Ethical versus Selfish Motivations and Turnout in Small and Large Electorates[1]

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Abstract

We evaluate voter motivations using both small and large electorates with a diverse subject pool via two virtual laboratory experiments. We find little support for selfish instrumental turnout; that is, abstention does not increase with electorate size and voters who are in the minority abstain more than those in the majority. Nevertheless, the majority vote for the candidate who maximizes their payoffs. These results combined suggests that selfish consumption motivations explain their behavior. A smaller significant number of voters make ethical choices. However, we also find a significant minority of voters appears to engage in bandwagon voting, which offsets the possible moral bias in electoral outcomes from ethical voting. Moreover, the percentage of ethical voting is unrelated to electorate size, so although we find a slight moral bias in electoral outcomes, it does not increase in electorate size.

One of the riddles in the academic literature on voting is the basic question of why people vote. The paradox of not voting posits that in large elections the probability of one vote affecting the outcome is relatively small, almost zero, so that if there is a cost to voting, then that cost will outweigh the investment or instrumental benefits which depend on the probability of being pivotal. Therefore, it is not rational to vote. Yet we observe large numbers of voters participating in elections.

Ever since the paradox of not voting was first articulated, theorists and empiricists, both in economics and political science, have attempted to provide solutions. The literature on this subject, and the controversy over it, continues to fascinate and draw researchers.[1] The question is not an esoteric one about a quirk of political behavior, but has important implications for our understanding of the positive properties of majority rule. For example, if voters are selfish and outcome-oriented, then theoretically we would expect underdog effects in which supporters of minority preferred candidates turn out in larger percentages than supporters of majority preferred ones. If the majority preferred candidate provides higher aggregate utility for society (as is generally true in game theoretic models), then the underdog effect can lead to possibly less efficient outcomes for society.[2]

On the other hand, if voters are motivated by consumption utility from expressing ethical preferences independent of electoral outcomes (one of the possible solutions to the paradox), it is possible that they will be more likely to vote for ethical choices as the size of an electorate increases, leading to a moral bias in elections that grows with electorate size. Hence, understanding the extent that voters are either motivated by ethical or selfish concerns is important to understanding the normative behavioral properties of elections decided by majority rule.

In an attempt to address this paradox, Ledyard (1984) and Palfrey and Rosenthal (1983, 1985) noted that the probability that a vote is pivotal is endogenously determined and that, when candidates have fixed policy positions, equilibria exist with positive turnout and purely

[1] For a recent review of this literature see Feddersen (2004).

[2] See Levine and Palfrey (2006) for a discussion of the underdog effect.

rational voter decision-making. This is because, if everyone assumed that the probability of being pivotal was smaller than the cost of voting and, consequently, no one voted, then the probability of being pivotal for any one voter would be 100 percent, since that one voter would determine the outcome. Thus, when electorates are finite and candidate positions are fixed and distinct, endogeneity of pivotality means that equilibria with positive voting are possible. Levine and Palfrey (2006) recently provide experimental evidence in support of the Palfrey and Rosenthal (1985) game theoretic model of voting, although they also find that turnout is higher than theoretically predicted in larger voting groups.[3]

An older alternative view that attempts to explain voter turnout argues that consumption or expressive motives for participating explain why voters participate.[4] These expressive motivations are viewed as independent of the instrumental benefits which arise from the act of voting itself and are argued to explain the higher than predicted turnout in larger electorates. In the version of this alternative view articulated by Feddersen, et al. (2009) these expressive motivations are related to moral or ethical concerns; that is, voters participate because they have a desire to act ethically by supporting morally appealing outcomes, even if their participation has little consequential effect on the outcome. They label this type of voting "ethical expressive" voting.

Feddersen, et al. provide an interesting experimental test of ethical expressive voting in that they vary both the probability that a subject's vote is decisive in the outcome and the ethical benefit from voting. They are able to vary the probability that an individual's vote is decisive by having voters randomly chosen to be dictators independent of other voters' choices. In their experiments they present voters with two choices, one that is arguably "ethical" on a number of dimensions and one that is "selfish." The ethical choice is a dominated choice since it gives

[3] Other experimental tests of game theoretic models of voter participation include Cason and Mui (2005), Duffy and Tavits (2008), Grosser, Kugler, and Schram (2005), Grosser and Schram (2006), Hsu and Sung (2002), and Schram and Sonnemans (1996).

[4] See the seminar work of Riker and Ordeshook (1968) and also Brennan and Buchanan (1984), Brennan and Lomasky (1993), Feddersen and Sandroni (2006a,b), Scheussler (2000), and Tullock (1971). In related work, Morton (1987, 1991), Schram and Van Winden (1991), and Uhlaner (1989) model these consumption benefits as strategically related to benefits to voting at a group level.

voters less of a payoff than the selfish choice (when the probability of being pivotal is positive), but is ethical because it provides the majority of voters with higher payoffs, reduces payoff inequity, and maximizes the minimum payoff. They find that significant numbers of voters make the ethical choice (as many voters as vote selfishly). They also find that voters are more likely to choose the ethical choice when the probability of being pivotal decreases (albeit still remaining positive), suggesting that ethical motivations are expressive rather than instrumental as instrumental ethical motivations would decline with the probability of being pivotal.

In this paper we extend the scope of the analysis of Feddersen, et al. in three ways in order to determine how much these results generalize:

First, we consider the extent that what appears to be ethical voting may be explained by voter error by comparing non-selfish choices by voters who do not have an ethical alternative to those who do. Feddersen, et al. do not compare the choices of their voters to choices made when no ethical choice exists as in the Levine and Palfrey experiments (they discuss the results of Levine and Palfrey, but because of significant differences in the design of the two experiments, the comparison is only conjectural). That is, the voting Feddersen et al. find for a dominated choice may simply reflect subject error or randomness in choices when the consequences to a subject are not large. Levine and Palfrey do not allow subjects to vote for their non-preferred party, hard-wiring subjects choices as either vote for their preferred choice or abstain. In order to determine if ethical voting exists, an important control or baseline experiment would be to compare voters' behavior in identical situations with and without an ethical choice. If voters are more likely to choose dominated choices when an ethical choice exists as compared to the situation when an ethical choice does not exist then we have stronger evidence of ethical voting.

Second, we provide an evaluation of voter motivations using both small and large electorates; we conduct voting experiments with electorate sizes of 6, 30, 60, 300, and 600. Thus we vary the probability of a decisive vote when the electorate is evenly divided over the two choices (each choice is preferred by 50% of the voters) from approximately 78% in an electorate of 6 to 28%

in an electorate of 60 to 0.09% in an electorate of 600. Pivot probabilities are much lower with unequal divisions of voter preferences (in our experiments with unequal divisions one choice has 2/3 support and the other 1/3 support), varying from approximately 42% in an electorate of 6 to 0.02% in an electorate of 30 to 1.23×10^{-12} in an electorate of 300.[5] In contrast, the experiments of Levine and Palfrey and Feddersen, et al. were conducted with relatively small electorates. The largest group used in a turnout experiment to our knowledge is found in Hsu and Sung (2002), who use 70 voters for one session. Feddersen et al. use methods of manipulating the probability of being pivotal to capture the effect of increases electorate size that are clean from an experimental design perspective, but artificial as compared to naturally occurring elections [see also Shayo and Harel (2011)].[6] Thus, in our experiment we investigate whether the results in previous work generalize to much larger voting groups. Given that these models of voting are meant to explain voter decisions in significantly larger electorates, it is desirable to determine if the results from small electorates generalize to more sizeable electorates.

Third, we use a diverse nonstudent subject pool. Previous turnout experiments use student subjects, which have been shown in other work to be less generous than more heterogeneous groups of nonstudents.[7] As one of the principal "solutions" to the paradox of not voting is to add in altruistic or ethical preferences for voters as in Feddersen et al., laboratory elections may understate the explanatory power of such explanations. There is now a quite sizable field experimental literature on turnout with larger, more diverse populations conducted during naturally occurring elections on the impact of various voter mobilization mechanisms that have helped us understand how voters might be influenced by different types of messages and mobilization measures during election campaigns.[8] Yet, in these experiments researchers cannot vary the

[5] We calculate these pivot probabilities using standard binomial probability calculations and the rates of turnout observed in the experiment. For the unequal sized electorates, we report the probability of being pivotal for a voter in the majority.

[6] For example, in Feddersen et al. a subset of voters are designated in each election as "active" types. Each active-type voter makes a choice between two options and one of the active-type voter's choices is randomly chosen as the electoral outcome. They then vary the number of active-type voters, which varies the probability that a voter's choice is decisive.

[7] See for example Anderson et al. (2010) and Belot et al. (2010).

[8] See Michelson and Nickerson (2011) for a review of the literature.

choices before voters and voting costs as can be done in a laboratory experiment in order to tease out the effects of different explanations of voter behavior. For example, in order to evaluate ethical explanations for voting, we need to compare voting behavior in situations in which there is an ethical or altruistic choice with voting behavior in situations where there is no such choice, holding other aspects of the election constant. Survey experiments are possible where voters are given hypothetical comparisons, simulating the laboratory environment, but these cannot be incentivized in the same fashion as is possible in an interactive laboratory experiment. Hence, we need a mixture of the field and laboratory that allows us the broadness of subjects available in the field but the control and variation that is available in the laboratory.

In this paper we find evidence that the results in Feddersen et al. do generalize somewhat to larger voter groups and nonstudent subjects. We find that a significant number of voters appear to choose according to ethical motivations once motivated to participate. From between 9-15% of voters whose selfish preference is not the ethical choice vote instead for the ethical choice. This ethical voting does help the vote share of the ethical choice and thus we find some degree of moral bias in elections as in Feddersen et al.

However, we also find evidence of considerable voter error and nonselfish voting that is not for ethical motivations. In particular, we find that approximately 10-15% of voters whose first preference is the ethical choice but not the first preference of the majority vote instead for the choice ex ante preferred by the majority; what is usually thought of as "bandwagon voting." This bandwagon voting reduces the benefits to ethical voting and any moral bias that can occur in elections as a consequence of ethical voting.

Most importantly, we find that in surprising contrast to the earlier work with smaller voting groups that abstention does not increase with electorate size. We also find no evidence that ethical voting increases with electorate size; thus we find no evidence that a moral bias in elections increases with electorate size.[9]

[9] We find strong cost effects, that is, participation falls as the cost of voting increases. While this effect is consistent with selfish instrumental turnout, it is also consistent with other accounts of turnout, as explained below in more detail.

In the next section, we present our experimental design and hypotheses. Next we discuss the results of our experiments. We conclude with a discussion of the implications of our results.

Experimental Design

Voting Games and Hypotheses on Ethical Voting

We conducted two experiments (labeled Experiments 1 and 2) based on simple voting games based on Levine and Palfrey (2002) and Feddersen et al. (2009) in which there are N voters, divided into two groups, which we label type 1 voters and type 2 voters. N is even and divisible by 3 (these restrictions on N are necessary for the sizes of the treatment groups). There are αN voters of type 1 and $(1-\alpha)N$ voters of type 2. In Experiment I $\alpha = \frac{1}{2}$ and in Experiment II $\alpha = \frac{2}{3}$. The size of the electorate and of each type of voters is common knowledge to all voters. All voters receive monetary payoffs that are only instrumental, that is, depend on which party is elected, and not how they vote.

Table 1 presents the payoffs in the voting games we used in both experiments. All type i voters receive the same payoffs if party j is elected, $u_i^j > 0$. Subjects were asked to vote for party 1, party 2, or abstain. Moreover, type i voters receive higher payoffs if party i is elected; that is, $u_1^1 > u_1^2$ and $u_2^2 > u_2^1$. Voting for a party is costly, while abstaining is costless. The cost of voting for voter k is given by c_k and voter k knows c_k before making his or her voting decision as well as the distribution of voting costs in the electorate.

Table 1: Voter Payoffs

	Election B: Baseline		
Voter Type	If Party 1 wins	If Party 2 wins	Tie Election
1	15	5	10
2	5	15	10
	Election E1: Ethical without Inequity		
1	19	15	17
2	5	15	10
	Election E2: Ethical with Inequity		
1	19	15	17
2	5	19	12

In our experiments we vary the distribution of the cost of voting; in Experiment I there are

three possible costs of voting: 0, $c_L = 1$, and $c_H = 5$, such that one third of each voter type is assigned each of the three values of c_k, as operationalized in the experiment. In Experiment II there are two possible costs of voting: c_L and c_H, such that one half of each voter type is assigned each of the two values of c_k. The payoffs and voting costs were in Danish kroner.[10]

As noted in Table 1, we conducted three types of elections, a *baseline election* (Election B) and two *ethical elections* (Elections E1 and E2). Election B captures the zero-sum election game used in most voting experiments as in Levine and Palfrey. In Elections E1 and E2, our payoffs in meet the following three conditions (from Feddersen et al.):

(a) Party 2 minimizes the inequality in payoffs: $u_1^1 - u_2^1 > u_2^2 - u_1^2$
(b) Party 2 maximizes the minimum payoff: $u_2^1 < u_1^2$
(c) Party 2 maximizes aggregate payoffs: $\alpha u_1^1 + (1-\alpha)u_2^1 < \alpha u_1^2 + (1-\alpha)u_2^2$

Condition (a) means that the difference in payoffs between types 1 and 2 voters is smallest when party 2 wins, minimizing the inequality in payoffs. Condition (b) means that the payoff received by voters of type 1 is greater when party 2 is elected than that received by voters of type 2 when party 1 is elected, maximizing the minimum payoff. In our baseline election $u_1^1 = u_2^2 = 15$ and $u_2^1 = u_1^2 = 5$ so the inequality in payoffs and the minimum payoff for party 1 is the same as for party 2, and in our ethical elections both inequality conditions hold and thus party 2 is unambiguously more ethical than party 1 according to either condition. And condition (c) means that party 2 provides higher total aggregate payoffs, or if we think of aggregate payoffs as social welfare, is the most efficient outcome for society. Thus, subjects also may choose to vote for party 2 for the ethical reason that it maximizes the total aggregate payoffs.

In our Baseline Election, however, if $\alpha > 0.5$ as in Experiment II, voting for party 1 maximizes the sum of payoffs because type 1 voters will be in greater numbers. In Experiment I, aggregate payoffs were equivalent across parties, and there was no clear ethical choice in the Baseline Election. Thus, our Baseline election has no ethical choice in Experiment I (is neutral), but is weakly ethical in Experiment II (Condition (c) is satisfied, but not conditions (a) or (b)).

[10] At the time of the experiments one dollar was equivalent to approximately 5 Danish Kroner.

The two ethical elections vary in whether inequity results when party 2 wins. That is, in Election E1, $u_2^2 = u_1^2 = 15$, so both types of voters benefit equally if party 2 wins, but in Election E2, $u_2^2 = 19 > u_1^2 = 15$, so voting ethically for type 1 voters means that they give type 2 voters more of a payoff than they receive themselves. Hence Election E1 is an ethical election without inequity and Election E2 is one with inequity. When such inequity exists, type 1 voters may place a lower value on voting ethically for party 2 as when such inequity does not exist. Feddersen et al. (2009), for example, setup their ethical choice so that such inequity does not occur because they anticipate voters will be less willing to sacrifice to benefit others.[11] Thus, if type 1 voters care about the fairness of outcomes in relation to themselves, we expect that ethical voting will be higher in Election E1 than in Election E2.

However, Election E2 provides greater aggregate payoff gains than in Election E1. That is, in Election E1 with 600 voters in Experiment I with equal distributions of types, the aggregate payoff benefit from party 2 winning as compared to party 1 is 1,800 Kroner, but in Election E2 the difference is 3,000 Kroner. If voters' ethical preferences are motivated by aggregate payoffs (Condition (c)), and the size of these payoffs, then we might expect ethical voting to be higher in Election E2 than in Election E1.

If voters are ethical expressive, we expect then to observe in Experiment I voters of type 1 voting for party 2 in Elections E1 and E2, but no such "other party" voting in Election B by voters of either type. In Experiment II, if voters are ethical expressive, we expect to voters of type 2 voting for party 1 in Election B and voters of type 1 voting for party 2 in Elections E1 and E2. Of course, it might be possible that voters choose the other party due to voter errors or bandwagon voting. By comparing the two types of voters in the elections with ethical choices and with their own types in elections where they do not have an ethical choice, we can estimate the extent that voters are voting for the other party for ethical reasons rather than as a result of an error or bandwagon voting. Furthermore, we should expect then a moral bias in Elections

[11] Shayo and Harel (2011) similarly setup their ethical choice to involve an equal distribution of payoffs.

E1 and E2, that the ethical choice has a higher probability of winning than in Election B. In summary we investigate the following hypotheses concerning ethical voting and the associated moral bias:

Hypothesis 1 (Ethical Voting) *Voters are more likely to vote for their non-preferred party when that party's payoffs are ethical than when they are non-ethical.*

Hypothesis 2 (Moral Bias in Ethical Elections) *Parties whose payoffs are ethical are more likely to receive a higher vote share than their ex ante support and are more likely to win than parties whose payoffs are non-ethical and have the same ex ante support.*

Other Hypotheses: Size, Underdog, and Cost Effects

As noted in the Introduction, we varied the size of the electorate in our experiment. As described in more detail below, in Experiment I voters participated in electorates of sizes 6, 60, and 600 and in Experiment II voters participated in electorates of sizes 6, 30, and 300. As Levine and Palfrey (2007) point out, the theory of selfish instrumental voting predicts a *size effect* given that the equilibrium probability of being pivotal is smaller in large electorates. Levine and Palfrey find some evidence of a size effect, turnout declines when electorate size increases from 3 to 9 to 27 voters, but they actually find some increase in turnout when the electorate increases from 27 to 51 voters. Feddersen et al. also argue that ethical expressive voting implies a size effect as well; that is, as the electorate size increases, the percent of ethical voting should increase as selfish instrumental motivations decline. Consequently, as electorate size increases, they contend that there should be an increasing moral bias in ethical elections. These hypotheses are summarized below:

Hypothesis 3 (Size Effect on Abstention) *As electorate size increases, voters will be more likely to abstain in all elections.*

Hypothesis 4 (Size Effect on Ethical Voting) *In elections with an ethical choice, as the electorate size increases ethical voting will increase.*

Hypothesis 5 (Size Effect on Moral Bias) *In elections with an ethical choice, as the electorate size increases, the ethical choice will receive a higher vote share and be more likely to win.*

In Experiment II, as discussed above, type 1 voters are in the majority. As Levine and Palfrey explain, if voters are selfish, we expect that participation is higher among minority voters than majority ones, or an *underdog effect*. Intuitively, the underdog effect should occur because of the combination of the winner-take-all aspect of an election and the nature of participation as a public good game within a group of supporters (when voting is costly). That is, in equilibrium supporters are drawn to participation rates that are sufficient given costs to win and the minority must participate at a greater rate than the majority. Levine and Palfrey find an underdog effect, but Duffy and Tavits (2008), Grosser and Schram (2010), and Agranov et al. (2012) find that majority voters participate at greater propensities than minority ones. We also investigate whether an underdog effect occurs in Hypothesis 6 below:

Hypothesis 6 (Underdog Effect) *Voters in the majority should abstain more than voters in the minority.*

Finally, in our experiments we also vary the cost of voting as discussed above. Both selfish and ethical explanations of voting predict that as the cost of voting increases, turnout should be lower. Thus, we also investigate the hypothesis below:

Hypothesis 7 (Cost Effect) *Voters with higher voting costs will be more likely to abstain.*

Subjects and Data

In our experiment we wished to provide new evidence using a heterogeneous subject pool and both small and large electorates. To do so, we conducted two paid internet voting experiments through iLEE (internet Laboratory for Experimental Economics) at the Center for Experimental Economics at the University of Copenhagen in summer and fall 2010 and the summer of 2011.[12]

[12] The internet platform is supported by the Carlsberg Foundation. More detailed information about the iLEE project can be found on the webpages of the Department of Economics at the University of Copenhagen.

These subjects were part of a larger subject pool first recruited in 2008. That is, in the spring of 2008, 21,793 subjects drawn based on socioeconomic characteristics from the general voting-age population of Denmark, with the collaboration of Statistics Denmark (SD) a Danish governmental agency, were invited to participate in iLEE1 and later iLEE2, both of which were combinations of a paid survey and a set of simple experiments, none of which involved voting games. In the summer of 2010, SD sent hard-copy letters by regular mail to the 2,245 subjects who participated in iLEE1, inviting participants to log into iLEE's webpage using a random ID number and to complete the experiments of iLEE3 within a month.[13] 1,560 of these subjects logged in for iLEE3. Of these, 1,065 started the voting experiment and were assigned to a treatment and 1,062 completed the voting experiment (three subjects dropped out after being assigned a treatment).[14] Not surprisingly the subjects in the experiment were better educated, a bit younger, and made higher income than in the Danish population. Nevertheless, the sample is significantly more diverse compared to that used in standard voting experiments with undergraduate students. A comparison of the sample of subjects with the Danish population is provided in Table 2 below.[15]

[13] 2,291 subjects completed iLEE1 but 46 subjects have since died, moved abroad, or otherwise left the address registry of Statistics Denmark.

[14] Seventeen additional subjects dropped out of the experiment after completing the entire voting section but before completing additional experiments unrelated to the voting experiment, so only 1,045 subjects were paid for their participation in the experiment. We discuss how we deal with the choices of subjects who dropped out in the next section.

[15] The Center Panel at the University of Tilburg is a also an internet-based panel that uses a "probability-based recruitment" scheme (random draws from phone numbers in Dutch households). According to Hoogedorn and Daalmans (2009), their overall "total sample rate" (essentially the share of people who effectively participate as a share of recruited people) is 11.5% which is similar to our participation rate. The authors document similar selectivity for age and income as in our sample. For example, they find that the total response rates are only 5% for the elderly (65+), 6% for the lowest income group (bottom quintile) and 16% for the top income group (top quintile), while the middle-aged tend to participate at higher rates (17% for the middle-aged, 30 to 44 years).

Table 2: Comparison of Sample with Danish Population		
	Fraction in Exp.	Danish Pop. Fraction*
Female	47.42%	50.2%*
Male	52.58%	49.8%*
18-29 years	17.5%	18.5%*
30-44 years	27.7%	29.1%*
45-59 years	36.7%	27.0%*
60-80 years	18.0%	25.3%*
Basic Education (up to 10 years)	9.6%	26.3%***
High School or Vocational Education	24.41%	45.4%***
Medium Tertiary Education	19.25%	21.1%***
Long Tertiary Education	46.76%	7.1%***
Low Income (< 300,000 Kr. per year)	25.16%**	65.9%
Middle Income (300,000-400,000 Kr. per year)	22.25%**	19.1%
High Income (> 400,000 Kr. per year)	52.58%**	15.0%
*For gender & age Danish pop. summarizes ages 18-80 years. **Only 721 subjects provided self-reported income data, so comparisons are suspect. ***For education Danish pop. is restricted to ages 20-69.		

One caveat to our design is that the subjects who self-select into our virtual experiment may be disproportionately more pro-social than the population at large. A recent experiment by Anderson et al. (2010) investigates possible selection effects by comparing the pro-social behavior of non-student subjects who selected into an experiment with a group for which selection was minimal (the group with little self-selection were in an on-the-job training program organized by a trucking company and participated at a rate of over 91%). They found no differences in the elicited other-regarding preferences between the self-selected nonstudents and the nonstudent trainees, suggesting that selection into this type of experiment is unlikely to bias inferences with respect to nonstudent subjects. They also compared the self-selected nonstudents with a group of student subjects and found that the students seemed significantly less pro-social.

We conducted a second paid internet voting experiment through iLEE4 in summer of 2011. The 753 subjects in Experiment II were recruited from the same pool of subjects recruited for Experiment I. Subjects who had participated in Experiment II had already received the feedback from that experiment and their payments based on their choices. Of the subjects who participated in Experiment II, 645 had participated in Experiment I and 108 had not. We compared the voting choices of subjects in Experiment I who then declined to participate in

Experiment II with the voting choices of subjects in Experiment I who did participate in Experiment II. Although there is some slight variation across the groups, there are no statistically significant differences in Experiment I voting behavior between those who chose to participate in Experiment II and those who did not (these results are available from the authors). We also compared experienced and inexperienced subjects' behavior in Experiment II and found no significant differences (these results are also available from the authors). The fact that there does not appear to be a selection effect is not surprising given that Experiment I was only one small module in a set of other experiments conducted in iLEE3 and unlikely to be a major factor in a subject's decision to participate in iLEE4.

In addition to the data from Experiments 1 and 2, we used the demographic data from iLEE1 as well as cognitive ability data from iLEE1. The demographic information measured income, educational attainment, and gender. In the IQ test subjects are presented with 20 questions or puzzles and asked to solve as many as possible within a 10 minute period. The IQ test we used is part of a more extensive test called "IST 2000 R". This test contains several modules and we chose to use a part that is a variation of Raven's Progressive Matrices. An advantage of The Raven's Progressive Matrices Test is that it does not depend heavily on verbal skills or other kinds of knowledge taught during formal education. The results from the IQ test were used to create a continuous variable measuring performance which we labeled IQ.[16] Finally, we also used data from a dictator game experiment conducted in iLEE2. We describe this experiment in more detail below.

Results

Experiment I

In Experiment I subjects were randomly assigned to three different sized electorates, with $N =$ 600, 60, or 6 subjects. There was only one electorate of 600 voters. When we had odd numbers

[16] The subjects also completed a personality trait questionaire. In unreported analyses avaiable from the authors we did not find any robust effects of personality traits on behavior.

of voters, missing observations were treated as abstentions in calculating payments, however, we only report data from actual subjects' choices. Subjects participated in the set of three voting games as defined in the previous section. Subjects were randomly assigned to either type 1 or type 2, such that for each electorate, half of the subjects were type 1 and the other half were type 2. Subjects were told the distribution of the type assignments and maintained their type assignments for all three voting games. Thus we used a between-subjects design to compare behavior across voting types and electorate sizes but a within-subject design to compare behavior across election types. Furthermore, as noted above, one third of each type of subject in each electorate paid a 0 cost to vote, one third paid $c_L = 1$ Danish Kroner, and the remaining third paid $c_H = 5$ Danish Kroner.

Tables A1 and A2 in the Appendix present the detailed behavior of voter types 1 and 2 in the three elections in Experiment I. Not surprisingly, we find strong evidence in support of a cost effect on voter behavior. As the cost of voting increases, type 1 voters abstained 6% of the time with 0 voting cost, 16% of the time with a voting cost of 1, and 19% of the time with a voting cost of 5.[17] Similarly, type 2 voters are significantly more likely to abstain with higher costs of voting–abstention is 5% when voting costs are 0, 13% when voting costs are 1, and 24% when voting costs are 5.[18] These effects are robust to disaggregation by election type and electorate size. Since both selfish and ethical voting predict a cost effect on voting, we focus instead on our other results. Below we analyze the specifics of the results with respect to the hypotheses presented above.

Ethical Voting in Experiment I

Hypothesis 1 predicts that we should observe ethical voting behavior by type 1 voters in Elections E1 and E2. Figure 1 below summarizes other party voting by both types of voters disaggregated by election and voter cost. We find some support for ethical voting – type 1 voters choose party 2 more in elections E1 (11%) and E2 (15%) than in Election B (8%) and abstain more in elections

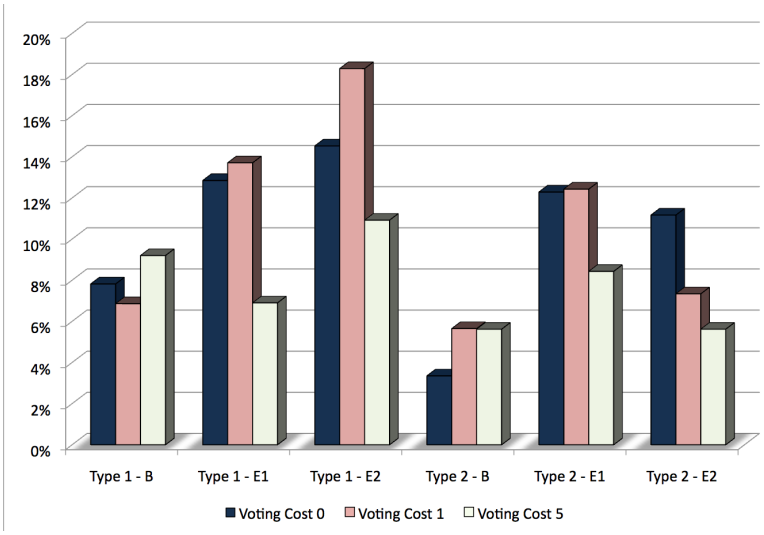
[17] The Pearson's χ^2 statistic = 97.73, Pr = 0.00.
[18] For the comparison the Pearson χ^2 statistic = 82.18, Pr = 0.00.

E1 (17%) and E2 (19%) than in Election B (15%). However, while the comparison of elections B and E2 is statistically significant, the comparison of elections B and E1 is not significant.[19] Furthermore, we find that type 2 voters also voted for party 1 more and abstained more in Election E1 as compared to Election B. Therefore we might expect some confusion with the change in voter payoffs which could explain the behavior of type 1 voters, rather than ethical motivations. When we use voters of type 2 as a control for voters of type 1 (i.e. coding the choices as sincere choice, 2nd choice, and abstaining), we find no significant differences between type 1 and type 2 voters in elections B and E1, but type 1 voters are significantly more likely to abstain and vote their 2nd choices (ethically) than type 2 voters in Election E2.[20] Thus, we find the strongest evidence of ethical voting by voters of type 1 in Election E2 (both comparing to their own behavior in Election B and to type 2 voters in Election E2). This result is surprising since we expected the inequity in Election E2 to lead to less ethical voting than in Election E2, but supports the hypothesis that voters' ethical motivations are more related to which option is the most efficient in terms of aggregate payoffs (Condition (c) above) rather than in terms of equity concerns (Conditions (a) and (b)).

[19] The Pearson's χ^2 statistic for the comparison of type 1's voting behavior in elections B and E1 is 4.37, Pr = 0.11, while it is 15.80, Pr = 0.00 for the comparison of elections B and E2.

[20] The Pearson's χ^2 statistic for the comparison of types A and B voters in election 1 is 4.45, Pr = 0.11; in election 2 is 0.27, Pr = 0.88; and in election 3 is 27.14, Pr = 0.00.

Figure 1: Other Party Voting in Exp. I by Voter Type, Election, & Cost

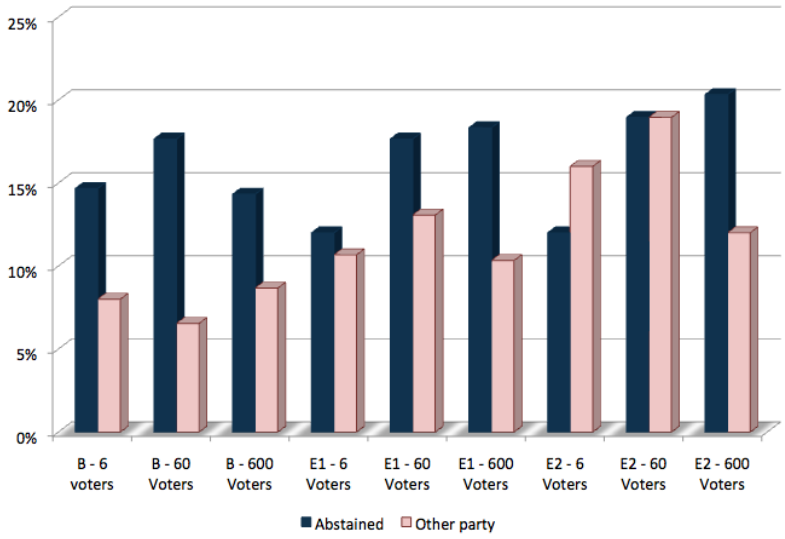


Size Effects in Experiment I

According to Hypotheses 3 and 4 we expect to find that as electorate size increases abstention declines and ethical voting increases. As Figure 2 shows below, we find little evidence of electorate size having a significant effect on type 1 voter behavior. Abstention in all elections and ethical voting in the ethical elections are both higher for type 1 voters when the electorate size is 60 as compared to 6, but these differences are all insignificant.[21] Moreover, abstention either is little different or less when the electorate size when the electorate is 600 as compared to 60 and ethical voting is significantly less (the lower degree of ethical voting in electorates of size 600 as compared to 60 is significant at the 7% level, t-statistic = 1.88).

[21] The t-statistic for the comparison of abstention rates in the sized 6 electorate with the sized 60 one in Election B = 0.66 (Pr = 0.51), in Election E1 = 1.24 (Pr = 0.22), and in Election E2 = 1.49 (Pr = 0.14). For the comparison of other party voting in Election E1, the t-statistic = 0.60 (Pr = 0.55) and in Election E2 = 0.64 (Pr =0.52).

Figure 2: Type 1 Choices by Electorate Size & Election Type in Exp. I

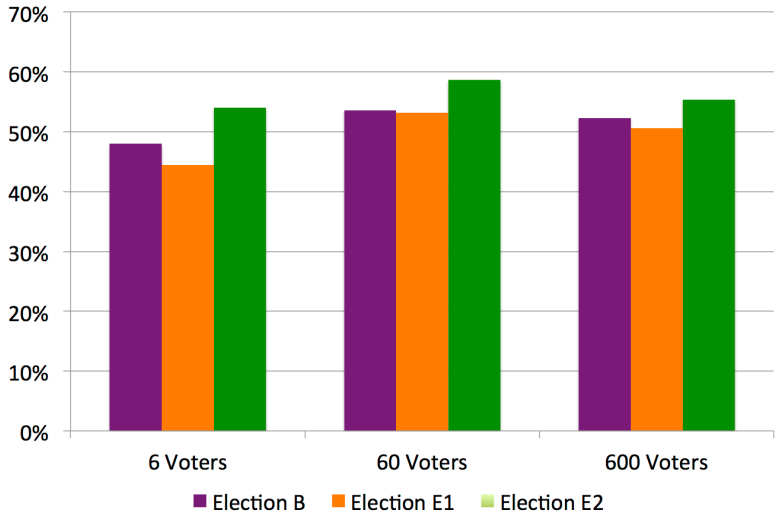


It might be the case that such electorate size effects are more likely to be manifested for voters with higher voting cost. Yet, when we do the same comparisons, disaggregating by voter costs, we again find no significant differences in either abstention or ethical voting by type 1 voters with differences in electorate sizes. We also find little evidence of a size effect on type 2 voters (here we would expect size to lead to more abstention only); type 2 voters abstain highest in groups of size 6 (18%), compared to 11% in electorates of sized 20 and 14% in electorates of sized 600.

Moral Bias in Experiment I

Finally, in Figure 3 we consider Hypotheses 2 and 5; that there will be a moral bias in Elections E1 and E2 (party 2 will receive a greater share of the vote, with the greatest in Election E1) and that this moral bias will increase with electorate size. We find some evidence for a moral bias in that the vote share for party 2 is higher in Election E2 than in Election B. However, the vote share is actually lower in Election E1 than in Election B (contrary to predictions). Furthermore, we find no evidence that the moral bias increases with electorate size.

Figure 3: Party 2 Vote Share by Size and Election



In summary, we find some evidence of ethical voting and moral bias in ethical elections. But we find little support for size effects on abstention or ethical voting or an increasing moral bias with electorate size. However, we have equal-sized groups of voters and this implies less of a size effect than when groups are unequal. Hence, we may be understating the possible size effects in elections in general. In Experiment II, which we turn to now, in which we have unequal sized groups of voter types, we address this concern.

Experiment II

Design Changes

Given the surprising result in Experiment I that electorate size has no effect, we purposely designed Experiment II to maximize the salience of electorate size. For example, in Experiment II we used a within-subjects design to measure the effects of electorate size on voter behavior. Therefore, voters participated in all three of the electorate size manipulations used in Experiment II. Specifically, as subjects logged into the experiment, they were assigned into a electorate-size sequence. The first 300 subjects who logged into the experiment were assigned to three different electorate sizes, $N = 300$ (all in one electorate), $N = 30$ (divided into 10 electorates), and $N = 6$ (divided into 50 electorates), sequentially. Because of concerns about that we would be unable

to recruit as many as 600 subjects, we reduced our larger electorate sizes. However, given the unequal distribution of types in the electorates, the probability of being pivotal declines faster and is theoretically lower in our 300 sized electorate than in our 600 sized electorate.

The order in which subjects were presented the choices within a given electorate size was varied such that all possible electorate-size sequences were assigned (6-30-300, 30-6-300, 6-300-30, 30-300-6, 300-6-30, and 300-30-6). Two subjects dropped out before completing the experiment so we had a total of 298 observations for the electorate of 300. In calculating the outcome of the elections for payoffs, these subjects' choices were recorded as abstentions (only actual behavior is used in the analysis in this paper). All of the subjects who participated in the electorate of 300 were experienced subjects; they had participated in Experiment I.

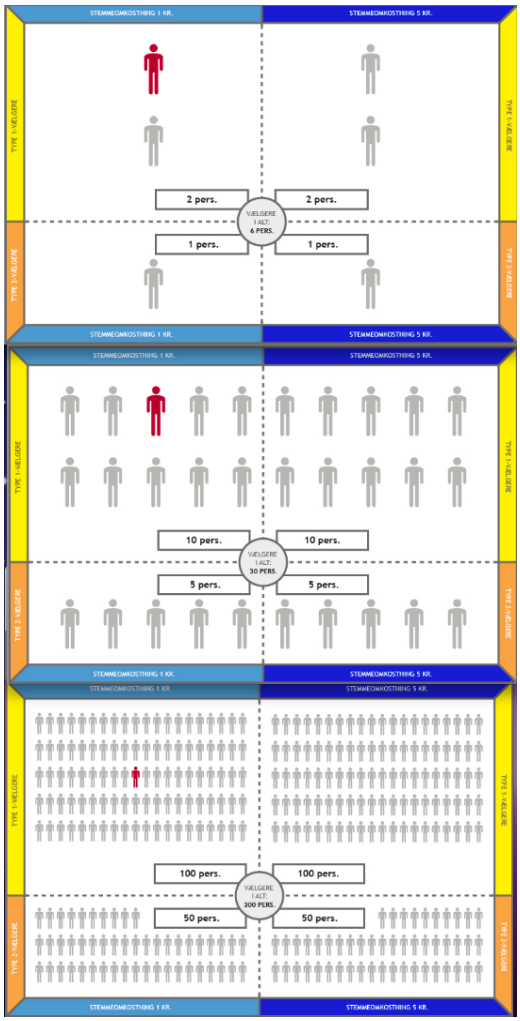
The remaining 455 subjects (108 of whom were inexperienced, had not participated in Experiment I) were matched into groups of $N = 30$ and $N = 6$, also sequentially, with roughly half of these subjects (237) experiencing the sequence 6-30 and the others (218) experiencing the sequence 30-6. Subjects were assigned only into groups with subjects with the same experience level. As discussed above, we analyzed this data to determine if there were selection effects between those subjects in Experiment I who chose to participate in Experiment II and those who did not in terms of demographics and choices in Experiment I, finding no significant differences. We also compared the choices of those who were experienced and those who were not and found no significant differences. Again, we have odd numbers of subjects for some groups because subjects logged into the experiment but did not complete the voting portion of the experiment. As in Experiment I, these subjects' choices were treated as abstentions in calculating electorate payoffs.[22]

Another measure we took in order to make the electorate size salient to the subjects was to use visuals designed specifically to make it clear to them the numbers of subjects in their

[22] In order to be sure of having an electorate of size 300 of experienced subjects, group-size sequences were assigned based on when a subject logged in, such that the first 30 subjects were assigned to the sequence 6-30-300, the next 30 were assigned to the sequence 30-6-300, etc. until 300 subjects had been assigned to a sequence including the electorate of 300. The next 30 subjects then were assigned to the sequence 6-30, the next 30 to the sequence 30-6, and so on, as long as subjects continued to log into the experiment.

electorates. Figure 4 below illustrates how a subject might have been presented information about the numbers of voters by voter type and voter cost as electorate sized varied (the subject was highlighted in red).

Figure 4: Visual Representation of Electorate Size to Subjects



Within each electorate size treatment, subjects participated in the same set of three voting games which varied in the extent that one of the choices was an ethical choice as used in Experiment I. Subjects did not receive any feedback between elections or electorate-size treatments as payoffs could not be determined until after all subjects had completed the experiment.

Subjects were randomly assigned to either type 1 or type 2, as in Experiment I, such that for each electorate, one-third of the subjects were type 2 and the remaining two-thirds were type 1.

Thus, in Experiment II $\alpha = 2/3$, as discussed previously. Subjects were told the distribution of the type assignments and maintained their type assignments for all three voting games. Thus we used a between-subjects design to compare behavior across voting types but a within-subject design to compare behavior across election types and electorate-sizes. For the cost of voting, one-half of each type of subject in each electorate paid a voting cost of $c_L = 1$ Danish Kroner, and the remaining half paid a voting cost of $c_H = 5$ Danish Kroner. We simplified the cost schedule given that the results on cost variations were robust in Experiment I and to reduce the complexity of the new voting games. Moreover, our focus is to explain why individuals vote when costs of voting are positive.

As with the electorate-size sequences, the order in which subjects were presented with the election choices was randomly determined, so that all possible orders of sequences were used. Moreover, unlike Experiment I, subjects were able to return to previous choices, even across electorate-sizes, and change them if they wanted via a "return to previous screen" button. Therefore, we attempted to minimize any possible ordering effects in terms of electorate-sizes and elections. Finally, in previous experiments subjects have been known to be more likely to choose the first choice in a voting game, so we always presented choice 2, the ethical choice, as the second choice, or as Party 2, as a strong test of ethical voting.

We present the detailed voting behavior in Experiment II in Tables A3 and A4 in the Appendix. As noted, we trivially expect a cost effect on voting. Thus, it is reassuring that as with Experiment I, we find strong support for the cost effect on rates of abstention across voter types, elections, and electorate sizes. In the Baseline Election, type 2 voters abstain about 40% when the cost of voting is 1 kroner and about 60% when the cost of voting is 5 kroner. The effect is is even more pronounced for type 1 voters, where abstention is about 19% when the cost of voting is 1 kroner, but nearly 50% when the cost of voting is 5 kroner. These differences in abstention rates by voting cost are significant for both voter types across all electorate sizes.[23]

[23]For the comparison for type 2 voters across electorate sizes, the χ^2 statistic = 24.34, Pr = 0.00; for type 1 voters across electorate sizes = 125.76, Pr = 0.00; for type 2 electorate size 6 = 12.90, Pr = 0.00; for type 2

As in the Baseline Election, we find significantly more abstention for both types of voters in both ethical elections as the cost of voting increases. These differences are significant when we disaggregate by electorate size as well except for type 2 voters in electorate sizes 30 and 300 in Election E2.[24]

Ethical Voting and Moral Bias in Experiment II

The extent that voters choose the other party by election and voter type is summarized in Figure 5 below. Recall, that since $\alpha = 2/3$, in Election B, party 1 is an ethical choice if voters care about maximizing aggregate payoffs, unlike the case in Experiment I. We find that indeed type 2 voters are significantly more likely to vote for party 1 than type 1 voters are likely to vote for party 2 in Election B, with over 10% of all type 2 voters choosing party 1, while only approximately 3% of all type 1 voters choosing party 2.[25] This result suggests that some type 2 voters are voting for party 1 for the ethical reason that party 1 maximizes total payoffs. However, these voters may be voting for party 1 simply because it is in the majority as in bandwagon effects, voting for the party with greater support, independent of ethical concerns. It is not possible for us to distinguish which motive explains this tendency examining only the data in the Baseline Election. We can, however, when we turn to the Elections E1 and E2,

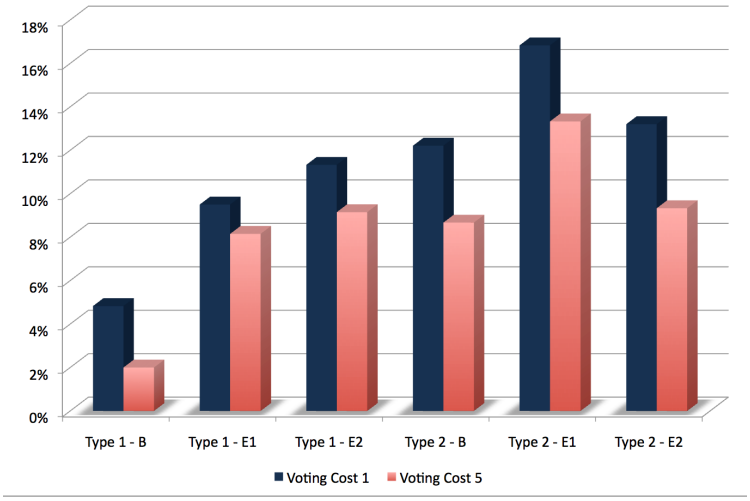
electorate size 30 = 8.39, Pr = 0.02; for type 2 electorate size 300 = 5.97, Pr = 0.05; for type 1 electorate size 6 = 61.49, Pr = 0.00; for type 1 electorate size 30 = 42.76, Pr = 0.00; and for type 1 electorate size 300 = 26.39, Pr = 0.00.

[24] The χ^2 statistic for the comparison for type 2 voters across electorate sizes in election B = 35.54, Pr = 0.00; for type 1 = 153.17, Pr = 0.00; the same comparisons for election 3 = 12.36, Pr = 0.00 and 135.07, Pr = 0.00, respectively. For election E1, the comparisons for electorate size 6 = 13.57, Pr = 0.00 and 53.89, Pr = 0.00, respectively; for electorate size 30 = 14.50, Pr = 0.00 and 71.78, Pr = 0.00, respectively; for electorate size 300 = 7.95, Pr = 0.02 and 30.23, Pr = 0.00, respectively. For election E2, electorate size 6 = 6.50, Pr = 0.04 and 48.49, Pr = 0.00, respectively; for electorate size 30 = 3.37, Pr = 0.19 and 49.26, Pr = 0.00, respectively; and for electorate size 300 = 3.21, Pr = 0.20 and 41.38, Pr = 0.00, respectively.

[25] These differences in voting behavior by voter type in election 1 are significant in all possible comparisons except for electorate size 300 and voting cost of 5 kroner. The χ^2 statistic for the comparison between the two types of voters' choices in election B across all electorate sizes and voting costs equals 93.65, Pr = 0.00; for the comparison across all electorate sizes for voting cost of 1 kroner = 70,67, Pr = 0.00; for the comparison across all electorate sizes for voting cost of 5 kroner = 37.70, Pr = 0.00; for the comparison across all voting costs for the electorate size of 6 = 51.37, Pr = 0.00; for the comparison across all voting costs for the electorate size of 30 = 29.33, Pr = 0.00; for the comparison across all voting costs for the electorate size of 300 = 16.53, Pr = 0.00; for the comparison for electorate size 6 and voting cost of 1 kroner = 34.22, Pr = 0.00; for the comparison for electorate size 6 and voting cost of 5 kroner = 30.46, Pr = 0.00; for the comparison for electorate size 30 and voting cost of 1 kroner = 22.53, Pr = 0.00; for the comparison for electorate size 30 and voting cost of 5 kroner = 11.20, Pr = 0.00; for the comparison for electorate size 300 and voting cost of 1 kroner = 20.14, Pr = 0.00; and for the comparison for electorate size 300 and voting cost of 5 kroner = 1.01, Pr = 0.60.

which we turn to now.

Figure 5: Other Party Voting in Experiment II by Voter Type and Cost



In Elections E1 and E2, we expect that some type 1 voters will vote ethically for party 2 , more so than in the Baseline Election. We do observe a significant higher percentage of votes for 2 by type 1 voters in both elections E1 and E2 as compared to the Baseline Election, almost 9% in Election E1 and 10% in Election E2 versus about 3% in the Baseline Election, which suggests some ethical voting by these subjects in the ethical elections.[26] When we compare by electorate size and voting cost, these differences are significant for all comparisons except for electorate size 6 and voting cost 1 kroner and electorate size 300 and voting cost of 5 kroner.[27] Notably, we find that as in Experiment I, ethical voting is higher in Election E2 than in Election E1, although it is not significantly higher. Recall that in Election E2 type 1 voters actually sacrifice in order to make the ethical choice and to benefit type 2 voters. We speculated that voters

[26] The z statistic for the comparison of elections B and E1 = 5.53, Pr = 0.00 and for the comparison of elections B and E2 = 6.64, Pr = 0.00.

[27] For electorate size 6 and voting cost 1 kroner, the z statistic for comparing elections B and E1 = 0.54, Pr = 0.59 and for comparing elections B and E2 = 1.35, Pr = 0.18. For electorate size 6 and voting cost 5 kroner for comparing elections B and E1 = 3.77, Pr = 0.00 and for comparing elections B and E2 = 3.90, Pr = 0.00. For electorate size 30 and voting cost 1 kroner for comparing elections B and E1 = 2.22, Pr = 0.03 and for comparing elections B and E2 = 3.28, Pr = 0.00. For electorate size 30 and voting cost 5 kroner for comparing elections B and E1 = 2.82, Pr = 0.00 and for comparing elections B and E2 = 3.52, Pr =0.00. For electorate size 300 and voting cost 1 kroner for comparing elections B and E1 = 3.13, Pr = 0.00 and for comparing elections B and E2 = 2.77, Pr = 0.01. For electorate size 300 and voting cost 5 kroner for comparing elections B and E1 = 1.55, Pr = 0.12 and for comparing elections B and E2 = 1.55, Pr = 0.12.

might find such a sacrifice not tasteful and be unwilling to vote as ethically in E2 as in E1. Yet we find no such effects, and some suggestion of the opposite. Our results instead support the notion that voters in particular value the ethical Condition (3), the value of maximizing total payoffs, since E2 provides higher aggregate payoffs than E1.

The evidence of voting by type 1 voters for party 2, which appears to be ethical voting, is noteworthy. But we also find that type 2 voters are also voting significantly more for party 1 in Election E1 than in the Baseline Election, at rates even higher than type 1 voters voting for party 2, 15% in Election 2 versus 10% in the Baseline.[28] Furthermore, when we compare the proportions of voting for the other party by voter type in Election E1, we find that significantly more such voting occurs by voters of type 2 than type 1, contrary to expectations.[29] But when we disaggregate our comparison by electorate size and voting cost, we find that the only significant differences occur when the electorate size is 6, both voting cost, and when the electorate size is 30 and the voting cost is 1 kroner.[30] We also find that while over 11% of type 2 voters are voting for party 1 in Election E2, however, the percentage in Election E2 is not significantly different from the tendency to do so in the Baseline Election and we do not find any significant differences by voter type in tendency to vote for the other party in Election E2.[31]

[28] This difference is not significant when disaggregated by electorate size and voting cost. The z statistic for the overall comparison is 2.42, Pr = 0.02; for the comparison for group size 6 and voting cost 1 kroner = 1.44, Pr = 0.15; for group size 6 and voting cost 5 kroner = 1.14, Pr = 0.26; for group size 30 and voting cost 1 kroner = 1.44, Pr = 0.15; for group size 30 and voting cost 5 kroner = 1.05, Pr = 0.29; for group size 300 and voting cost 1 kroner = 0.55, Pr = 0.58; and for group size 300 and voting cost 5 kroner = 1.05, Pr = 0.29.

[29] The z statistic = 4.02, Pr =0.00.

[30] For the comparison of group size 6 and voting cost 1 kroner the z statistic = 3.02, Pr = 0.00; for the comparison of group size 6 and voting cost 5 kroner = 2.02, Pr = 0.04; for the comparison of group size 30 and voting cost 1 kroner = 2.03, Pr = 0.04; for the comparison of group size 30 and voting cost 5 kroner = 1.27, Pr = 0.20; for the comparison of group size 300 and voting cost 1 kroner = 0.05, Pr = 0.96; and for the comparison of group size 300 and voting cost 5 kroner = 0.77, Pr = 0.44.

[31] For the comparison overall, the z statistic = 0.46, Pr = 0.64; for the comparison when group size is 6 and voting cost of 1 kroner = 0.39, Pr = 0.70; for the comparison when group size is 6 and voting cost of 5 kroner = 0.89, Pr = 0.37; for the comparison when group size is 30 and voting cost of 1 kroner = 1.11, pr = 0.27; for the comparison when group size is 30 and voting cost of 5 kroner = 1.24, Pr = 0.21; for the comparsion when group size is 300 and voting cost of 1 kroner = 1.49, Pr = 0.14; and for the comparison when group size is 300 and voting cost of 5 kroner = 0.00, Pr = 1.00. For the comparison of voter types overall in election 3 the z statistic = 0.67, Pr = 0.50; for the comparison when group size is 6 and voting cost is 1 kroner = 1.02, Pr = 0.31; for the comparison when group size is 6 and voting cost is 5 kroner = 0.52, Pr = 0.60; for the comparison when group size is 30 and voting cost is 1 kroner = 0.67, Pr = 0.50; when group size is 30 and voting cost is 5 kroner = 0.83, Pr = 0.41; when group size is 300 and voting cost is 1 kroner = 0.71, Pr = 0.48; and when group size is 300 and voting cost is 5 kroner = 0.46, Pr = 0.65.

As noted above, in the Baseline Election, such votes by type 2 voters could be for ethical motivations since in the Baseline Election a win by party 1 maximizes total payoffs, but could also reflect a tendency to vote for the ex ante front-runner party which is supported by a greater number of voters, bandwagon voting. We were not able to distinguish between such motivations in the Baseline Election.[32] But in elections E2 and E3, a win by party 2 maximizes total payoffs, so there is no obvious ethical motivation for voting for party 1 by type 2 voters. Thus, the high percentage of voting for party 1 by type 2 voters suggests the appeal of the front-runner party explains such voting, rather than ethical concerns. Thus, we find significant evidence of bandwagon voting.

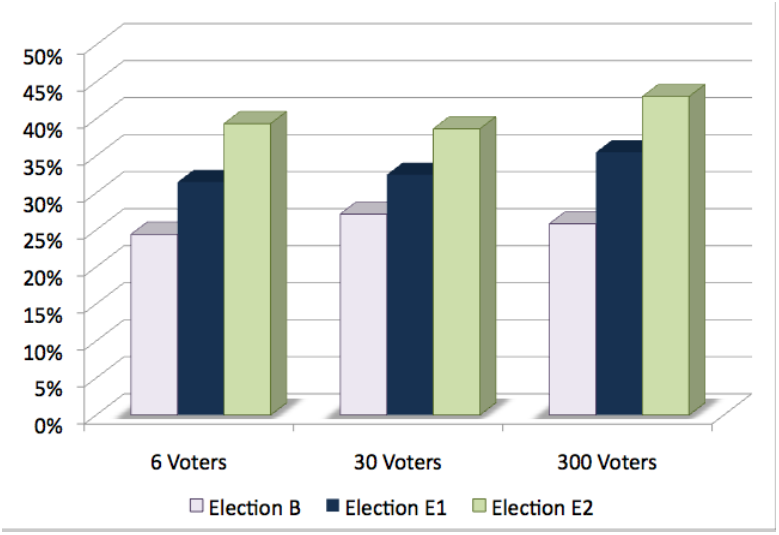
Recall that in Experiment I we also found that some of type 2 voters chose party 1 even though the groups were equal sized, although not in as large of percentages as type 1 voters for party 2. So some of the apparent bandwagon voting by type 2 voters could be due to errors, as is also true of the observed ethical voting. However, the higher other party voting by type 1 voters in Elections E2 and E3 than in Election B supports the supposition that a significant part of the other party voting by type 1 voters is ethical. Also, the fact that we observe a higher degree of other party voting in Experiment II by type 2 voters than in Experiment I (once we control for voting cost differences), suggest that a significant part of the other party voting by type 2 voters is indeed bandwagon voting.

As we observe both ethical voting by type 1 voters and bandwagon voting by type 2 voters for party 1, it is unclear whether the ethical voting of type 1 voters actually leads to increased vote share for party 2 in the ethical elections (a moral bias). Figure 6 presents the average vote share received by party 2 by election and electorate size. As we can see, party 2's vote share increases across the three elections, for each electorate size, reaching its highest level with Election E2. The key is that since there are more type 1 voters, then although we find some bandwagon voting by type 2 voters for party 1, party 2's vote share increases due to the greater

[32] This inability to distinguish between bandwagon and ethical voting is also a characteristic of Agranov et al. (2012)'s experiment in which the majority preferred candidate is also the ethical choice if voters care about aggregate utility. Our formulation in Elections E1 and E2 allow us to distinguish these two types.

number of ethical voting by type 1 voters. Nevertheless, the ethical voting is not consequential as party 2 on average receives less than 45% of the vote even in Election E2 for electorate size 300, where party A receives the highest percentage of the vote. Furthermore, there is some very slight increase in the vote share with electorate size, but this is only weak support for the Feddersen et al. contention that as electorate size increases, there is a moral bias such that ethical choices have a greater advantage in larger electorates.

Figure 6: Average Party 2 Vote Share in Exp. II by Election & Electorate Size



Size Effects in Experiment II

So far we find evidence of selfish voting (the majority of voters), ethical voting, and bandwagon voting. As stated in Hypotheses 4 and 5, we expect two size effects – Hypothesis 4 – that as electorate size increases abstention increases and – Hypothesis 5 – as electorate size increases ethical voting and the moral bias increase. Surprisingly, despite the measures taken to make electorate size more salient than in Experiment I, we find little evidence of size effects. Although abstention slightly rises with electorate size overall and there are in some cases increases in ethical voting with electorate size, these differences are not significant. In Election B, type 2 voters (who should vote ethically for party 1 if they care about aggregate payoffs) actually abstain less with higher electorate sizes, they abstain about 52% of the time when there are 6 voters, 48%

of the time when there are 30 voters, and 47% of the time when they are 300 voters. They also vote for party 1 less when there are 30 voters in the electorate than when there are 6, although slightly more when there are 300. None of these differences are significant, however.[33]

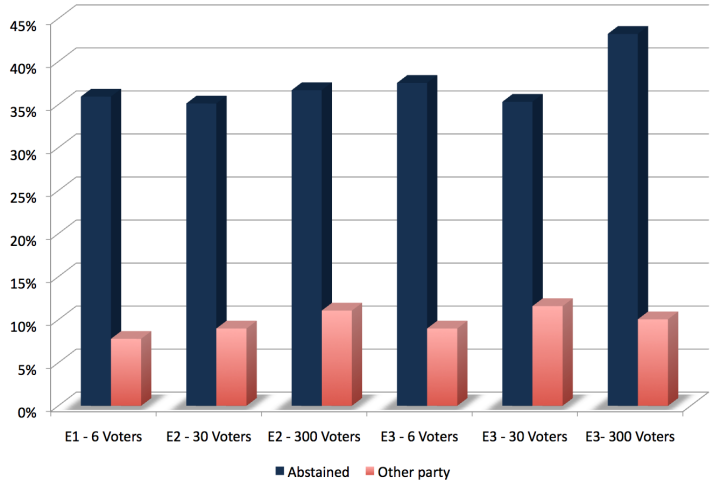
Type 1 voters' behavior for different electorate sizes in Elections E1 and E2 is presented in Figure 7 below, disaggregated by election. Probably because voting costs are on average higher, we observe greater abstention rates and less voting for the other party in general than in Experiment I. Type 1 voters choose more ethically in higher electorate sizes in Election E1, but the effects are not significant.[34] Although there are cases where abstention and other party voting are slightly higher with higher electorate sizes, these differences for both type 1 and type 2 voters are small and insignificant in both elections E1 and E2 both comparing across voting costs and disaggregated by voting costs.[35] These results suggest that explanations that predict a size effect such as selfish instrumental, ethical expressive, and bandwagon voting are not supported by the data. These results might be explained by voters receiving sizable expressive ethical or bandwagon utility, however, we would expect to observe then weak cost effects as well if such expressive utility was large, which we do not.

[33] The χ^2 statistic = 1.46, Pr = 0.83.

[34] The χ^2 statistic = 2.71, Pr = 0.61.

[35] The χ^2 statistic in election E1 for the overall comparison for type 2 voters = 0.91, Pr = 0.92 and for type 1 = 2.30, Pr = 0.68; for the comparison for voting cost of 1 kroner = 0.36, Pr = 0.99 and 4.73, Pr = 0.32, respectively; for the voting cost of 5 kroner = 1.05, Pr = 0.90 and 0.66, Pr = 0.96, respectively; for election E2 overall comparison = 5.20, Pr = 0.27 and 5.39, Pr =0.25, respectively; for voting cost of 1 kroner = 2.23, Pr = 0.69 and 2.21, Pr = 0.70, respectively; and for voting cost of 5 kroner = 3.73, Pr = 0.44 and 7.54, Pr = 0.11, respectively.

Figure 7: Type 1 Voter Behavior by Ethical Election and Electorate Size



Underdog Effect

If voting is selfish, we expect to find an underdog effect, that is, we expect to find that type 2 voters abstain less than type 1 voters. However, as with the size effect, we find little evidence in support of an underdog effect. In fact, type 2 voters abstain more than type 1 voters overall. In Election B, nearly 50% of type 2 voters abstain compared to approximately 34% for type 1 voters.[36] In Election B, the higher abstention rates of type 2 voters compared to type 1 voters is significant across electorate sizes and voting costs except for the electorate of 300 and the electorate 30 when the cost of voting is 5 kroner.[37] It could be that the higher abstention reflects ethical instrumental voting by type 2 voters, since party 1 is the ethical choice in the election. However, in Election E1, as in the Baseline Election, we find that type 2 voters are overall significantly more likely to abstain that type 1 voters even when party 2 is the ethical choice, although when disaggregated by electorate size and voting cost this effect is isolated

[36] The t test statistic for the comparison of abstention rates equals 6.15, Pr = 0.00.

[37] The t statistic for the comparison of abstention rates across voting costs for electorate size 6 = 5.09, Pr =0.00; for electorate size 30 = 3.49, Pr = 0.00; for electorate size 300 = 1.52, Pr = 0.13; for the comparison across electorate sizes for voting cost of 1 kroner = 6.31, Pr = 0.00; for voting cost of 5 kroner = 2.84, Pr = 0.00; for electorate size 6 and voting cost 1 kroner = 4.94, Pr = 0.00; for electorate size 6 and voting cost 5 kroner = 2.64, Pr = 0.01; for electorate size 30 and voting cost 1 kroner = 3.59, Pr = 0.00; for electorate size 30 and voting cost 5 kroner = 1.48, Pr = 0.12; for electorate size 300 and voting cost 1 kroner = 1.95, Pr = 0.05; and for electorate size 300 and voting cost 5 kroner = 0.28, Pr = 0.78.

to voters in electorate size 30 and voting cost of 1 kroner.[38] In Election E2, we find some evidence of an underdog effect, type 1 voters abstain more than type 2 voters, but the difference is insignificant overall.[39] When we disaggregate by electorate size and voting cost, we find that type 1 voters abstain significantly more than type 2 voters whenever the voting cost is 5 kroner.[40] Thus, we find only extremely weak evidence of underdog effects suggesting that selfish instrumental explanations are not successful in explaining the data.

Summary of Main Results

In summary, we find the following seven results:

Result 1 (Ethical Voting) *We find that a notable minority of voters whose preferred option is not an ethical choice vote for the other option when that choice is an ethical one (10-15%). They are significantly more likely to do so than when the other option is not an ethical choice.*

Result 2 (Bandwagon Voting) *We find evidence of bandwagon voting by voters whose preferred option is not supported a priori by the majority (10-15%). The bandwagon voting occurs even when the choice supported by the a priori majority is not ethical on any of our three dimensions.*

Result 3 (Moral Bias) *We find that there is a moral bias in elections; when a choice is more ethical on the three dimensions, it receives a greater vote share due to ethical voting, even when bandwagon voting offsets ethical voting.*

Result 4 (Size Effect on Abstention) *We find no evidence of a size effect on abstention.*

[38] The z statistic for the overall comparison = 2.51, Pr = 0.01; for electorate size 6 and voting cost 1 kroner = 1.80, Pr = 0.07; for electorate size 6 and voting cost 5 kroner = 0.04, Pr = 0.97; for electorate size 30 and 1 kroner = 3.00, Pr = 0.00; for electorate size 30 and 5 kroner = 0.26, Pr = 0.80; for electorate size 300 and 1 kroner = 1.74, Pr = 0.08; and for electorate size 300 and 5 kroner = 0.28, Pr = 0.78.

[39] The z statistic = 1.76, Pr = 0.08.

[40] The z statistic for the comparison for electorate size 6 and voting cost 1 kroner = 0.52, Pr = 0.60; for electorate size 6 and voting cost 5 kroner = 2.38, Pr = 0.02; for electorate size 30 and voting cost 1 kroner = 1.57, Pr = 0.12; for electorate size 30 and voting cost 5 kroner = 2.16, Pr = 0.03; for electorate size 300 and voting cost 1 kroner = 1.02, Pr = 0.31; and for electorate size 300 and voting cost 5 kroner = 2.30, Pr = 0.02.

Result 5 (Size Effect on Ethical Voting and Moral Bias) *We find no evidence of a size effect on ethical voting and moral bias.*

Result 6 (Underdog Effect) *We find no evidence of an underdog effect on voting behavior.*

Result 7 (Cost Effect) *We find strong evidence of a cost effect on voter behavior; voters with higher voting costs are more likely to abstain.*

Robustness Checks

Ethical Voting and Other-Regarding Behavior

Our evidence suggest that a relatively large minority of voters do engage in ethical voting as they increase other party voting when the other party is an ethical choice. In order to check for robustness of ethical motivations as an explanation for this behavior, we compared their voting choices with their choices in a dictator game that was part of iLEE2. Dictator games have been used as a measure of other-regarding preferences and thus, if these voters are motivated by other-regarding preferences, we should expect some consistency in their behavior. Furthermore, other research has shown a relationship between dictator behavior and voter participation [see for example Fowler and Kam (2007)].

In the dictator game experiment, each subject was endowed with 75 kroner. One subject was designated the dictator and could choose how to distribute the total of 150 kroner endowed to both him and his randomly matched partner recipient. That is, the dictator could choose to keep his own 75 kroner and take up to 75 kroner from the recipient's endowment or to not take at all from the recipient's endowment and to give to the recipient up to 75 kroner from his own endowment. Each subject played the game with two different recipients (randomly matched), once as dictator and once as recipient. Subjects made their dictator decisions without knowing the choice of their randomly matched dictator partner in the game in which they were are recipient. Of the subjects who participated in iLEE4, 658 completed the dictator game. Of these subjects who participated in both experiments, 27.66 percent took all of the recipient's

endowment and earned 150 kroner, 23.56 percent took some of the recipient's endowment and earned between 75 and 150 kroner, and 48.78 percent did not take any money from the recipient or gave the recipient some money and earned 75 kroner or less.[41]

We compare abstention and other party voting in Experiment II by dictator type, voter type, and election. We find that abstention rates are significantly higher for voters who took all of their recipient's endowment in the dictator game for both voter types and in all three elections. These voters abstained 47% of the time compared to abstention rates of 35% for dictators who took less. We also find that other party voting is much lower for these voters as well, only 6% of the time did they vote for the other party, while other dictators voted 10% of the time for the other party.[42]

Moreover, for type 1 voters, these differences in behavior by dictator type are significant for all three elections (type 1 dictators who took all abstained 46% and voted for the other party 4% of the time, while others abstained 32% and voted for the other party 9% of the time), however, the differences are not significant at conventional levels for type 2 voters when disaggregated by election (overall type 2 dictators who took all abstained 49% and voted for the other party 11% of the time, while others abstained 39% and voted for the other party 13% of the time).[43] These results suggest that there is a close relationship between choosing a more fair distribution in the dictator game and those who participate in elections and vote ethically or bandwagon voting (although type 1 dictators who shared the 150 kroner were more likely to vote for the other party in Election B than dictators who took all when this choice is not the ethical one, they were twice as likely to do so in Elections E1 and E2). Placing a value on fairness appears to be highly correlated with both selfish participation (supporting the citizen duty explanation of turnout) and ethical voting. We find similar results when we examine the relationship between

[41] Only 6 subjects (or 0.91 percent) gave the recipient addional money meaning that the recipient earned more than the dicator in these cases.

[42] The χ^2 statistic comparing both vote choices = 67.36, Pr = 0.00.

[43] The χ^2 statistic for type 1 voters in election 1 = 10.21, Pr = 0.04, in election 2 = 29.92, Pr = 0.00, and in election 3 = 28.00, Pr = 0.00; for type 2 voters in election 1 = 6.40, Pr = 0.17, in election 2 = 5.74, Pr = 0.22, and in election 3 = 8.63, Pr = 0.07. These results are robust to controlling for voter cost except for type 1 voters in election 1 with a voting cost of 1 kroner, the relationship is significant only at the 6% level for these voters.

dictator choices and voting behavior in Experiment I.

Individual Differences, Cognitive Behavior, and Voter Errors

To check for robustness of the overall effects reported above for subject-specific differences such as cognitive abilities, age, and sex, we estimated six separate multinomial logits of voter behavior by voter type and election in iLEE4, with independent variables for IQ, age, high voter cost, female, dictator type, experience in iLee3, and electorate size. We find that cognitive abilities, as measured by IQ, is a significant predictor of abstention for type 2 voters (type 2 voters with higher IQ scores abstain more) and other party voting of type 2 voters in Election E2 (type 2 voters with higher IQs vote for the other party significantly less in Election E2). We find no effect of IQ on type 1 voter behavior.[44] This evidence provides some weak support for the explanation that some of the bandwagon voting is explained by voter errors.

We also find no effect of female on voting behavior and some evidence that older voters were less likely to abstain. The other variables were consistent with the analysis above. That is, when the voting cost is 5 kroners, subjects were significantly more likely to abstain and electorate size had no significant effect on voter behavior in any of the estimations. Dictator type significantly predicted both abstention and other party voting, with type 1 voters who as dictators provided more to their partners significantly less likely to abstain and more likely to vote for the other party in Elections E1 and E2. Dictator choices were not a significant predictor of behavior for type 1 voters in Election B or type 2 voters in any of the three elections.[45]

Summary of Additional Results

In summary, our analysis of other-regarding behavior, cognitive abilities, and individual characteristics provides the following additional results:

[44] In the multinomial logits the base outcome was selfish voting. In the estimation of type 1 voters in Election B, the z-statistic measuring the significance of the effect of IQ on abstention = -0.27, Pr = 0.79 and for other party voting = -1.31, Pr = 0.19; for election E1, the z-statistics are -0.95, Pr = 0.34 and -0.80, Pr = 0.42, respectively; and for election E2, = -0.49, Pr = 0.63 and -0.38, Pr = 0.70, respectively. For type 2 voters in Election B, = 2.32, Pr = 0.02 and -1.36, Pr = 0.17; for Election E1 = 2.84, Pr = 0.00 and -1.19, Pr = 0.24; and for Election E2 = 2.21, Pr = 0.03 and -2.17, Pr = 0.03.

[45] The detailed report of these estimations are available from the authors.

Result 8 (Other-regarding Behavior and Abstention) *We find strong evidence that abstention is lower among those who demonstrate other-regarding behavior in the dictator game.*

Result 9 (Other-regarding Behavior and Ethical Voting) *We find strong evidence that ethical voting is greater among those who demonstrate other-regarding behavior in the dictator game.*

Result 10 (Cognitive Abilities and Abstention) *We find weak evidence that subjects with higher cognitive abilities abstain more.*

Result 11 (Cognitive Abilities and Ethical Voting) *We find no relationship between cognitive abilities and ethical voting.*

Result 12 (Cognitive Abilities and Bandwagon Voting) *We find evidence that subjects with higher cognitive abilities engage in less bandwagon voting.*

Concluding Remarks

The paradox of not voting has puzzled researchers for nearly 50 years and has been the subject of much theoretical and empirical investigation. In contrast to previous experimental investigations of voter turnout, we combine both laboratory and field methods, using the control, variation, and incentives of a laboratory experiment with the diversity of subject pool and large electorate sizes possible in the field. We find little evidence in support of selfish voting other than strong cost effects on participation. Abstention is unaffected by the electorate size. Majority voters do not abstain more than minority voters, contrary to the underdog prediction of game theoretic models. However, we find that the majority of voters who participate choose selfishly, voting for the party that yields them the highest payoff, a combination which suggests that most voters are either selfishly expressive or citizen duty motivated. We find that turnout is highest among those who are more "fair" in other contexts such as the dictator game, which lends support to the citizen duty explanation for turnout over simple selfish expressive motivations.

We also find that a significant minority of voters choose ethically in the election, voting for the party that is arguably more ethical. We find approximately 11-15% of voters whose first preference is not an ethical choice choose ethically in Experiment I and 9-10% of comparable voters do so in Experiment II. In both experiments, we find that ethical voting is actually higher in Election E2, in which voters make sacrifices to vote ethically but achieve a higher aggregate payoff than in Election E1. This result suggests that ethical voters are motivated strongly by ethical choices that maximize aggregate payoffs to society and not so much inequities between voters.

Taken together our results suggest that many voters who participate in our sample are motivated by some degree of ethical concerns and that ethical motivations are significant in explaining voter turnout decisions and to a lesser degree vote choices. For the majority of voters, these ethical concerns are relatively minimal, citizen-duty related and explain turnout decisions only; they do not affect how they choose once in the ballot booth, where selfish motivations dominate. For a minority of voters, these ethical concerns are stronger and are also expressed in how they choose once in the ballot booth; these voters appear to both turn out and vote because of ethical motivations. We find that ethical voting does increase the vote share of the party deemed ethical in our experiments and thus there is a moral bias in our elections as Feddersen et al. contend. However, we find no evidence that this moral bias is more pronounced in larger electorates, contrary to their contention.

More troubling is the fact that we also find evidence of a significant but small number of voters engaging in bandwagon voting in Experiment II in which such voting was possible. We find that between 11-15% of voters whose first preference is the minority ex ante candidate but also the ethical one instead vote for the candidate who is the first choice of the majority and the non-ethical choice. To some extent the bandwagon voting may also reflect voter error and lack of attention to the experiment and cognitive abilities, particularly since we find no size effect in bandwagon voting. Notably, bandwagon voting may also reflect a deference of voters to what

may appear at face value to benefit the total of society by voting for the majority. Although in our design, party 2 in Elections E1 and E2 provides higher aggregate payoffs, type 2 voters may not bother to make that calculation and may guess that party 1, because it has more ex ante supporters, is the choice that benefits the total of society. We find some evidence that IQ is related to higher turnout, but less evidence that it explains other-party voting. In Feddersen et al.'s experimental design, bandwagon voting was ruled out by design (in fact in many of the treatments the ethical choice also was ex ante the choice supported by the majority, but the majority were unable to vote – yet their results may also reflect this desire of voters to defer to the majority) and thus the potential offset from such behavior on ethical benefits was not considered. Our results show that ethical voting may not necessarily lead to electoral outcomes that are more ethical when the ethical choice is preferred by the minority, if minority voters are also motivated to vote for the majority candidate by bandwagon effects.

The good news is that although we find approximately the same percentages of bandwagon voting as ethical voting within voting types, there are more ethical voters than bandwagon ones in absolute numbers since there are more type 1 voters who can make an ethical choice for the other party. That is, approximately 7% of all voters vote ethically for the other party in Experiment II, while only about 4% of all voters engage in bandwagon voting for the non-ethical party. Hence, although bandwagon voting exists, ethical voting does still lead to a higher vote share for the ethical choice in our experiment (albeit not a win by that party). Our results provide further support for pro-social explanations of turnout, using a much more diverse subject pool and larger electorates than has been previously considered in laboratory experiments.

Appendix

Table A1: Percent Type 1 Choices by Election, Size, & Cost in Exp. I											
		Election B			Election E1			Election E2			
Size	Cost	1	2	Abs.	1	2	Abs.	1	2	Abs.	Obs.
All	All	76.70	7.95	15.34	71.59	11.17	17.23	66.67	14.58	18.75	528
All	0	84.92	7.82	7.26	79.89	12.85	7.26	81.01	14.53	4.47	179
	1	78.86	6.86	14.29	66.29	13.71	20.00	66.86	18.29	14.86	175
	5	66.09	9.20	24.71	68.39	6.90	24.71	51.72	10.92	37.36	174
6	All	77.33	8.00	14.67	77.33	10.67	12.00	72.00	16.00	12.00	75
	0	88.46	7.69	3.85	84.62	7.69	7.69	92.31	7.69	0.00	26
	1	68.00	12.00	20.00	68.00	20.00	12.00	64.00	28.00	8.00	25
	5	75.00	4.17	20.83	79.17	4.17	16.67	58.33	12.50	29.17	24
60	All	75.82	6.54	17.65	69.28	13.07	17.65	62.09	18.95	18.95	153
	0	84.91	5.66	9.43	81.13	15.09	3.77	81.13	15.09	3.77	53
	1	78.00	4.00	18.00	54.00	20.00	26.00	52.00	32.00	16.00	50
	5	64.00	10.00	26.00	69.28	4.00	17.65	52.00	10.00	38.00	50
600	All	77.00	8.67	14.33	71.33	10.33	18.33	67.67	12.00	20.33	300
	0	84.00	9.00	7.00	78.00	13.00	9.00	78.00	16.00	6.00	100
	1	82.00	7.00	11.00	72.00	9.00	19.00	75.00	9.00	16.00	100
	5	65.00	10.00	25.00	64.00	9.00	27.00	50.00	11.00	39.00	100

Table A2: Percent Type 2 Choices by Election, Size, & Cost in Exp. I											
		Election B			Election E1			Election E2			
Size	Cost	1	2	Abs.	1	2	Abs.	1	2	Abs.	Obs.
All	All	4.87	80.34	14.79	11.05	72.85	16.10	8.05	80.71	11.24	534
All	0	3.35	92.74	3.91	12.29	80.45	7.26	11.17	84.92	3.91	179
	1	5.65	82.49	11.86	12.43	72.32	15.25	7.34	80.79	11.86	177
	5	5.62	65.73	28.65	8.43	65.73	25.84	5.62	76.40	17.98	178
6	All	7.23	69.88	22.89	15.66	63.86	20.48	9.64	79.52	10.84	83
	0	3.57	85.71	10.71	17.86	71.43	10.71	14.29	82.14	3.57	28
	1	11.11	70.37	18.52	14.81	62.96	22.22	7.41	74.07	18.52	27
	5	7.14	53.57	39.29	14.29	57.14	28.57	7.14	82.14	10.71	28
60	All	3.97	85.43	10.60	10.60	77.48	11.92	8.61	80.79	10.60	151
	0	1.96	98.04	0.00	15.69	80.39	3.92	13.73	86.27	0.00	51
	1	4.00	86.00	10.00	8.00	80.00	12.00	6.00	82.00	12.00	50
	5	6.00	72.00	22.00	8.00	72.00	20.00	6.00	74.00	20.00	50
600	All	4.67	80.67	14.67	10.00	73.00	17.00	7.33	81.00	11.67	300
	0	4.00	92.00	4.00	9.00	83.00	8.00	9.00	85.00	6.00	100
	1	5.00	84.00	11.00	14.00	71.00	15.00	8.00	82.00	10.00	100
	5	5.00	66.00	29.00	7.00	65.00	28.00	5.00	76.00	19.00	100

Table A3: Percent Type 1 Choices by Election, Size, & Cost in Exp. II											
		Election B			Election E1			Election E2			
Size	Cost	1	2	Abs.	1	2	Abs.	1	2	Abs.	Obs.
All	All	62.11	3.41	34.47	55.45	8.83	35.72	52.21	10.24	37.55	1201
	1	76.00	4.83	19.17	71.67	9.50	18.83	67.17	11.33	21.50	600
	5	48.25	2.00	49.75	39.27	8.15	52.58	37.27	9.15	53.58	601
6	All	64.07	3.59	32.34	56.29	7.78	35.93	53.49	8.98	37.52	501
	1	77.60	6.00	16.40	72.00	7.20	20.80	68.00	9.20	22.80	250
	5	50.60	1.20	48.21	40.64	8.37	51.00	39.04	8.76	52.19	251
30	All	61.28	3.59	35.13	55.89	8.98	35.13	53.09	11.58	35.33	501
	1	74.00	4.80	21.20	72.80	10.00	17.20	66.40	13.20	20.40	250
	5	48.61	2.39	49.00	39.04	7.97	52.99	39.84	9.96	50.20	251
300	All	59.30	2.51	38.19	52.26	11.06	36.68	46.73	10.05	43.22	199
	1	77.00	2.00	21.00	68.00	14.00	18.00	67.00	12.00	21.00	100
	5	41.41	3.03	55.56	36.36	8.08	55.56	26.26	8.08	65.66	99

Table A4: Type Voter 2 Choices by Election, Size, & Cost in Exp. II											
		Election B			Election E1			Election E2			
Size	Cost	1	2	Abs.	1	2	Abs.	1	2	Abs.	Obs.
All	All	10.45	39.97	49.59	15.09	43.12	41.79	11.28	55.39	33.33	603
	1	12.21	48.18	39.60	16.83	53.14	30.03	13.20	60.07	26.73	303
	5	8.67	31.67	59.67	13.33	33.00	53.67	9.33	50.67	40.00	300
6	All	10.71	37.70	51.59	16.27	43.65	40.08	9.92	57.94	32.14	252
	1	11.02	48.03	40.94	17.32	53.54	29.13	12.60	62.20	25.20	127
	5	10.40	27.20	62.40	15.20	33.60	51.20	7.20	53.60	39.20	125
30	All	9.52	42.06	48.41	14.68	42.86	42.46	14.29	52.78	32.94	252
	1	11.02	4961	39.37	17.32	51.97	30.71	15.75	56.69	27.56	127
	5	8.00	34.40	57.60	12.00	33.60	54.40	12.80	48.80	38.40	125
300	All	12.12	40.40	47.47	13.13	42.42	44.44	7.07	55.56	37.37	99
	1	18.37	44.90	36.73	14.29	55.10	30.61	8.16	63.27	28.57	49
	5	6.00	36.00	58.00	12.00	30.00	58.00	6.00	48.00	46.00	50

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