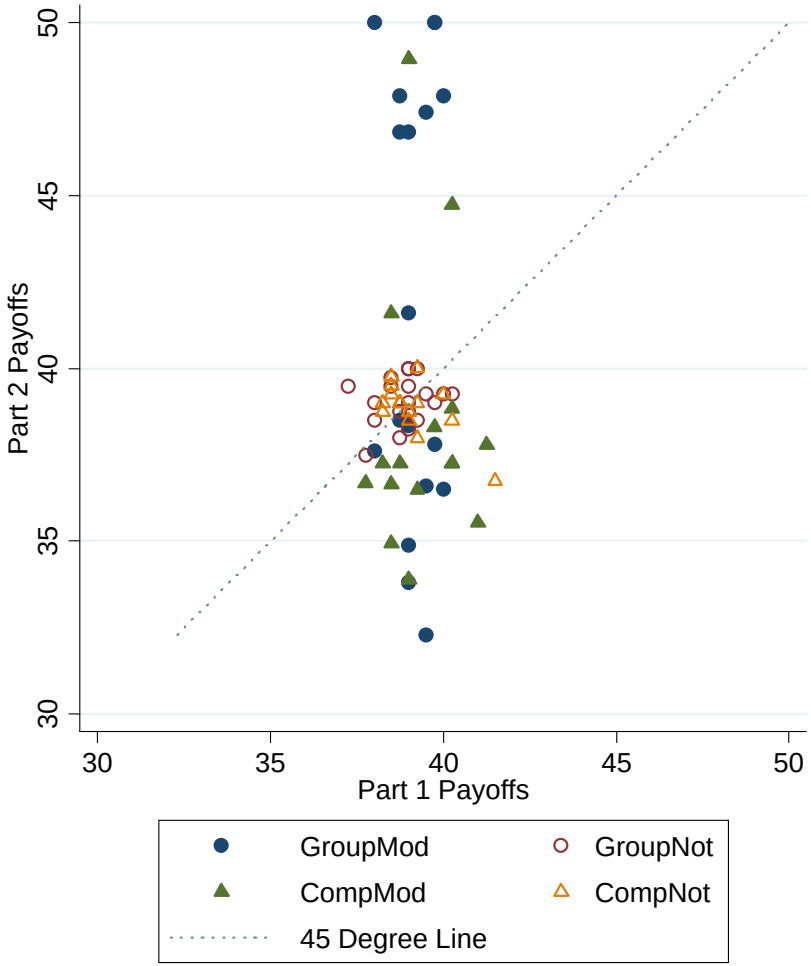


Figure 5: Cooperation by Round, Vote Stage Results and Individual Vote