The Secret Ballot and Prosocial Behavior[1]

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March 29, 2015

[1]Support for this research from New York University is greatfully acknowledged. We thank Han Il Chang, Dominik Duell, Jorge Gallego, Tianyang Xi, and Biling Zhang for their assistance in conducting the experiments. We also appreciate the comments/advice of Bernd Beber, Eric Dickson, Jon Eguia, Timothy Feddersen, Ignacio Esponda, Dorothea Kübler, Salvatore Nunnari, and Ernesto Reuben. Earlier versions of this paper were presented at the WZB Berlin Social Sciences Center, the Center for Experimental Social Sciences, New York University, and the University of Pittsburgh Behavioral Models Conference and we thank the participants for their comments and suggestions. All errors remain the responsibility of the authors.

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Abstract

We compare the effects of observability on voters' prosocial behavior in elections. Voters are more likely to choose nonselfishly when voting is public as compared to private. Voters are least likely to choose nonselfishly when voting is private and they are in the majority (2-8%) and most likely to do so when voting is public and they are in the minority (25-38%). These differences in behavior advantage prosocial choices in elections (by 26%) when voting is public. Moreover, some voters willingly choose public voting even at their own expense, suggesting a preference for voting mechanisms that advantage prosocial choices.

keywords: secret ballots, observability, voting, prosocial behavior, other-regarding voting, bandwagon voting

I Introduction

Secret ballots are used in many voting situations in order to ensure privacy and anonymity. In large elections they are seen as a way to shield democracy against corruption and vote-buying, giving citizens protection from intimidation and coercion so that they can make free choices.[1] Secret ballots are also used in many smaller voting groups such as legislative and parliamentary leadership decisions and other internal allocative choices as well as academic committees making personnel decisions. Privacy in voting in these smaller groups is viewed as a safeguard to prevent strong arm tactics from party leaders or academic deans and other administrators.[2]

The main argument against the use of the secret ballot focuses on the responsibility of the voter as a representative to a larger community – an emphasis on the value of the vote to the interests of the larger society over individual private interests. The argument that the secret ballot facilitates selfish behavior at the expense of the public good goes back to at least John Stuart Mill (1861). Recently, in academic personnel decisions the concern voiced is that the secret ballot can allow biased individuals to vote based on selfish and inappropriate reasons (personal likes and dislikes) or legally discriminatory reasons such as race, ethnicity, sexual orientation, religion, national origin, or age, which they would be less comfortable doing if voting were public. Indeed, in 1981 a U.S. Federal Court compelled a member of the University of Georgia's Education Promotion Review Committee to disclose his vote on a tenure decision arguing that the importance of the vote for the university required that the individual voice his opinion publicly.[3] The

[1] For studies of the history and effects of the adoption of the secret ballot in elections see Evans 1917, Harris 1929, 1934, Benson, 1941, Rusk 1970, Wigmore 1989, Heckelman 1995, Kenny & Lott 1997, Kousser 1974, Stokes 2005.

[2] See Saalfeld (1995) and Robbins (2007).

[3] See *In re Dinnan*, 661 F.2d 426 (5th Cir. 1981).

criticism of the secret ballot is not just expressed about small group decision making; Brennan and Pettit (1990) argue for loosening the veil on voters' choices even in large elections by having voters go to different voting booths depending on which choice they plan to make as a way of inducing voters to make less selfish choices.

Much recent experimental research has highlighted that observability alone may influence individuals' choices, in particular, their willingness to engage in prosocial behavior.[4] This evidence suggests that criticism of secret ballots may be correct, that the extent that voting is public may affect individuals' willingness to forgo private selfish concerns for "the greater good" or a perceived more prosocial choice. In situations where voting is public, the outcome may be more likely to be prosocial as a consequence.

The extent that individuals have privacy in voting is not uniform. Recent studies of e-voting systems which are being adopted or considered in many jurisdictions find that they cannot guarantee the anonymity of a secret ballot (see Jefferson et al. 2004 and Loeber 2008). Mail-in and absentee ballots used in many states and localities are also potentially non secret as individuals' choices may be made in homes and other localities where privacy may not be ensured. Legislatures vary in their use of secret ballots; although public voting is used for most votes in the U.S. Congress, secret ballots are often used in making committee assignments (see Frisch and Kelly (2006)) as well as in some leadership and other internal decisions. Similarly, while most European countries adopted public voting early in the 20th century, the Italian parliament used secret ballots extensively until 1988 and the President in Italy (not Premier) is still elected by secret ballots of legislators and regional delegates. The European Union parliament allows for

[4]See Kahneman et al 1986, Forsythe et al 1994, Camerer 2003, and Koch and Normann 2008. A number of recent experiments on charitable giving and public goods games show the effects of observability, see: Andreoni and Petrie (2004), Ariely, et al (2009), Lacetera and Macis (2010), Linardi and McConnell (2011), and Soetevent (2011). Benabou and Tirole (2006) provide a formal model in which individuals care about their social image and provides one explanation for these observations.

the use of secret ballots if requested by 20% or more of its members. Likewise, Robbins (2006) finds that although most law schools in the United States use secret ballots for personnel decisions, nine of the top eleven law schools (according to rankings in U.S. News & World Report) do not use them.

Despite the variance in the extent that voting is public, the theoretical argument that observability makes voters more socially responsible, and the suggestion from other research that observability affects individuals' prosocial behavior, there is no empirical evidence on the question of the effects of secret ballot on the content of voters' choices either in the field or the laboratory. Most of the empirical research on the secret ballot (both with observational and experimental data) focuses on its effects on turnout in large elections.[5] The observational research suggests that the advent of the secret ballot in U.S. elections led to a large decline in turnout, which most presume resulted from a reduction in vote buying, although some argue that the decline is due to the literacy requirements implicit in a secret ballot.[6]

A recent field experiment conducted during a naturally occurring election suggests a complicated relationship between the secret ballot and turnout in modern day elections. Specifically, Gerber et al 2013 found that alleviating privacy concerns of voters who do not have a history of participation can increase their turnout, while having little effect on voters who tend to vote regularly. Furthermore, another field experiment on privacy in a naturally occurring election found that voters whose preferences are in the minority are most likely to be concerned about the privacy of their decisions (see Karpowitz 2011),

[5] See for example, Rusk 1970, Heckelman 1995, Kenny & Lott 1997, Gerber et al 2013, and Karpowitz et al 2011.

[6] For example, Heckelman (1995, 2000) contends that the decline is due to the reduction in vote buying while Kousser 1974 contends that the secret ballot increased the literacy requirement for voting which penalized black and poor voters disproportionately. Vicente (2013) found that a campaign against vote buying in West Africa significantly reduced turnout and increased the vote share of the incumbent.

suggestive of a relationship between observability and social conformity.[7] These field studies on turnout, however, are unable to investigate directly whether the secret ballot actually changes individual voters' choices, makes them choose more selfishly and less for socially desirable options. That is, although there may be effects of the secret ballot on vote shares (as found by Vicente 2013), these effects could be simply due to the effects of observability on turnout, not in voters making different choices. Moreover, in naturally occurring elections it is difficult to measure individuals' private preferences and determine when a voter's selfish preference may be in conflict with an arguably prosocial choice.

In this paper we investigate the effects of observability on the extent that voters choose pro-socially. We compare choices under secret ballots and public voting. We consider elections in which one of the choices is arguably more prosocial and in which the difference in choices is not large. Hence we consider directly whether observability of voting decisions leads to greater prosocial voting behavior. In our experiments we are able to control and manipulate underlying voter preferences and the choices before voters while varying privacy in voting independently so that we can measure the causal effect of observability directly.

A number of previous experiments compare simultaneous private voting with sequential public voting such as Morton and Williams (1999, 2001), Battaglini, et al (2007), and Fischbacher and Schuddy (2013). In situations of sequential voting, earlier voters may have an incentive to attempt to influence later voters as later voters update based on observed choices. In this paper we wish to isolate the effects of observability of one's vote from the effects of choosing sequentially versus simultaneously. Thus, in the public voting treatment in our experiment we reveal votes in an election only after all have

[7] Setälä, Grönlund, and Herne (2010) conducted a deliberation experiment in the field in which they compared secret ballots with nonsecret deliberation. They found little differences in opinion changes between treatments, but a greater increase in knowledge of participants without secret ballots.

chosen. Our experimental design also allows us to isolate the effects of observability on voting behavior by eliminating other factors that might affect voters' choices when voting is public, such as coercion, intimidation, and communication between voters.[8]

In the next section we summarize the voting games used in the experiment and predictions of behavior. In Section II we present our experimental design, how we vary privacy in voting, and the predicted effects of observability on behavior. Section III contains the results of our principal treatments and Section IV discusses our robustness checks. In Section V we present our follow-up experiment in which subjects are given a choice between public voting and secret ballots and Section VI concludes.

II Voting Games and Predicted Behavior

In our experiment we study a simple voting game in which there are 10 voters, divided into two groups, which we label Type A and Type B voters. There are x voters of Type A and $10 - x$ voters of Type B, where $x = 6$ in our principal treatments.[9] The size of the electorate and of each type of voters is common knowledge to all. 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 principal voting games we used. All type i voters receive the same payoffs if party j is elected, $u_i^j > 0$. Subjects were asked to vote for party A, party B, or abstain. Moreover, type i voters receive higher payoffs if party i is elected; that is, $u_A^A > u_A^B$ and $u_B^B > u_B^A$. Hereafter, for expositional purposes we label u_i^i voter i's "selfish preference." We also label vote choices when voter i votes for party j, $i \neq j$, "other party voting." Voting for a party is costly, while abstaining is free. The cost of voting was always \$2. Although subjects played 24 voting games

[8] Our design also allows us to measure the effects of observability independent of the possible effects of public voting on legislators due to re-election concerns.

[9] As explained below, we vary x in our robustness tests.

in a session (8 games of each type of election), only one voting game of the total was paid. This game was randomly selected by one of the subjects at the end of the session. Subjects also received a show-up fee of \$8 and a total average payoff of approximately \$24.

Table 1: Voter Payoffs in U.S. Dollars

	Election C		Election E1		Election E2	
Voter Type	A wins	B wins	A wins	B wins	A wins	B wins
A	20	5	25	20	25	18
B	5	20	5	20	5	23

We used a random dictator rule to determine the winner in each election.[10] Specifically, in each election all ballots (including abstentions) were placed in a box and a subject was chosen to draw one of the ballots to determine the winner. Subjects were chosen to draw the winners sequentially such that all subjects chose the winner in at least two elections. If the ballot drawn was an abstention then another ballot was drawn until a ballot marked with either A or B was chosen. We used the random dictator rule for three reasons. First, introducing a random effect on the outcome of the election allowed us to identify unique symmetric equilibria to the voting games in our principal treatments, as described below.[11] Second, the random dictator rule introduced some uncertainty over the outcome of the election such that even if all voters voted sincerely, there was a probability that B could win the election. This uncertainty captures the "realism" of naturally occurring voting situations in which individual preferences may be subject to random shocks or variations. Third, in order to manipulate the degree of privacy subjects experienced in the voting games (as discussed below), we conducted the experiment "by

[10] Feddersen, et al. 2009 use a similar mechanism.

[11] An alternative method of introducing random effects in voting games is to make the cost of voting random as in Levine and Palfrey (2007). Given that we conducted this experiment without the aid of a computer network in order to manipulate privacy, the added complication of having a random cost of voting would have made the experiment longer than is typically acceptable for subjects. As discussed below, there are asymmetric equilibria in voting games C and E2, but we find little support for these equilibria in the data.

hand," not via computer networks as is typical for such voting experiments. Hence, it was more time efficient to use the random dictator rule than the traditional counting of the ballots (although we did also publicly count ballots in some treatments as we describe below).

As noted in Table 1, we conducted three types of elections, a *Control Election* (Election C) and two *Prosocial Elections* (Elections E1-E2). Following Feddersen et al. (2009), our payoffs in the prosocial elections meet the following three conditions:[12]

(a) Party B minimizes the inequality in payoffs: $u_A^A - u_B^A > u_B^B - u_A^B$
(b) Party B maximizes the minimum payoff: $u_B^A < u_A^B$
(c) Party B maximizes aggregate payoffs: $6u_A^A + 4u_B^A < 6u_A^B + 4u_B^B$

Condition (a) means that the difference in payoffs between Types A and B voters is smallest when party B wins, minimizing the inequality in payoffs. Condition (b) means that the payoff received by voters of Type A is greater when party B is elected than that received by voters of Type B when party A is elected, maximizing the minimum payoff. Condition (c) means that party B provides higher total aggregate payoffs, or if we think of aggregate payoffs as social welfare, is the most efficient outcome for society. In our prosocial elections all three inequality conditions hold and thus party B is labeled as more prosocial than party A accordingly.

In our Control Election $u_A^A = u_B^B = 20$ and $u_B^A = u_A^B = 5$ so the inequality in payoffs and the minimum payoff for party A is the same as for party B and neither condition holds for either party. However, voting for party A maximizes the sum of payoffs when $x = 6$ in our Control Election because Type A voters will be in greater numbers. Thus, in our Control Election voting for party A is weakly prosocial (Condition (c) is satisfied for party A, but not conditions (a) or (b)). Hereafter, vote choices when a Type A subject

[12] Feddersen et al. (2009) call the behavior we study "ethical" rather than prosocial. However, we use the label prosocial since it is less ambiguous than the term ethical and is widely accepted within social science as a term to describe "actions intended to benefit one or more people other than oneself–actions such as helping, comforting, sharing, and cooperation," see Batson and Powell (2003).

votes for party B in E1 and E2 (or when a Type B subject votes for party A in C) are labeled "prosocial other party voting" and vote choices when a Type B subject votes for party A in E1 and E2 (or a Type A subject votes for B in C) are leaded "non-prosocial other party voting."

The prosocial elections vary in whether inequity results when party B wins. That is, in Election E1, $u_B^B = u_A^B = 20$, so both types of voters benefit equally if party B wins, but in Election E2, $u_B^B = 23 > u_A^B = 18$, so voting prosocially for Type A voters means that they give Type B voters more of a payoff than they receive themselves. Hence Election E1 is a prosocial election without inequity and Election E2 results in inequity. When such inequity exists, Type A voters may place a lower value on voting prosocially for party B as when such inequity does not exist. Feddersen et al. (2009), for example, setup their prosocial choice so that such inequity does not occur because they anticipate voters will be less willing to sacrifice to benefit others.[13] Thus, if Type A voters care about the fairness of outcomes in relation to themselves, we expect to observe more prosocial voting in Election E1 than in Election E2. Note also that the aggregate payoffs are the same in E1 and E2, so the only difference is in the degree of fairness.

II.1 Equilibrium Predictions Under Selfish Voting

As a benchmark for our analysis of the data, we derive the equilibrium predicted voting behavior assuming selfish behavior; that is, that voters care only about their own payoffs. We also focus on symmetric equilibrium strategies, i.e. where voters of the same type with the same information use the same strategies. Define p as the probability that an A type voter votes for A and q as the probability that a B type voter votes for B. Given the random dictator rule, it is straightforward to show that any vote in favor of a party

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

increases the probability that that party wins the election. Hence, for any distribution of voter choices, voting for one's own party strictly dominates voting for the alternative party. Thus, the only choice facing voters is whether to vote their own party or abstain and the probability that an A (B) type voter abstains is given by $1-p$ $(1-q)$. Define π_i as the increase in the probability of party i winning when a voter of type i chooses to vote rather than abstain. We assume voters make their voting decisions using the standard calculus of voting (randomizing when indifferent between abstaining and voting):

If $\pi_i(u_i^i - u_i^j) > 2$ vote for party i
If $\pi_i(u_i^i - u_i^j) = 2$ randomize
If $\pi_i(u_i^i - u_i^j) < 2$ abstain

There are no symmetric pure strategy equilibria to any of our voting games. We therefore solve for the symmetric mixed strategy equilibria, which are summarized in Table 2 below (see Appendix A for details).[14]

Table 2: Selfish Predictions

Election	p^*	q^*	Prob. A Wins
C	0.35	0.52	50%
E1	0.01	0.37	4%
E2	0.08	0.48	20%

For Election C, our theoretical analysis provides predictions similar to those found in other experiments using analogous payoff matrices. That is, our analysis predicts that minority voters will turnout at a higher rate than majority voters (the so-called underdog effect), such that the outcome of the election is a toss-up and the minority party, B, is as likely to win as the majority party. For Elections E1 and E2, however, the difference in payoffs to A voters from B winning instead of A are substantially less than the difference for B voters. As a consequence, we expect turnout of A voters to be substantially lower (almost nil) as compared to that of B voters and a much lower probability that A wins

[14] There are asymmetric equilibria in pure strategies in Elections C and E2. In Election C there are asymmetric equilibria where 2 voters of each type participate and in Election E2 there are asymmetric equilibria in which 1 A type votes and 2 B types vote. There are also asymmetric mixed strategy equilibria as well in Elections E1 and E2.

as compared to Election C. These predictions are summarized below:

Prediction 1 (Underdog Turnout Effect) *Under selfish voting, voters in the minority should participate at a higher rate than voters in a majority in Election C. As a result, the outcome of the election will be a toss-up.*

Prediction 2 (Relative Benefit Effect) *Under selfish voting, voters whose favored candidate is the prosocial choice should participate at a higher rate than voters whose favored candidate is not the prosocial choice. As a result, the prosocial candidate is expected to win most of the time.*

II.2 Predictions with Prosocial Voting

In our analysis above we assume that voters choose based purely on their selfish preferences and do not receive any utility from making a choice that is deemed more prosocial than the alternative. In our elections, however, if voters have prosocial motivations Type B voters might be willing to vote for party A in Election C because party A leads to greater aggregate payoffs, higher social welfare. And Type A voters might be willing to vote for party B in Elections E1 and E2 because party B not only leads to greater aggregate payoffs, but also maximizes the lowest payoff, and minimizes the inequity in payoffs. Indeed, Feddersen et al (2009) found evidence suggestive of prosocial other party voting in an election similar to our E1.[15] In particular, they argue that some voters displayed a tendency to engage in what they label "ethical expressive voting" in which they receive some additional consumption utility from voting for the prosocial choice independent of

[15] In their experiment they only allowed their equivalent of type A voters to participate and varied the probability that a vote was pivotal by varying the number of type A votes which could determine the outcome. Although they found evidence of type A voters choosing their equivalent of party B, since only these voters could vote they did not compare this tendency to the extent that B voters vote for A or to voter behavior in other elections in which voting for a nonselfishly preferred party was less clearly prosocial.

the electoral outcome. As the expected benefits from voting for a selfish choice decline with a decline in the probability of being decisive, then, they contend that selfish voters chose to abstain but prosocial voters continue to participate, advantaging prosocial choices.

Formally, we assume that with probability θ a voter is a "prosocial expressive" voter and will always vote for the prosocial choice and with probability $1-\theta$ a voter is selfish and will vote to maximize his or her expected payoffs. Furthermore, we assume that θ is a function of observability, such that an increase in observability of votes increases θ. We choose to model prosocial behavior in this fashion rather than assuming that a voter receives some utility from voting for the prosocial choice since we are agnostic as to the motivations behind voting prosocially. That is, as Batson (2003) discusses, prosocial behavior does not imply or require altruistic preferences. Indeed, if observability of voting leads to more prosocial behavior, then arguably one reason is that these voters are engaging in the behavior not because they are more altruistic in such a situation, but because they care about how they are perceived, their social image (note that we minimize possible reciprocity and reputation reasons in our experimental design). Yet, we also do not want to assume that all prosocial voting is due to social images concerns; we wish to allow that some voters are genuinely altruistic and engage in prosocial voting even when ballots are secret and social image concerns are not relevant. Our experimental design, by varying privacy, allows us to distinguish between the two possible motivations between prosocial voting and the extent that both exist.

As θ increases, we expect selfish voters to best respond by engaging in what we call "compensating behavior." That is, we expect selfish voters to change their voting behavior, such that those whose first preference is the prosocial choice abstain more and those whose first preference is not the prosocial choice vote their first preference more often. Table 3 summarizes the equilibrium values of p and q in the different elections for values of

$\theta \leq 0.14$. Note that in Election C as θ increases the equilibrium value of p decreases and the equilibrium value of q increases, and in Elections E1 and E2 as θ increases the equilibrium value of p increases and the equilibrium value of q decreases, both of which reflects the compensating behavior discussed above. The compensating behavior should imply that even when we observe prosocial voting, the expected vote shares received by the two parties and the probabilities of winning should be the same as when all voters are selfish. Furthermore, the compensating effect implies that as θ becomes large, participation of voters whose first preference is the prosocial choice, even allowing for some to be prosocial expressive, is less than that predicted with only selfish voters. So for example, when $\theta = 0.10$, the predicted percent votes for A (total participation) from Type A voters (combining together both selfish and prosocial Type A voters) in Election C is 27%, as compared to 35% when $\theta = 0$. Similarly, when $\theta = 0.10$, the predicted percent votes for B from Type B voters in Election E1 (E2) is 22% (34%), as compared to 37% (48%) when $\theta = 0$. Depending on the payoffs in the election and whether the majority's selfish preference is the prosocial choice, as θ increases participation of selfish voters whose first preference is the prosocial choice converges to zero and participation of selfish voters whose selfish preference is not the prosocial choice approaches zero (although still positive given the random Dictator Rule in determining the winner).

Table 3: Predictions with Some Prosocial Expressive Voters										
				Expected Percent Votes						
				From All Type A's			From All Type B's			
Election	θ	p^*	q^*	A	B	Abstain	A	B	Abstain	Pr. A wins
C	0.02	0.33	0.53	34%	0	66%	2%	52%	46%	50%
	0.06	0.26	0.54	30%	0	70%	6%	51%	43%	50%
	0.10	0.18	0.56	27%	0	73%	10%	50%	40%	50%
	0.14	0.11	0.58	24%	0	76%	14%	49%	37%	50%
E1	0.02	0.008	0.37	0.8%	2%	97.2%	0	34%	66%	4%
	0.06	0.009	0.29	1%	6%	93%	0	28%	72%	4%
	0.10	0.014	0.14	1%	10%	89%	0	22%	78%	4%
	0.14	0.021	0.02	2%	14%	84%	0	15%	85%	4%
E2	0.02	0.083	0.44	8%	2%	90%	0	45%	55%	20%
	0.06	0.089	0.36	8%	6%	86%	0	40%	60%	20%
	0.10	0.095	0.22	9%	10%	81%	0	34%	66%	20%
	0.14	0.103	0.16	9%	14%	77%	0	28%	72%	20%

If θ is a function of the size of the perceived prosocial benefits of a particular choice, then we might expect that prosocial other party voting will be greater in E1 than in C. Furthermore, we might expect less prosocial other party voting in Elections E2 than E1 if prosocial voters care primarily about fairness. If prosocial voters care primarily about aggregate payoffs, then there should be little difference in prosocial other party voting between E1 and E2. We summarize these predictions below:

Prediction 3 (Prosocial Expressive Voting) *If some voters are prosocially expressive, then we expect to find that some Type B voters choose party A in Election C, but not in elections E1 and E2, and that some Type A voters choose party B in Elections E1 and E2, but not in Election C. Conversely, we expect to find compensatory behavior by Type A voters in Election C and Type B voters in Elections E1 and E2.*

Prediction 4 (Inequity v. Aggregate Welfare) *If voters care more about fairness, then we expect more prosocial other party voting in Election E1 than in Election E2. Conversely, we expect to find more compensatory behavior by Type B voters in Election*

E1 than in E2. If voters care more about aggregate welfare, then we expect little difference in prosocial other party voting and compensatory behavior between Elections E1 and E2.

II.3 Predictions with Bandwagon Voting

An alternative explanation for voters choosing a party that is not their selfish preference is the desire to vote for the winner, or bandwagon voting.[16] If individuals receive consumption utility from choosing the party that is most likely to win, then we expect minority voters to vote for the majority regardless of whether that party is the prosocial choice or not. Thus, a desire to vote for the winner should lead voters of Type B to vote for party A when A is in the majority but not the prosocial choice (in Elections E1 and E2), engage in non-prosocial other party voting when the non-prosocial choice is the selfish preference of the majority. We label such voting non-prosocial bandwagon voting. Of course, such bandwagon voting should result in compensatory behavior by voters who do not receive consumption utility from bandwagon voting and whose first preference is in the majority. That is, these voters should abstain more. The compensatory behavior should lead to less of a difference between the expected outcome of the election and the case with purely selfish voters, as in the case of prosocial expressive voting.

Prediction 5 (Bandwagon v. Prosocial Voting) *If voters care about being on the winning side, then we expect some Type B voters to choose party A, even when A is not a prosocial choice in Elections E1 and E2 (non-prosocial bandwagon voting). We expect to find some compensatory behavior by Type A voters in these elections if we observe non-prosocial bandwagon voting.*

[16] For a theoretical model of bandwagon voting see Zech, C. (1975).

III Privacy and Experimental Design

The experiment was conducted at New York University. Subjects were recruited via a subject pool in which there are more than 4,500 registered NYU students from different majors. The diverse and large subject pool helps to guarantee that most students did not know each other before the experiment. Subjects were not allowed to participate in more than one session of the experiment. Subjects were identified by their ID numbers; no names were revealed before or after the experiment.

In this experiment we are interested in the effects of observability on subjects' voting behavior. Our two principal treatments were a Secret Ballot Treatment, or S, and a Public Voting Treatment, or P. Most recent voting experiments are conducted via computer networks. The computerized environment provides considerable privacy to subjects except with respect to the experimenter, who is aware of subjects' choices by experimenter given ID numbers, what is typically called a "single-blind" setting. We wished to provide subjects with anonymity from even the experimenter as well as other subjects to ensure that our secret ballot treatment was equivalent to a true secret ballot. And in our public voting treatment, we wished to ensure that individuals faced each other and could observe each others' voting choices. As such, we chose to conduct our experiment outside of a computerized environment using pen and paper.

In the Secret Ballot Treatment to maintain the double-blind privacy we recruited one additional subject who was randomly selected to be a "monitor." The monitor sat in a room where he or she could not see the subjects but could see the experimenters and hear the experimental instructions. The monitor calculated payoffs for subjects by ID number, but did not know which subject was assigned to which ID number. In the Public Voting Treatment our special concern was that subjects made their choices in private and

then revealed the choices such that voting was not sequential and we implemented special procedures to ensure subjects did not change their choices. We describe our procedures in full detail in the Supplemental Online Appendix B.

III.1 Predicted Effects of Observability

In summary, we examine voting behavior under two anonymity levels: Secret Ballot and Public Voting. How do we expected observability to matter? Given that all voter decisions are made simultaneously (even when there is limited privacy as in P), the selfish and prosocial voting predictions derived in the preceding section continue to hold regardless of privacy condition. Moreover, our design limits the ability of subjects to engage in coercion or otherwise intimidate or bribe fellow voters since the subjects did not know each other in advance, did not know the details of the experiment in advance, and communication between subjects was not allowed during the experiment. Therefore, we do not expect that reductions in privacy should affect voters via those mechanisms. Our focus is on the effects of observability on the willingness of voters to both participate and choose prosocially rather than selfishly without coercion, intimidation, bribes, or communication. Previous research has suggested that observability increases prosocial behavior. We therefore assumed above that observability increases θ, the probability that a voter chooses prosocially, independent of any other concerns. Thus we expect to observe more prosocial other party voting under public voting as compared to secret ballots. This prediction is summarized below:

Prediction 6 (Effects of Observability on Prosocial Voting) *We expect prosocial other party voting to be higher in the Public Voting Treatment than in the Secret Ballot Treatment.*

As discussed in the previous section, increasing θ leads to compensating behavior of non-prosocial voters such that prosocial choices are not actually advantaged. That is, selfish voters who prefer the prosocial choice should participate less (leading actually to lower participation overall of the voters whose selfish preference is the prosocial choice) and selfish voters whose selfish preference is not the prosocial choice should participate more. However, evidence from previous experiments conducted in the field casts doubt on the likelihood of such compensatory behavior. For example, the field evidence of Gerber et al (2013) (discussed in the introduction) suggests that voters who feel that their voting choices (not just participation decisions, but choices in the ballot booth) are not fully private are less likely to participate and that of Karpowitz et al (2011) that voters whose preferences are in the minority are likely to be more concerned about their privacy in expressing their vote choices. Hence, under public voting we might expect that turnout of those voters who think their vote choices may be contrary to the majority opinion might be lower as compared to the Secret Ballot Treatment. Instead of engaging in compensating behavior by participating more, selfish voters whose selfish preference is not the prosocial choice may choose to participate less. One explanation for this turnout effect is that these selfish voters care about their social image, which induces them to make choices that appear less selfish (see for example Benabou and Tirole (2006)). By abstaining, these voters are not "outed" as being selfish and having preferences contrary to the social norm.

In contrast, those whose selfish preference is arguably the prosocial choice, might actually turnout at a higher rate in the Public Voting Treatment, which is also contrary to the prediction of compensatory behavior. That is, these voters may enjoy the enhanced social image from voting for the prosocial choice and participate in greater percentages. Therefore, we predict that voters' turnout decisions will be contrary to those predicted by

compensatory behavior for prosocial other party voting. Those whose selfish preference is arguably not the prosocial choice will be less likely to turnout in the Public Voting Treatment as compared to the Secret Ballot Treatment and that those whose selfish preference is arguably the prosocial choice will be more likely to turnout in the Public Voting Treatment as compared to the Secret Ballot Treatment. We summarize these predictions below:

Prediction 7 (Effects of Observability on Turnout) *We expect a differential effect of privacy on turnout. We expect that voters whose selfish preferences are in the minority and/or contrary to social norms (in our formulation Type B voters in Election C and Type A voters in Elections E1 and E2) may turnout less in the Public Voting Treatment as compared to the Secret Ballot Treatment, while those voters whose preferences are in the majority and/or coherent with social norms (in our formulation Type A voters in C and Type B voters in Elections E1 and E2) may turn out more in the Public Voting Treatment as compared to the Secret Ballot Treatment.*

Finally, we expect that the greater prosocial other party voting and differential effect of observability on turnout should advantage the prosocial choice and increase the probability that that choice wins elections. We summarize these predictions below:

Prediction 8 (Effects of Observability on Election Outcomes) *We expect that the prosocial choice will be more likely to win under Public Voting than in the Secret Ballot Treatment.*

III.2 Election Sequences and Robustness Checks in Part I

Our experiment is divided into two Parts. In Part I we conducted 12 sessions which varied by privacy treatment with 7 sessions of S and 5 sessions of P. Because of the complicated

procedures, we used a between-subjects comparison of privacy treatments, but varied elections within each session, using between- and within-subjects comparisons of election types. In Part II, we conducted 4 additional sessions in which subjects participated both types of privacy conditions and then could choose which mechanism to use in subsequent periods. We explain and present the results of Part I first, then we explain and present the results of Part II subsequently.

We conducted three variants of election sequences in Part I. In our principal or main variant, Sequence I, we used a fixed order in which $x = 6$ (there were 6 Type A voters and 4 Type B voters) and subjects participated in Elections C, E1, and E2 sequentially, with 8 periods for each election type for a total of 24 elections. That is, for periods 1-8 subjects played Election C with $x = 6$, for periods 9-16, subjects played Election E1 with $x = 6$, and for periods 17-24, subjects played Election E2 with $x = 6$. Subjects also stayed in the same roles throughout the session. The design of Sequence I was chosen in order to facilitate learning and convergence to equilibria as well as within-subjects' comparisons of behavior. Although subjects engaged in repeated elections within the same cohort and they knew in advance they would participate in 24 elections, there was no opportunity for punishment of other voters across election periods since subjects did not know the voting games in advance nor when the voting games would change. Moreover, subjects knew that only one election period would be selected for payment.

In our second election sequence, Sequence II, subjects participated in Election C for 8 periods and then Election E1 for periods 9-24, also with $x = 6$. We conducted Sequence II for two reasons: (1) Sequence I may have not allowed subjects sufficient learning experience in Election E1 to converge to equilibrium behavior and (2) our comparison of E1 and E2 in Sequence I may be confounded by the fact that E2 always follows E1.

For a robustness check on the further effects of sequence, fixed roles, and fixed ma-

jorities, we conducted additional sessions using a more complicated sequence in which we varied election type by period, rather than in blocks, Sequence III. We also varied by period which party was in the majority and subjects' roles (so that subjects were sometimes Type A's sometimes Type B's). Finally, we considered an alternative version of Election E2, Election E3, in which $u_B^B = 25 > u_A^B = 20$. That is, in this case the payoff to Type A voters if party B wins is the same as in Election E1, although the aggregate payoffs are greater. If we see more prosocial other party voting in E3 than in E1, we have greater evidence that the effect is due to the value voters place on aggregate payoffs than they place on fairness (a stronger evaluation of Prediction 4). Subjects were told the elections would vary but they were not told how they would vary. In Sequence III, then, subjects played elections C, E1, and E3 in a predetermined random order which was the same for both the S and P treatments as presented in Table 4 below. We used three values of $x \in \{4, 5, 6\}$ and three election types. Therefore, there were 9 different election/majority combinations. Time constraints from changing these combinations each period meant that we conducted 18 elections (2 of each combination) in total in sessions using Sequence III. As noted above subjects' types also varied randomly given the variation in x.

Table 4: Order of Sequence III

Period	Election	x	Period	Election	x
1	E3	4	10	E1	4
2	C	6	11	E1	6
3	E3	5	12	C	4
4	E3	6	13	E1	6
5	C	6	14	E3	4
6	C	4	15	C	5
7	C	5	16	E1	5
8	E3	5	17	E3	6
9	E1	5	18	E1	4

In the Public Voting Treatment voters necessarily receive information on the distribution of voter choices after an election given that there is no privacy. However, in S,

subjects are only given the information of who won each election, not the complete distribution of voter choices after each election. Revealing voter distribution information also allows voters, in some cases, to infer what choices others are making and thus to some extent provides less privacy. For instance, if all voters choose their selfish preference, revealing votes of 6 for party A and 4 for party B, then it may seem a safe inference to voters that everyone is voting selfishly. Hence, in S we did not reveal vote distribution information. As a robustness check, we controlled for the effects of such information as distinct from the variation in privacy and conducted a variation of S, SI, in which the information on the distribution of voter choices was revealed even though the choices were private. SI was conducted exactly as S, except that after each election, the envelopes containing voter's choices were opened and the distribution was tabulated and written on the board for subjects to see. The identities of the voters by choices, were, however, kept anonymous to both the experimenter and the other subjects as described above. We conducted two SI sessions using Sequence I.

Table 5 summarizes the sessions we conducted in Part I by sequence, x, privacy, and voting rule.

Table 5: Summary of Sessions in Part I

Session Numbers	Sequence	x	Privacy	Non-monitor Subjects
1, 2	I	6	S	20
3, 4	I	6	P	20
5	II	6	S	10
6	II	6	P	10
7, 8	I	6	SI	20
9, 10	III	$\{4, 5, 6\}$	S	20
11, 12	III	$\{4, 5, 6\}$	P	20

IV Experimental Results in Part I: Principal Treatments

We begin our analysis of the experimental results in Part I with a comparison of voter behavior in S and P using Sequences I and II and $x = 6$ (sessions 1-6 in Table 5 above). Figure 1 summarizes voter behavior by election type in the Secret Ballot Treatment in these treatments. We measure the percentage voting for one's own party on the horizontal axis and abstention percentage is measured on the vertical axis. The distance between an observation and the diagonal line measures the percentage voting for the other party. Figure 1a presents behavior of Type A voters and Figure 1b presents behavior of Type B voters. C marks the average behavior of voters in Election C, E1 and E2 are likewise measures for the other two elections. We also include voter behavior in E1 under Sequence II in the last 8 periods, represented by the point E1′ as a better point of comparison with E2. CP, E1P, and E2P mark the predicted selfish behavior.

Figure 1a: Type A Secret Ballot Voting Behavior

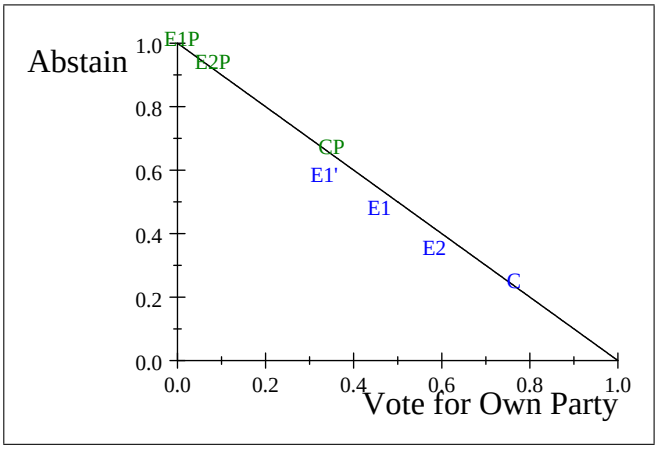
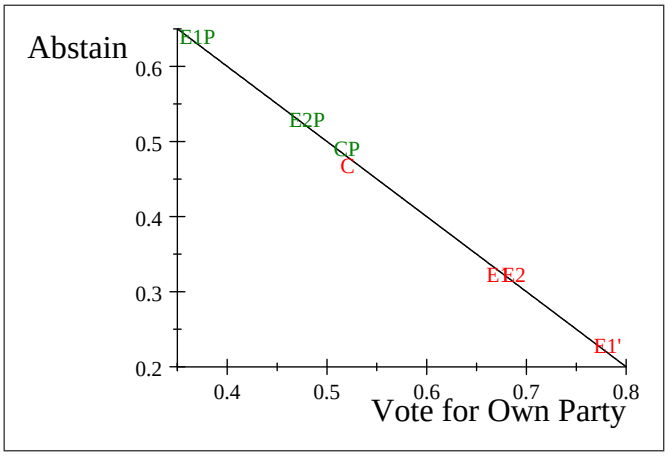


Figure 1b: Type B Secret Ballot Voting Behavior



Result 1 (Turnout Exceeds Selfish Predictions) *Turnout is generally greater than predicted by selfish behavior.*

We find little support for the selfish point predictions overall. First consider abstention rates. Subjects of both types abstain on average much less than theoretically predicted, except for Type B voters in Election C, who came close to the theoretical prediction. Specifically, subjects of Type A abstain on average 23% of the time in Election C, 46% in E1 (56% in the last 8 periods of E1 in Sequence II) and 31% in E2 as compared to the theoretical predictions of (65%, 99%, and 92%). Subjects of Type B abstain on average 46% of the time in C, 31% in E1 (22% in the last 8 periods of E1 in Sequence II) and 31% in E2 as compared to the theoretical predictions of (48%, 63%, and 52%).

Result 2 (Negative Underdog Effect) *Turnout of majority voters in Election C is greater than minority voters, contrary to predicted by selfish behavior.*

We find little to no support for our comparative static predictions assuming selfish voting. That is, we find no evidence of an underdog effect; in fact, we find the opposite. Subjects of Type B abstain significantly more than A's in Election C.[17] We find slight

[17] The z statistic for the comparison = 3.73, Pr = 0.00.

evidence of a relative benefit effect; subjects of Type A abstain more than B's in Elections E1 and E2, but the difference is not significant in E2 and only significant in E1.[18]

Result 3 (Positive Prosocial Voting) *Voters whose selfish preference is not the prosocial choice are more likely to vote for the other party than voters whose selfish preference is the prosocial choice.*

Result 4 (No Evidence of Non-prosocial Bandwagon Voting) *Minority voters whose selfish preference is the prosocial choice engage in much less other party voting than majority voters whose selfish preference is not the prosocial choice.*

Result 5 (Aggregate Welfare Concerns Exceed Fairness Ones) *There is no significant difference between prosocial other party voting in E1 and E2, even when we control for possible experience effects.*

The selfish prediction is that voters will either vote for their own party or abstain. However, subjects do vote for the other party and prosocial other party voting exceeds non-prosocial other party voting. In Election C Type B voters choose party A 2% of the time, which is more than Type A voters choosing party B in the same election (0%), but the difference is not significant.[19] This other party voting in Election C might be either prosocial or bandwagon voting. In Elections E1 and E2, however, we find stronger evidence in support of prosocial other party voting instead of bandwagon voting. In E1, Type A voters choose party B 7% of the time and 8% of the time in E2 (as compared to B voters choosing A less than 1% of the time in E1 and 0% of the time in E2). The differences are significant.[20] Bandwagon voting would predict that Type B voters would be voting for party A in these elections, but we find little evidence of such behavior.

[18] For E1 the z statistic = 3.31, Pr = 0.00 and for E2 0.28, Pr = 0.78.
[19] The z statistic for the comparison = 0.95, Pr = 0.34.
[20] The z statistic for the comparison in E1 = 2.70, Pr = 0.01 and in E2 = 2.37, Pr = 0.02.

However, the near equal other party voting of Type A voters in E2 as compared to E1 is contrary to our prediction, but may reflect learning and experience since subjects participated in E2 in the last 8 periods of each session. If we restrict our comparison of E2 behavior to the subjects who participated in E1 in the last 8 periods of Sequence II, we find slightly more prosocial other party voting of Type A subjects in E1 than in E2 (10% as compared to 8%), but the difference is not significant.[21] Hence, it appears that prosocial other party voting is more driven by aggregate welfare concerns than fairness concerns. In general, we find evidence suggesting that prosocial other party voting is real and that there are likely prosocial expressive voters even when voting behavior is unobserved.

Our evidence of prosocial other party voting may suggest higher rates of participation of other voters as compensatory behavior, discussed above. But even if prosocial other party voting is 10%, abstention is much lower than predicted except for Type B voters in Election C. That is, from Table 3 above, when $\theta = 0.1$, Type A's are predicted to abstain 73% of the time in Election C, 89% in E1, and 81% in E2 and Type B's are predicted to abstain 40% of the time in C, 78% in E1, and 66% in E2, predictions which are generally higher than the observed abstention rates. Hence, our data shows excessive turnout even when allowing for compensating behavior of selfish voters.

Result 6 (Excessive Turnout Advantages Majority Parties) *Although we find evidence of some prosocial other party voting, because majority voters participate at greater rates than predicted, party A is more likely to win than theoretically predicted in all elections with only selfish voting.*

[21] The z statistic for the comparison is 0.41, Pr = 0.69.

In Election C, the greater than predicted turnout of Type A voters, the prosocial or bandwagon voting by Type B voters, and the lack of an underdog effect all result in a significantly higher proportion of expected wins by A than predicted (69% compared to 50%).[22] Even more interesting, we find also that A has a significantly higher probability of winning in Elections E1 and E2 than predicted (47% as compared to 4% in E1 and 52% as compared to 20% in E2).[23] Thus, even though there is prosocial other party voting by Type A voters in these two elections, because there is also a much greater percentage of selfish voting than predicted, the probability A wins is actually higher than predicted under selfish voting. Prosocial other party voting, then, is insufficient to offset the excessive turnout of majority voters in these elections.

Result 7 (Turnout is Generally Higher Under Public Voting) *Overall, observability of voting behavior results in higher participation of voters with the exception of the last periods of E1 where abstention is higher under public voting.*

Result 8 (Public Voting Turnout Effect Depends on Voter Type) *The effects of observability of voting behavior on turnout of voters depends on whether voters' first preference is the prosocial choice. However, over time the turnout effect declines with experience.*

The analysis above focuses on voting behavior in the Secret Ballot Treatment. Even in that treatment we find evidence of prosocial other party voting and excessive participation of voters. We now turn to our main research question: To what extent does observability result in differences in voters' behavior? We first consider the effects of observability on turnout. Figure 2 below presents percent abstention by privacy treatment, election type,

[22] We measure the predicted probability of winning as the share of votes received by A, not counting abstentions. The t statistic for the comparison is 8.92, Pr = 0.00.

[23] The t statistic for the comparison for E1 is 24.28, Pr = 0.00 and for E2 is 15.84, Pr = 0.00.

and voter type in each period for treatments in Sequences I and II. We find that overall abstention is significantly lower under Public Voting than in the Secret Ballot Treatment. Type A voters abstain 36% of the time overall in S but only 26% in P, while Type B voters abstain 35% in S as compared to 18% in P.[24] When we break the effects down by election type, the effects become more nuanced. In Election C, which takes place in the first 8 periods of each session, the greater participation of both Type A voters (abstention is 23% in S as compared to 8% in P) and Type B voters (abstention is 46% in S as compared to 22% in P), is significant.[25] But in Election E2, there is only a significantly higher participation rate of Type B voters, whose selfish preference is the prosocial choice (Type A's abstain 33% of the time in S as compared to 27% in P and Type B's abstain 31% of the time in S as compared to only 3% of the time in P).[26] Moreover, in E1 we find that the effects of observability appears to not be long-lasting for Type B's, and Type A's begin to abstain more in P than in S. In Sequence II in which subjects participate in 16 periods of E1 elections, in the latter half of the periods abstention is actually higher under Public Voting than the Secret Ballot. Specifically, in the first 8 periods of E1 combining Sequence I and II, Type A voters abstain 44% of the time in S, but only 28% of the time in P and Type B voters abstain 31% of the time in S, but only 18% of the time in P.[27] But in the last 8 periods of E1 in Sequence II, Type A voters abstain 56% of the time in S compared to 75% of the time in P and Type B voters abstain 22% of the time in S compared to 41% of the time in P (a difference which is significant at conventional levels for Type A voters).[28]

[24] The test of proportions for type A voters yields a z statistic = 3.16, Pr = 0.00 and for B voters 4.52, Pr = 0.00.

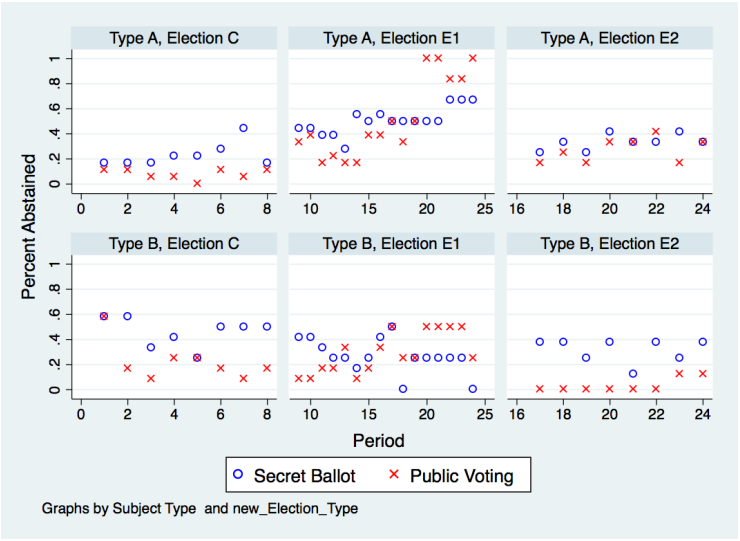
[25] The z statistic for the comparison with A voters is 3.60, Pr = 0.00 and for B voters 3.51, Pr = 0.00.

[26] For the comparison for E2, Type A, the z statistic = 0.94, Pr = 0.35 and for Type B = 4.22, Pr = 0.00.

[27] The z statistic for the comparison for A is 2.94, Pr = 0.00 and for B is 2.18, Pr = 0.03.

[28] The z statistic for Type A is 1.93, Pr = 0.05 and for Type B is 1.62, Pr = 0.11.

Figure 2: Abstention by Privacy Treatment in Sequences I and II



As noted above, we expect a nuanced relationship between our privacy treatments and turnout. That is, we expect that public voting will affect voters whose selfish preferences are prosocial differently from those whose selfish preferences are arguably not prosocial. We expect that voters whose selfish preferences are not prosocial to be less likely to turnout in P than in the S Treatment, while the voters whose selfish preferences are arguably prosocial will be more likely to turnout in P as compared to S. The results above provide some support for this prediction. First, the fact that observability has only a significant effect on Type B voters in E2 is consistent with the prediction, since these voters' selfish preference is the prosocial choice. Although we find that observability leads to higher abstention for both types of voters in the latter half of E1, when examining the behavior more carefully, we see that abstention is much higher for Type A voters, whose first preference is not the prosocial choice, under public voting, that for Type B voters. In fact, in some periods, Type A voters abstain 100% of the time. High Type B voter abstention is to be expected after elections in which Type A voters are publicly abstaining as such high rates, which is evidence of some compensatory behavior by Type

B voters. The results, nevertheless, suggest that indeed observability has a differential effect on voters depending on whether their first preference is the prosocial choice.

Result 9 (Prosocial Voting is Greater When Public) *Voters are generally more likely to choose prosocially when voting is public.*

Result 10 (No Effect of Observability on Non-prosocial Bandwagon Voting) *Minority voters whose selfish preference is the prosocial choice rarely engage in non-prosocial other party voting.*

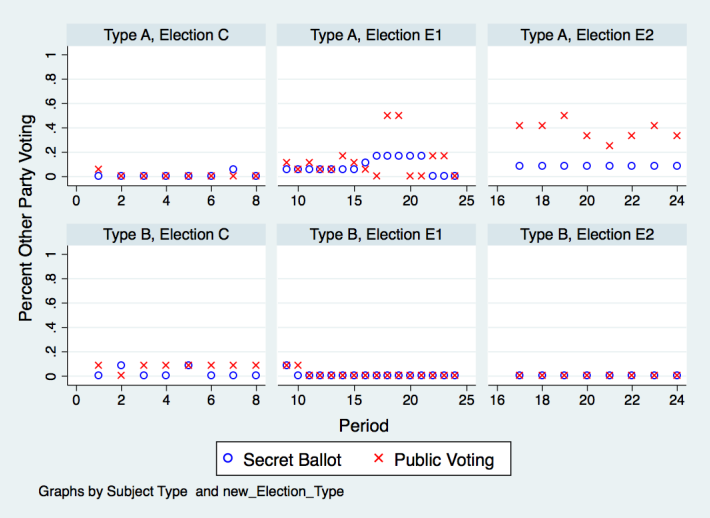
What is the effect of privacy on other party voting? Figure 3 below presents abstention by privacy treatment and voter type in each period in an election type. Prosocial other party voting does appear to be affected by whether voting is public or not, although the effect is not always significant. Specifically, in Election C we expect Type B voters to vote prosocially for party A. Type B voters choose party A 7% of the time when voting is public as compared to 2% of the time when it is private (a difference which is significant at the 10% level), whereas Type A voters in Election C vote for party B less than 0.7% of the time with both secret ballots and public voting.[29] In Elections E1 and E2, we expect prosocial other party voting by Type A voters. We find significant effects in Election E2: Type A voters choose party B 38% of the time when voting is public as compared to 8% of the time when it is private, whereas Type B voters in Election E2 never vote for party A.[30] In Election E1, we find also more other party voting by Type A voters (11% when voting is public as compared to 7% when ballots are secret) but the difference is not significant.[31]

[29] The z statistic comparing Type A voters' choices in P with S equals 0.00, Pr = 1 and for B voters 1.71, Pr = 0.09.

[30] The z statistic comparing Type A voters' choices = 4.81, Pr = 0.00.

[31] The z statistic for the comparison is 1.24, Pr = 0.21. We also find slightly more other party voting by Type B voters under public voting (1.6% as compared to 0.8%), but an examination of Figure 3 shows that the effect appears a delayed reaction to the change in the voting payoff matrix by some voters.

Figure 3: Other Party Voting by Privacy Treatment in Sequences I and II



When we restrict our comparison to the last 8 periods of E1 (Sequence II), however, we find no support for the contention that voters are more likely to choose prosocially when voting is public. Type A voters choose party B slightly more often when voting is private than when it is public (8% as compared to 6%), although the difference is not significant.[32] However, recall that in these latter periods of E1 we also find extremely high abstention rates (sometimes 100%) of Type A voters when voting is public. Hence, the lack of a significant difference in prosocial other party voting is not surprising, since these voters are primarily responding to observability by simply abstaining and letting Type B voters determine the outcome.

Result 11 (Prosocial Wins Somewhat Higher Under Public Voting) *Prosocial parties are more likely to win in Elections E1 and E2 when voting is public.*

We expect that the effects of public voting on turnout and other party voting should advantage prosocial parties. Specifically, party A should be more likely to win under public

[32] The z statistic for the comparison is 0.56, Pr = 0.58. Type B voters choose the other party 2% of the time under DB and 3% under PV.

voting in Election C and party B should be more likely to win under public voting in Elections E1 and E2. The greater turnout and prosocial other party voting actually leads to a lower probability of A winning in Election C under public voting than secret ballots (67% compared to 69%), although the difference is not significant. Overall in Election E1, as predicted A is less likely to win under public voting than with secret ballots (40% of the time compared to 45% of the time), but the difference is not significant either. However, if we analyze just the last 8 periods of E1 in Sequence II, we find a highly significant large effect; A is likely to win only 9% of the time under public voting, but 35% of the time with secret ballots.[33] In Election E2, as expected, the higher prosocial other party voting and the differential effect on turnout of observability under P leads to a significantly lower probability A wins than in the S treatment (26% compared to 52%).[34] Thus, we find strong evidence that public voting in Elections E1 and E2 increases the probability that the prosocial choice wins, by approximately 26 percentage points.

V Robustness Checks

Result 12 (Minor Effects of Vote Distribution Information) *We find only minor differences in behavior between the Secret Ballot Treatment and the Secret Ballot Information Treatment.*

As noted above we conducted sessions using the Secret Ballot Treatment but revealing vote distributions, SI using Sequence I. We conducted this variation to deal with concerns over comparability between S and the P treatments while maintaining the degree of privacy desired in each treatment. That is, when we compare S and P, both voters' privacy is varied as well as how much information voters had after each election about

[33]The z statistic for the overall comparison is 0.96, Pr = 0.34 and for the last 8 periods is 3.41, Pr = 0.00.

[34]The t statistic for the comparison is 8.16, Pr = 0.00.

the distribution of voter choices. Therefore, we conducted SI in which we revealed the information to subjects after each election and S in which we did not so reveal. When we compare voting behavior in SI with S in Sequence I, we find similar behavior with a few differences as shown in Appendix C which compares abstention and other party voting behavior in S with SI. We find significantly greater abstention in SI by Type B voters in the prosocial elections.[35] We also find greater other party voting by Type A voters in SI in the first few periods of E2, but these voters converge to behavior equivalent of those in S. The overall difference is not significant.[36] When we compare the expected probability that A wins in SI with S, we find that there are no significant differences in expected outcomes for Elections C and E2, but that A is significantly more likely to win in Election E1 under SI.[37] The difference in Election E1 is no doubt a consequence of the greater abstention by Type B voters in SI. The evidence suggests then that revealing vote distributions slightly leads to greater abstention by Type B voters in prosocial elections generally leading to a somewhat higher probability that A wins in Election E1.

Result 13 (Observability Effects Similar with Vote Distribution Information) *The results when comparing the Secret Ballot Information Treatment and Public Voting are qualitatively the same as the comparison of Secret Ballot and Public Voting.*

When we further compare behavior in SI with P in Sequence I directly we find essentially the same findings as reported above for our comparison of S with P. Specifically, public voting leads to greater turnout of both types of voters overall (Type A voters turnout overall 66% in SI as compared to 80% in P in Sequence I, while Type B voters turnout overall 52% in SI as compared to 85% in P in Sequence I).[38] We find furthermore,

[35] The z statistic for the comparison in E1 is 1.99, Pr = 0.05 and for E2 is 2.51, Pr = 0.01.

[36] The z statistic for the comparison is 1.56, Pr = 0.12.

[37] The t statistic for the comparison of S and SI in Election C is 0.29, Pr = 0.79; for Election E1 is 2.98, Pr = 0.01, and for Election E2 is 0.57, Pr = 0.58.

[38] The z statistic for the comparison for A voters is 3.56, Pr = 0.00 and for B voters is 7.05, Pr = 0.00.

as above, that the effect of observability on turnout is nuanced and primarily on those voters whose selfish preferences are also the prosocial choice. That is, the difference in turnout rates for Type A voters is significant only in Elections C and E1 and for Type B voters only in Elections E1 and E2.[39] Our conclusions about the effect of observability on prosocial other party voting is also supported when we compare SI with P; we find that other party voting is significantly higher for Type B voters in Election C and for Type A voters in Election E2.[40] Finally, when we compare the expected probability that A wins in SI with P in Sequence I we find similar results as in our comparison of S and P; that is, there is no significant differences in the expected probability that A wins in Elections C and E1, but that the expected probability A wins is significantly less in Election E2 (26% as compared to 54%).[41] Our results then suggest that the differences in privacy between the Secret Ballot Treatments and Public Voting explain our results above and not the differences in information about voter distributions.

Result 14 (Observability Effects Robust to Majority Sizes and Role Changes) *Observability leads to greater participation and prosocial other party voting in sessions with Sequence III.*

Result 15 (Prosocial Voting, Observability, and Majority Status) *Voters engage in more other party voting when they are in the minority. Furthermore, prosocial other party voting is much higher when the voters whose selfish preference is not the prosocial choice are in the minority.*

[39] The z statistic for Type A voters in Election C is 2.87, Pr = 0.00; for Election E1 2.27, Pr = 0.02; and for Election E2 1.39, Pr = 0.16. For Type B voters in Election C is 1.86, Pr = 0.06, for Election E1 4.20, Pr = 0.00; and for Election E2 6.29, Pr = 0.00.

[40] The z statistic for Type A voters in Election C is 1.00, Pr = 0.32; for Election E1 0.31, Pr = 0.76; and for Election E2 3.43, Pr = 0.00. For Type B voters in Election C is 1.43, Pr = 0.15, for Election E1 4.20, Pr = 0.00; and for in neither treatment did these voters engage in other party voting.

[41] The t statistic for the comparison for Election C is 1.26, Pr = 0.22; for Election E1 1.32, Pr = 0.20; and for Election E2 5.50, Pr = 0.00.

In our principal treatments subjects had fixed roles and the size of the majority was constant. We also used a fixed sequence of elections, with Election C always first. Our sessions using Sequence II partly controls the sequencing effect of E2 always following E1, but in order to determine if our results of the effects of privacy are robust to a more complicated environment, we also conducted sessions using Sequence III as discussed above in which the election types varied randomly, majority sizes changes, and subjects' changed roles randomly. Figures 4a,b summarize abstention and other party voting, respectively, by Election, Voter Type, and x (number of A voters). We find significant support for the effects of privacy on overall voting behavior found with our principal treatments in the sessions using the more complicated design. Abstention overall is much lower when voting is public (21%) as compared to when it is private (45%) in these sessions. Furthermore, when voting is public we find stronger evidence of prosocial other party voting. In our sessions using Sequence III, there were 304 cases in which a voter's selfish preference was not the prosocial choice. When voting was public (152 observations), 15% of the votes were for the prosocial choice, while when the secret ballot was used (152 observations), only 4% of the votes were for the prosocial choice, a significant difference.[42]

[42] The z statistic for the comparison of proportions is 3.32, Pr = 0.00.

Figure 4a: Abstention in Sequence III Sessions

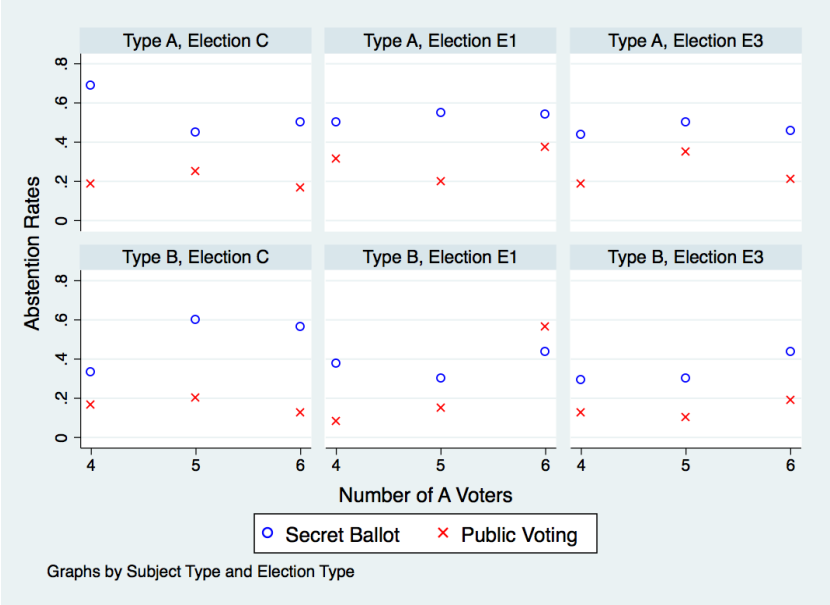
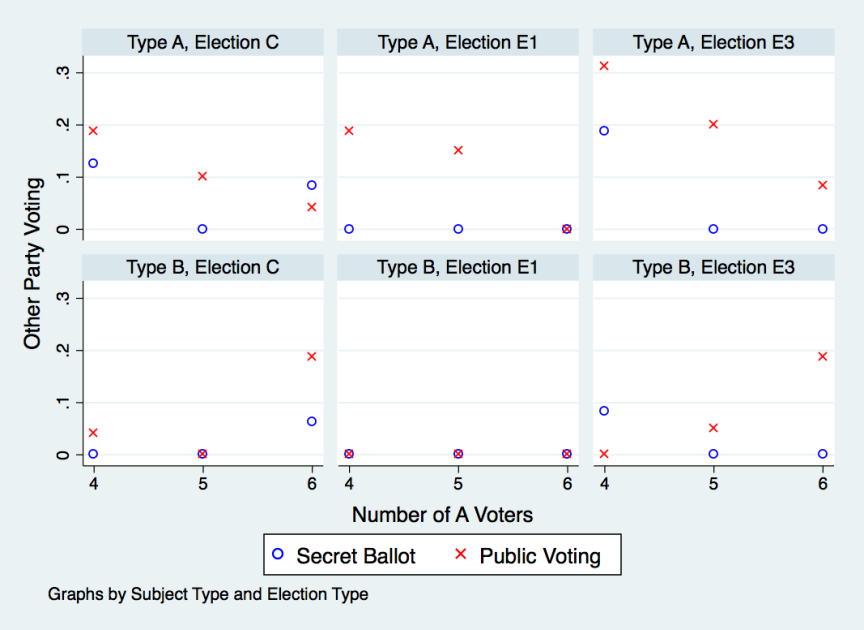


Figure 4b: Other Party Voting in Sequence III Sessions



In Sequence III we consider situations in which we vary the size of the majority in Election E1 and E3, such that in some cases the prosocial choice is also the selfish preference of the majority of voters ($x = 4$) as well as cases where $x = 5$ or 6 (recall that

in Sequence I $x = 6$). We find that the percentage of voters whose selfish preference is not the prosocial choice who engage in prosocial other party voting is significantly greater when $x = 4$, 17%, as compared to 5% when $x = 5$ or 6.[43] The difference is significant both when voting is secret (9% prosocial other party voting when $x = 4$ as compared to 0%) and when voting is public (25% prosocial other party voting when $x = 4$ as compared to 10%).[44] Our results, then, suggest that voters are more likely to vote prosocially instead of selfishly when they are in the minority and most likely to do so when voting is public (when 25% of votes are prosocial other party votes). This result is consistent with the fact that when $x = 4$, the aggregate social benefit from choosing the prosocial choice is greater given that more B voters benefit than when $x = 5$ or 6.

Result 16 (Observability and Non-prosocial Bandwagon Voting) *In Sequence III voters engage in non-prosocial bandwagon voting when voting is public.*

Given that the observed prosocial other party voting is greater when the prosocial choice is the selfish preference of the majority, what appears to be prosocial other party voting might be interpreted as bandwagon voting. We find little evidence of bandwagon voting when the prosocial choice is the selfish preference of the minority overall. We find of those voters whose selfish preference is the prosocial choice, about 5% of minority ones cast non-prosocial other party votes and about 2% of non-minority ones do so.[45]

However, we find evidence of non-prosocial bandwagon voting when voting is public in Sequence III. Specifically, of the voters whose selfish preference is the prosocial choice, when voting is public we observe about 9% minority ones casting non-prosocial other party votes and only 1% of nonminority ones doing so, which is significantly different.[46] We

[43] The z statistic = 2.99, Pr = 0.00.

[44] The z statistic for the comparison when voting is secret = 2.90, Pr = 0.00 and when voting is public = 2.05, Pr = 0.04.

[45] The z statistic = 1.31, Pr = 0.19.

[46] The z statistic = 2.22, Pr = 0.03.

find the difference is in the opposite direction and nonsignificant, though, when voting is secret (0% of such votes when in the minority versus 2% when nonminority).[47] Therefore, we find some evidence that observability not only leads to greater prosocial other party voting but also non-prosocial bandwagon voting in Sequence III and that some of the increase in prosocial other party voting may be due to bandwagon effects rather than an effect of observability on prosocial preferences alone. Notably, we found no evidence of such non-prosocial bandwagon voting in Sequence I and II and no effect of observability on non-prosocial bandwagon voting (see Figure 3 and analysis above), when voters were allowed greater opportunities to gain experience and learn. So although we find some conformity effects of observability in Sequence III, these effects do not appear to be robust.

VI Choosing Between Public Voting and Secret Ballots

We find strong evidence that voter behavior is affected by observability, even controlling for the possibility of signaling through sequential choices, coercion, or intimidation. Voters whose first preference is the prosocial choice participate at a greater rate and those whose first preference is not the prosocial choice engage in prosocial other party voting and to some extent greater abstention. Prosocial choices are as a consequence significantly more likely to win when voting is public. So far, we have only mentioned social image concerns. That is, we have suggested that voters whose selfish preference is not the prosocial choice are more likely to abstain and vote for the other party because they are concerned about their social image. If social image is the reason we find the effects of observability, then, it follows that subjects would prefer secret balloting where they do not need to worry about these concerns. In Part II of our experiment, we investigate the

[47] The z statistic = 0.86, Pr = 0.39.

extent that social image alone explains the effects of observability.[48]

In Part II we conducted four additional sessions (Sessions 13-16) with 10 subjects each in which subjects experienced both types of voting systems and then were given the opportunity to vote over which system they preferred for succeeding periods. Subjects played Election E1 only in these sessions and $x = 6$. In two of these sessions subjects participated in 5 periods of public voting and secret ballots each using Election E1 and then voted over which method to use for the next 5 periods. They then voted again over which method to use for the final 5 periods (Sequence IV). In the other two sessions subjects participated in 10 periods of each type of voting and then voted over which method to use for the final 5 periods (Sequence V). We used Sequence V to increase the experience subjects had with the two mechanisms prior to voting. We varied the order in which subjects experienced the two voting mechanisms, that is, in one of the sessions in each of Sequence IV and Sequence V subjects used public voting first and in the other they used secret ballots first. We used secret balloting for the choice of voting mechanism. Subjects were allowed to abstain if they wished. Finally, we surveyed subjects anonymously at the end of three of the sessions. Table 6 below summarizes the order of these four sessions.

Table 6: Summary of Sessions in Part II

Sequence	Session	Periods Before Choice	First	Repeat	Survey	Non-monitor Subjects
IV	13	5 Each Method	Secret	yes	no	10
IV	14	5 Each Method	Public	yes	yes	10
V	15	10 Each Method	Secret	no	yes	10
V	16	10 Each Method	Public	no	yes	10
All periods used Election E1 and $x = 6$						

Restricting the comparison to the periods before choosing a voting mechanism, these sessions provide within-subjects comparisons of voting behavior under the two mecha-

[48] We thank Ernesto Reuben for suggesting these additional sessions.

nisms, which we examine first. In only one session (15) public voting was the chosen voting mechanism. To ensure comparability and control for possible selection effects, we restrict our comparisons to the periods in which both mechanisms were used in equal numbers of periods before choosing. We find that a bit surprisingly that both types of subjects are more likely to abstain in public voting, but the difference is only significant for Type A subjects (80% compared to 55%). Type B subjects abstain 50% of the time in public voting and 40% with secret ballots.[49] We also find that Type A subjects vote for party B 10% of the time when voting is public and 5% of the time with secret ballots, a difference that is not statistically significant, while Type B subjects never vote for party A.[50] Although not as strong as the results in the between-subjects' sessions, the greater abstention and other party voting of A's in public voting is supportive of those results.

When we examine the choices subjects made over voting mechanisms, we find that a substantial minority of subjects did choose public voting. Specifically, 31% of Type A subjects and 50% of Type B subjects voted for public voting. Two more A voters chose to abstain (6% of A's). The greater tendency of Type B subjects to choose public voting is not surprising given that B is more likely to win under public voting (although the difference between the two types of voters' behavior is not significant). These results suggest that indeed a consequential minority of A voters, nearly a third, appear to prefer a mechanism that made it easier for the prosocial choice to win.

One explanation for A voters choosing public voting may be that due to the random nature of the Dictator Rule A happened to win more under public voting than secret ballots. So naive voters may have simply voted for the mechanism in which his or her selfish preference had won more elections in the periods prior to voting. We find evidence

[49] The z statistic for Type A subjects = 2.57, Pr = 0.01 and for Type B subjects = 0.83, Pr = 0.41.
[50] The z statistic for the comparison of A subject behavior = 1.16, Pr = 0.24.

that voters are responding to the success of their preferred candidate in choosing whether to vote for public voting or secret ballots. In Figure 5 below we graph the percentage choosing public voting versus the difference in percentage wins by A. As the figures show, there is a clear significant relationship between the two variables. However, even when the percentage of wins for A is 20 points higher under secret ballots than in public voting, we observe approximately 17% of Type A's choosing public voting over secret ballots and when the difference in wins is 0, we find 25% of Type A's choosing public voting. Hence, we find evidence at a substantial minority of Type A subjects chose public voting.[51]

From examining the survey, we see that many voters seem to clearly perceive the source of the benefits to B from public voting and made their choices for either secret or public voting because of these benefits. Table 7 below summarizes the responses to our survey by voter type. 56% of A voters and 17% of B voters explicitly expressed such motivations.[52] Hence, we find evidence that voters were aware of the differences in the systems when making their choices. Of course, some voters expressed other reasons. Some of the B voters who chose secret ballots expressed a desire for privacy and to avoid tension. Some A subjects also wrote that secret ballots were more fair, allowing one to express one's true feelings without outside pressure. Such answers for A's seem to imply that they also felt pressured to abstain or vote for B in public voting, while they did not explicitly say so. We attempted as much as possible to ensure that each voting mechanism took the same amount of time, nevertheless 3 voters perceived that one or the

[51] Appendix C reports the results of probit regressions by subject type in which the dependent variable is the probability of voting for the secret ballots and the independent variable is the proportion wins by A before choosing the mechanism in secret ballots minus the proportion wins by A before choosing in public voting. We find not surprisingly a relationship which is positive and highly significant for Type A voters and negative and significant at the 6% level for Type B's.

[52] For example, one A voter who admitted to having voted for B wrote: "Either way I voted, basically the same, though I abstained more often in secret because I didn't have to prove that I was being generous." To quote one B voter: "Public voting outed people as selfish [derogatory term deleted] if they voted A. So I think it made more people abstain if they were an A Type."

other was faster and preferred the faster one. Although we observed only 2 abstentions in actual voting over the mechanism (both from A subjects), 8 subjects contended there was no difference in the voting mechanisms and claimed that they had no preference.

Figure 5: Percent Voting for Public Voting Versus Relative Success of A

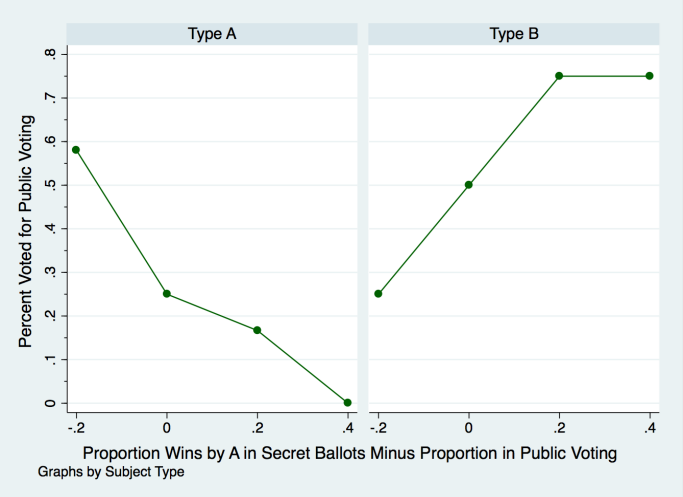


Table 7: Percent Responses to Survey on Voter Motivations		
Explanation	Type A Voter	Type B Voter
Secret Shorter	6%	0
Public Shorter	6%	8%
Didn't Make a Difference	17%	42%
More Voting for A in Secret	56%	17%
More Voting for A in Public	6%	0
More Voting for B in Public	0	17%
Secret is More Fair	11%	8%
Didn't Like Announcing Vote	0	8%
No. of Observations	18	12

VII Concluding Remarks

Secret ballots are used in most large elections and many other smaller voting groups ranging from legislative bodies to academic personnel committees. Secret ballots have evolved to be the norm in large elections to prevent vote-buying or more violent coercion and intimidation. Individuals advocate the use of the secret ballot in small group decision-making likewise to encourage candor and truthful revelation of preferences. Secret ballots

have been justified for legislators as a way of avoiding coercion from party leaders and other political bosses and to allow them to "vote their conscience" in line with the "trustee" view of representation. In academic circles the concern is that when voting is public individuals will be reluctant to make choices contrary to the preferences of deans and administrators or tenured-faculty if the voter is untenured. These arguments for the use of the secret ballot in academic personnel decisions have been recently articulated by Robbins (2006).

In contrast, as noted in the Introduction, some have contended that the secret ballot leads to more selfish choices by voters than when voting choices are observed. We find support for these concerns with the secret ballot. We find that when voting is public, individuals are significantly more likely to make prosocial rather than selfish choices than when voting is private. The effect is interactive with majority status, suggesting that social conformity is also a factor. That is, voters are least likely to vote prosocially instead of selfishly when voting is private and they are in the majority (2-8% of possible choices) and most likely to do so when voting is public and they are in the minority (25-38% of possible choices). Nevertheless, we find only minor support for non-prosocial bandwagon voting (minority voters choosing the majority party when it is not prosocial to do so). We also discover that participation in elections is in general higher when voting is public, but the effect is primarily among those voters whose selfish preferences are the prosocial choice. The participation of voters whose selfish preferences are not prosocial is either largely the same or significantly less when voting is public as compared to secret ballots.

These induced differences in voting behavior caused by observability (higher turnout by voters whose selfish preference is prosocial and prosocial other party voting by some voters) have real consequences on the outcomes of elections. In particular, the differences in behavior advantage prosocial choices in elections such that the probability that the

prosocial choice wins is on average 26 percentage points higher under public voting as compared to secret ballots.

Importantly, our experimental design isolates the effects of observability on voters' choices from possible confounds in public voting (coercion, intimidation, communication, and sequential voting). Observability alone makes voters choose more prosocially which advantages prosocial choices. Thus our results support the theoretical argument that voters care about their social image in making choices, independent of any strategic concerns. However, social image concerns do not fully explain the greater prosocial voting in public voting alone. That is, we find evidence of prosocial voting by a small minority of voters even when voting is secret. Moreover, we find that a large minority of voters whose selfish preference is not the prosocial choice prefer public voting (30%) and that many appear to know the consequences of that preference. Hence we find evidence that some voters care about making prosocial choices in themselves, not just to improve their social image, and are willing to use public voting to increase such behavior.

In summary, our results demonstrate that there is a trade-off between positive and negative benefits from ballot secrecy. Secret ballots may help shield voters from strong arm practices and corruption in some cases, but they also lead voters to make more selfish and less prosocial choices. When coercion and intimidation are unlikely under public voting, these negative effects of the secret ballot on the likelihood of prosocial choices may outweigh the benefits of privacy.

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Supplemental Online Appendix A: Equilibrium Solutions to Voting Games

We focus on symmetric equilibria. The possible symmetric pure strategy equilibria are the cases where either all voters are voting, all are abstaining, or one type is voting and the other type is abstaining. When all voters are voting, $\pi_A = \frac{2}{45}$ and $\pi_B = \frac{1}{15}$ and when each is multiplied by the respective difference in payoffs in all elections the product is less than 2. Therefore, the voters are not optimizing if all are voting. When all voters are abstaining, $\pi_A = \pi_B = 0.5$, which when multiplied by the respective difference in payoffs in all elections the produce is greater than 2. Again voters are not optimizing if all are abstaining. If only A type voters are participating, then $\pi_A = 0$ and each would prefer to abstain; similarly if only B type voters are participating.

We thus turn to symmetric mixed strategy equilibria. To solve for these, we derive the reaction curves for each type of voter as functions of p and q. Specifically, equation (1) below presents the values of p and q such that a voter of Type A is indifferent between voting and abstaining and equation (2) below presents those values such that a voter of Type B is indifferent between voting and abstaining.

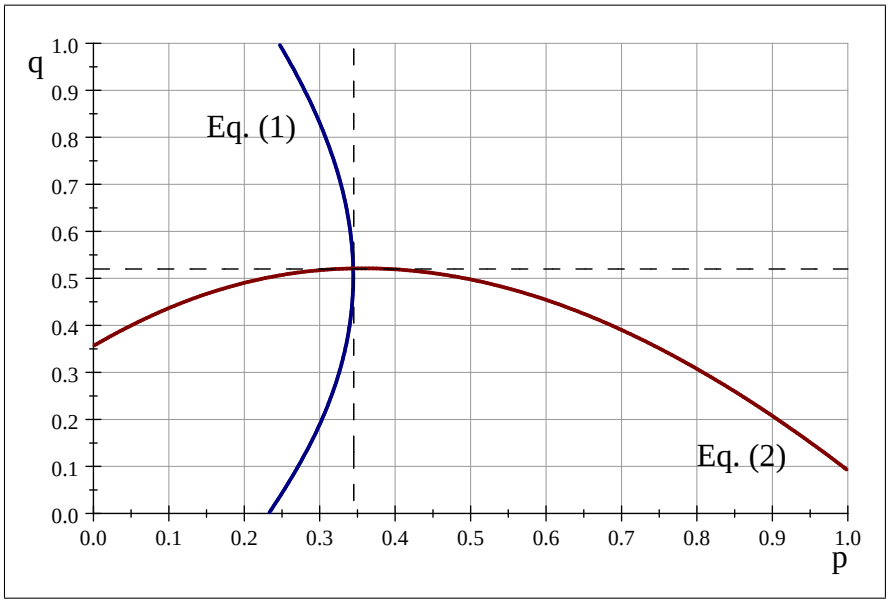
Equation (1): $-\frac{1}{10}p^5q^4+\frac{2}{3}p^5q^3-\frac{3}{2}p^5q^2+\frac{10}{7}p^5q-\frac{1}{2}p^5+\frac{5}{18}p^4q^4-\frac{5}{2}p^4q^3+\frac{45}{7}p^4q^2-\frac{20}{3}p^4q+\frac{5}{2}p^4+\frac{20}{7}p^3q^3-10p^3q^2+12p^3q-5p^3-\frac{5}{7}p^2q^4+6p^2q^2-10p^2q+5p^2+\frac{5}{6}pq^4-2pq^3+\frac{10}{3}pq-\frac{5}{2}p-\frac{3}{10}q^4+q^3-q^2+\frac{1}{2}=2/(u_A^A-u_A^B)$

Equation (2): $\frac{1}{10}p^6q^3-\frac{1}{2}p^6q^2+\frac{3}{4}p^6q-\frac{5}{14}p^6-\frac{1}{3}p^5q^3+\frac{9}{4}p^5q^2-\frac{27}{7}p^5q+2p^5-\frac{45}{14}p^4q^2+\frac{15}{2}p^4q-\frac{9}{2}p^4+\frac{10}{7}p^3q^3-6p^3q+5p^3-\frac{5}{2}p^2q^3+\frac{9}{2}p^2q^2-\frac{5}{2}p^2+\frac{9}{5}pq^3-\frac{9}{2}pq^2+3pq-\frac{1}{2}q^3+\frac{3}{2}q^2-\frac{3}{2}q+\frac{1}{2}=2/(u_B^B-u_B^A)$

Solving these two reaction functions simultaneously for Election C yields a unique symmetric mixed strategy equilibrium in which $p \approx 0.345$ and $q \approx 0.52$ as shown in

Figure A1 below.

Figure A1: Symmetric Mixed Strategy Equilibrium in Election C



Similarly, the unique symmetric mixed strategy equilibrium in Election E1 (E2) is given by $p \approx 0.0075$ (0.0825) and $q \approx 0.365$ (0.475) as shown in Figures A2 and A3 below.[53]

[53] There are also asymmetric equilibria in Election C in which 2 of each voter types participate. In this case for those A types who are participating, the effect of their vote on the outcome is 1/6, which leads to an expected benefit of $15/6 > 2$. For those A types who are abstaining, the effect of their vote on the outcome is 1/10, which leads to an expected benefit of $1.5 < 2$. Similarly, each B type voter who is voting can be shown to be best responding, while each B type voter who is abstaining is best responding. Simple calculations also show that there are asymmetric equilibria in Election E2 in which one A type votes and 2 B types vote. There are no asymmetric equilibria in Election E1.

Figure A2: Symmetric Mixed Strategy Equilibrium in Election E1

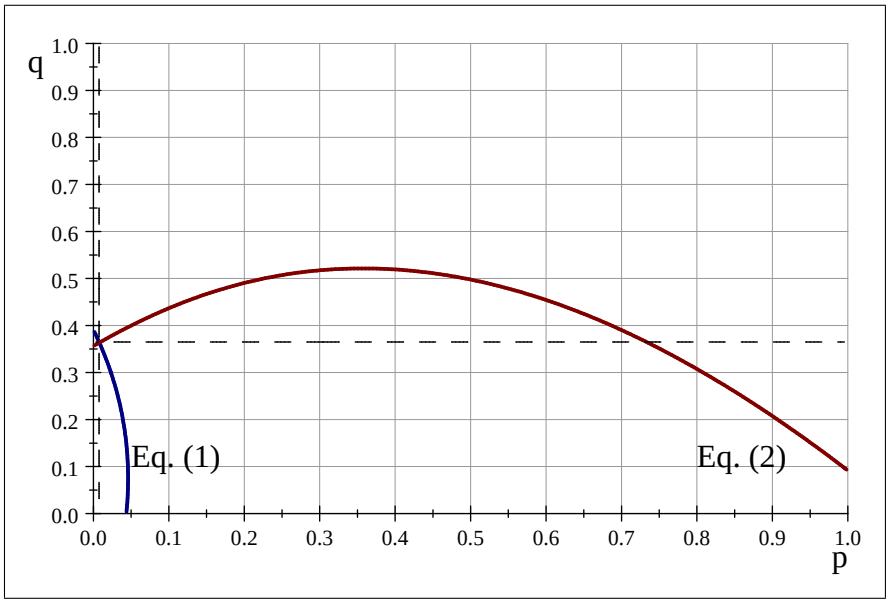
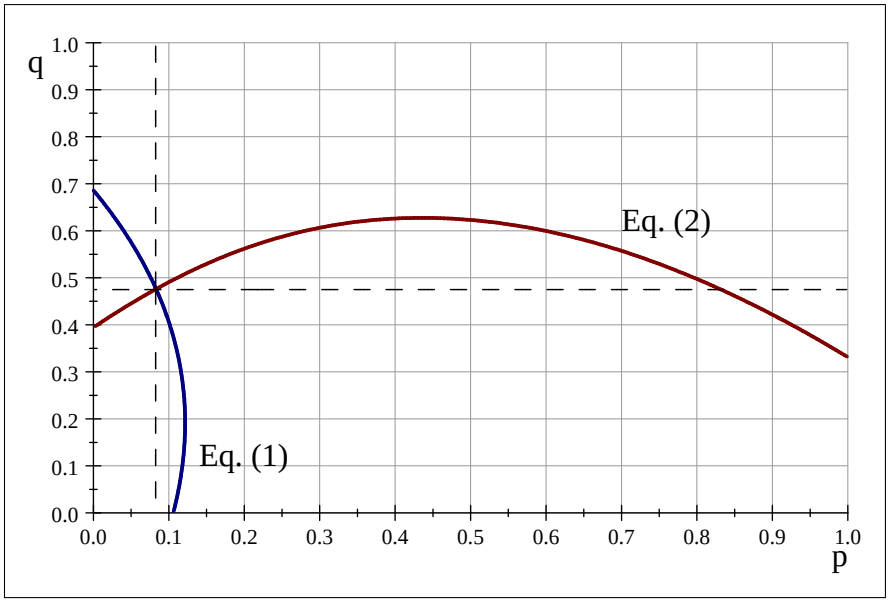


Figure A3: Symmetric Mixed Strategy Equilibrium in Election E2



We similarly solved for symmetric equilibria using the same approach allowing for prosocial expressive voting as summarized in Table 3 in the text. The detailed algebraic calculations of those equilibria are available from the authors.

Supplemental Online Appendix B: Description of Procedures Used to Vary Privacy and Sample Instructions

Instructions were read by the same experimenter in all sessions. The experimenters had not known any participants previously. After obtaining subjects' consent to participate, the experimenters gave each participant a copy of the written instructions and 24 large sealed envelopes. Each of these large envelopes had a number written on the front for each experimental period. Subjects were asked to open the sealed envelope labeled number 1 in the first period. Similarly, during the next period, they were asked to open the sealed envelope labeled number 2, and so forth, for 24 periods. Each large envelope contained standard letter sized envelopes in different colors and ballot tickets, which are described below. Instructions were read orally, allowing subjects to ask questions privately and to make sure that everyone had common knowledge of the decision tasks. As discussed above, in each period, after all the votes had been collected, one of the subjects was randomly chosen to draw one voting choice from the ballot box to decide the winner of that period. If an abstention ballot was drawn then another ballot was drawn in its place until one containing a party choice was selected. If all voters had abstained, then one of the parties would have been randomly chosen as the winner; as it happened this never occurred. Again, as discussed above, at the end of the experiment, only one of the rounds was randomly chosen by a subject as the period to be paid.

Secret Ballot Treatment

In the Secret Ballot Treatment or S, subjects were told that neither the other participants nor the experimenter knew their decisions and payments, and the experimenters explained how the experiment worked to achieve this goal. The instructions for S are available in Appendix A. In order to ensure anonymity in the Secret Ballot Treatment, subjects

were randomly given the sealed envelopes which contained their role assignments etc. Furthermore, one subject was randomly chosen to serve as a monitor to ensure credibility and calculate subjects' payoffs as described below (so we recruited 11 subjects for each Secret Ballot Treatment).[54] After being chosen, the monitor was asked to wait in another room. The room had an open door such that the monitor could hear what was occurring during the experiment but not see the other subjects or observe their choices. The other subjects randomly chose their ID number cards. The experimenters had marked the same number on two pieces of paper and had stapled them together in advance. So, every subject received two ID number cards.

In each period, subjects were asked to make voting decisions. Subjects were seated at individual work stations which were shielded such that their neighbors (either next to or behind) could not observe their choices. In each large envelope for each period, the two standard sized envelopes were orange and blue, and the ballot tickets were marked "Vote for Party A," "Vote for Party B," and "Abstain." The large envelope also contained a "For Payment" piece of paper. Subjects' roles—A type voters or B type voters—were marked on every ballot ticket and "For Payment" piece of paper, but their ID numbers were not marked on the tickets. If voting for Party A, subjects were asked to put "Vote for Party A" in the orange envelope, "For Payment," "Vote for Party B," and "Abstain" in the blue envelope; if voting for Party B, they were asked to put "Vote for Party B" in the orange envelope, "For Payment," "Vote for Party A," and "Abstain" in the blue envelope; if abstaining, they were asked to put "Abstain" in the orange envelope, "For

[54] To avoid design issues pointed out by Frohlich et al 2001 and Koch and Normann 2008, the monitor was selected publicly. The experimenters put eleven pieces of paper into an envelope. Ten of them were marked "Subject," and one of them was marked "Monitor." When all subjects entered the laboratory, the experimenters asked them to draw one piece of paper from the envelope to decide who was the monitor. All subjects were present during the entire process, which reduced any belief that subjects had that the monitor was a confederate of the experimenters.

Payment," "Vote for Party A," and "Vote for Party B" all in the blue envelope. After making their choices, the experimenters collected the orange envelopes into the ballot box, which was opaque. The experimenters were extremely careful not to collect ballots before subjects had completed making their decisions and not to scrutinize the orange envelopes.

Only the votes in the orange envelopes were used to determine the winner in the election using the random dictator rule discussed above. At the end of the session and the paid period had been selected, the blue envelopes of that period as well as one ID number card were given to the monitor who then calculated subjects' payoffs without knowing the identities of particular subjects. The monitor calculated the payoffs by consulting the submitted blue envelopes for the selected period. Specifically, the monitor saw on the "For Payment" sheet which revealed to the monitor a subject's type in the period and therefore how much he or she should be paid. The monitor checked whether the subject abstained or not by examining whether the subject included the "Vote for Party A" and "Vote for Party B" ballot tickets in the blue envelope. If the subject had included both of these, then the monitor knew the subject had abstained and did not deduct \$2 from the payoff. If the monitor did not see both of these ballot tickets in addition to the "For Payment" piece of paper, then he or she deducted the \$2 from the payoff.

Next, the monitor put subjects' payoffs in new white envelopes, sealed them and gave them to the experimenters. Subjects' ID number cards were taped on the front of the white envelopes so that the experimenters could check the second ID card in each subject's hands and accordingly give the sealed payoffs to the subjects. But the experimenters did not know how particular subjects voted by ID number nor how much they earned. The monitor was asked to add up the total amount that he or she paid to the subjects. The experimenters, from examining the orange envelopes and knowing the distribution of voter

types, could tell how many voters abstained and calculate the total as well to check the monitor's calculation. Subjects were also asked to check their payments. If any subject had reported a wrong payment, the monitor forfeited his or her payment. However, no subject objected to his or her payoff calculation and monitor calculations always fit the expected total.

Public Voting Treatment

The Public Voting Treatment or P, was identical to the previous treatment except the experimenters modified the ballot tickets and the function of the colored envelopes, adding an additional green envelope. Subjects received ballot tickets that were not marked "Vote for Party A," "Vote for Party B," or "Abstain," Only their roles and ID numbers were printed on the ballot tickets. They were asked to put one ballot ticket into every envelope. Next, if they voted for party A, they submitted the orange envelope; if they voted for party B, they submitted the blue envelope; if they abstained, they submitted a green envelope. Subjects were asked in a randomly determined order which varied each period to go to the rostrum and put their decisions into the ballot box. At the same time, the experimenters recorded their decisions of each period on the white board. This design was aimed to guarantee that, although subjects' identities were anonymous to each other, everyone knew who made which decisions. Special care was taken by the experimenters to make sure that subjects made their decisions simultaneously while behind the privacy screens and were not able to change their decisions after observing others' choices. Hence, although voters cast their ballots sequentially, the choices were actually made simultaneously.[55] One of

[55] We instituted measures to prevent subjects from observing the votes of others prior to making their own voting decisions. Specifically, subjects were instructed to choose which envelope to keep for their vote and put it aside. The experimenters collected the two envelopes that voters did not plan to use. The experimenters made sure that other subjects were not allowed to see this collection by placing the collected envelopes in a large opaque envelope. Then subjects individually put their votes in the ballot box publicly. Although some subjects might have seen how others had voted before they put their

the subjects was randomly chosen to draw one envelope from the ballot box to decide the winner of that period. Note that the box in which the envelopes were placed was opaque. The subject could not see inside the box when the he or she made the random draw. Next, if the envelope was orange then party A was declared the winner; if the envelope was blue then party B was declared the winner; if the envelope was green then a new envelope was randomly drawn from the ballot box to decide the result.

Instructions for Secret Ballot Treatment

Welcome to our experiment. When you entered the laboratory, you were asked to draw a card. The subject who drew the card marked "monitor" is assigned to be the monitor in this experiment. He or she makes the payments to the other subjects at the end of experiment. The monitor is being paid a flat amount which equals the maximum that can be earned in this experiment.

For all the other subjects, after the monitor was assigned to wait in another room, the experimenters asked each of you to randomly draw your experimental ID number cards. The ID numbers are used to calculate your payments. Note that you received 2 ID number cards simultaneously. Each had the same number. Be careful not to lose any of the ID cards. Since now the monitor is in another room, the monitor does not know which person has which ID number. At the same time, each of you does not know other participants' ID numbers. Please note that, there is no connection between the seat number and your ID number. As we explain shortly, the monitor will calculate your payments anonymously using the ID numbers.

Voting Procedure

vote in the ballot box, there was no way for them to change their choices. Under sequential voting, subjects choices may be significantly different than when voting is simultaneous, particularly when the decisions are observed. See Battaglini, Morton, and Palfrey (2007) for a discussion of sequential versus simultaneous voting.

During the following experiment, we require your complete and undivided attention, and ask that you follow the instructions carefully. Please turn off your cell phones. For the duration of the experiment, do not take actions that could distract you or other participants. Peeking at other participants' decisions is not allowed during the session. And do not let others observe your decisions. If you have any questions during the experiment, please raise your hands. The experimenters will come to you privately and answer your questions. If we think the questions are of a general nature, we will announce the answers to everyone. Please restrict these questions to clarifications about the directions only. If you break silence while the experiment is in progress, you will be asked to leave the experiment.

Please find 24 envelopes on your tables. Each of these envelopes has a number written on the front. This experiment will last for 24 rounds. In the first round, you are asked to open the large numbered envelope labeled number "1." Similarly, during the next round, you are asked to open the large numbered envelope labeled number "2," and so forth, for 24 rounds.

In each of these envelopes, there are

1. three envelopes: ORANGE, BLUE, GREEN
2. three ballot tickets: "Vote for Party A," "Vote for Party B," and "Abstain"
3. one piece of paper: "For payment"

In the experiment, there are two groups of players: A-type voters and B-type voters. Beside the "monitor," ten participants of this experiment will be randomly assigned as one of these two types players. There are always 6 A-type voters and 4 B-type voters who are asked to make a series of voting decisions in this experiment. You can find your role—A or B-type voter—on the ballot tickets, and your role will remain the same throughout the entire experiment.

In each round, you need to decide whether to vote for party A, vote for party B, or abstain. Then once you decide, please select the associated ballot ticket and put it into the corresponding envelope as described below.

- If you vote for Party A, put "Vote for Party A" in the ORANGE envelope, "For Payment" in the GREEN envelope, "Vote for Party B" and "Abstain" in the BLUE envelope.

- If you vote for Party B, put "Vote for Party B" in the ORANGE envelope, "For Payment" in the GREEN envelope, "Vote for Party A" and "Abstain" in the BLUE envelope.

- If you abstain, put "Abstain" in the ORANGE envelope, "For Payment," "Vote for Party A," "Vote for Party B" all in the GREEN envelope, NOTHING in the BLUE envelope.

You should **FOLD** your ballot tickets before putting them into the envelopes so that your vote choice cannot be seen through the envelope. After you make your voting decisions, the experimenters will come around and collect the ORANGE envelopes. Please put the leftover envelopes back to the numbered large envelopes. Please note that neither the experimenters nor the other participants know your vote choices. When you are making your decisions, please place the ballot tickets confidentially and do not let others know your decision. Please raise your hand when you have made your decision.

Winning Rule

Only the votes in the ORANGE envelopes will be used to determine the winner in the election. In each round, after the ORANGE envelopes have been collected, one of you will be randomly chosen to draw one of the ORANGE envelopes from

the ballot box and open it. If the envelope contains the paper marked "Vote for Party A" then Party A is declared the winner; if the envelope contains the paper marked "Vote for Party B" then Party B is declared the winner; if the envelope contains the paper marked "Abstain," or the envelope contains more than one ballot ticket, then a new envelope is randomly drawn from the ballot box in order to decide the result.

Costs and Payoffs

You will receive $8 for showing up. You will also earn an additional payoff based on the outcome of the election in the chosen round and your type. That is, at the end of the experiment, one of the 24 rounds is randomly chosen to be "paid." The experimenters will randomly invite one of you to choose the round that will be paid. Your payoff will depend on your type and which party wins the election in the chosen round. For each election you will be given a separate set of instructions with a payoff table that explains what your payoffs will be in that election. Please read the instructions carefully for each round. The payoff tables may change from round to round.

Voting is costly. You will pay $2 if you vote for either party A or party B. If you choose to abstain (not vote) you do not need to pay this additional amount. The cost of voting will stay at $2 for the entire experiment. You will be paid based on your type and who the winner is for the selected round to be paid. So, if you abstain, you will also be paid. But please note that, whether you vote or abstain decides the probabilities that party A and party B wins the elections.

Privacy

Your decisions and payments are absolutely anonymous. Neither the other participants nor the experimenter knows this information.

In order to achieve absolute anonymity, the experimenters sealed all the large envelopes after they randomly put all the necessary materials into them. Then, the experimenters

randomly distributed these large envelopes to your tables.

When the round to be paid is selected, you need to find the GREEN envelope of the selected. Please only submit the GREEN envelope of the selected round, but not the ones of other rounds. Also, you need to clip one of your ID numbers to the GREEN envelope using the provided paper clips. Note that, you need to FOLD the ballot tickets so that your decisions cannot be seen through the envelope.

After collecting all the GREEN envelopes, the experimenters will give them to the monitor who sits in another office of the laboratory. The monitor does not know who you are. He or she will simply put the voucher into each GREEN envelope based on the outcome of the election and your type in the selected round. The monitor will be able to calculate the payoffs by consulting your GREEN envelopes for the selected round. That is, the monitor will see on the "For payment" sheet your type. That will tell the monitor what your payoff from the election should be given who the winner is. The monitor can also see whether you abstained or not by seeing if you have included the "Vote for Party A" and "Vote for Party B" pieces of paper. If you have included both of these, then the monitor knows you abstained and does not deduct \$2 from your payoff. If the monitor does not see both of these pieces of paper in addition to the "For payment" piece, then she or he will deduct the \$2 from your payoff. The monitor will add up the total amount that she is going to pay to subjects. The experimenters, from examining the orange envelopes and knowing the distribution of voter types, will be able to tell how many abstained and be able to calculate the total as well to check the monitor to be sure the monitor's calculation is right. But the experimenters will never know whether you IN PARTICULAR abstained or not and if you voted, how you voted. No one will know this information.

Then, the experimenter gives back the GREEN envelope to each of you without know-

ing your payments. When you receive your payment, please check that it is the right amount that you should receive from participating in the experiment. If you have any problems with your payment, please report it to the experimenters. If your payment is correct, please come to the experimenter and sign your name on the receipt. The experiment is over and you are free to leave.

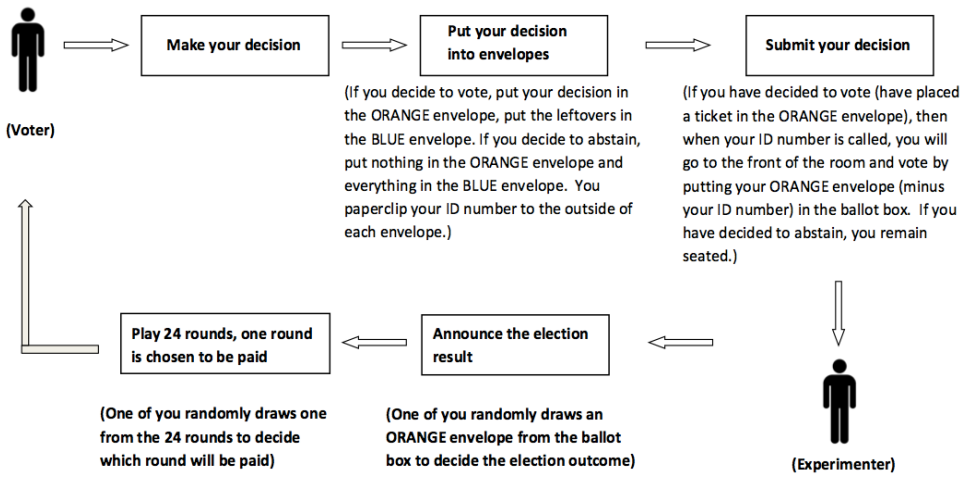
Summary

- There are two types of voters: A type and B type. You will randomly be assigned as one of these types. There are 6 A type voters and 4 B type voters who are asked to make a series of voting decisions in this experiment. The number of A type and B type voters, and your role—A type or B type—will remain the same throughout the entire experiment. But the payoff tables may change from round to round. You need to read the instructions carefully in each round.

- You need to pay $2 to vote. If you abstain, you do not need to pay the voting cost. You will be paid based on your type and who the winner is for the selected round to be paid. So, if you abstain, you will also be paid. But please note that, whether you vote or abstain decides the probabilities that party A and party B wins the elections.

- You need to select the associated ballot tickets, FOLD, and put them into corresponding envelope as required. In each round, one of the participants will be asked to randomly draw an envelope from the ballot box to decide the winner of the election. After the 24 voting games have been finished, the experimenters randomly ask one of you to draw one round from the 24 rounds as the round to be paid.

- Your decisions and payments are absolutely anonymous. Neither the other partici-



pants nor the experimenter knows this information.

If you have any questions, please ask them now.

DO NOT TURN TO THE NEXT PAGE UNTIL INSTRUCTED TO DO SO.

Typical Page for a Period

In this round, there are 6 A-type voters and 4 B-type voters. Please check your role in the envelope. The payoff table for the two types of voters is shown below (Here subjects would find a table with the voting payoffs for the period).

This table tells you the payoffs you and the other members of the group receives for every potential winning alternative. For example, if Party A wins, A type voters receive 20 dollars, B type voters receive 5 dollars. If Party B wins, A type voters receive 5 dollars, B type voters receive 20 dollars.

Remember that voting is costly and if you choose to vote, you will pay \$2 for voting. So, if you are an A type voter, and you choose to vote, and A wins, you receive \$20-2 = \$18. If you are a B type voter, and you choose to vote, and A wins, you receive \$5-2=\$3. If you abstain, you do not have to pay the \$2 to vote.

Please make your decision now!

- If you vote for Party A, put "Vote for Party A" in the ORANGE envelope, "For Payment" in the GREEN envelope, "Vote for Party B" and "Abstain" in the BLUE envelope.

- If you vote for Party B, put "Vote for Party B" in the ORANGE envelope, "For Payment" in the GREEN envelope, "Vote for Party A" and "Abstain" in the BLUE envelope.

- If you abstain, put "Abstain" in the ORANGE envelope, "For Payment," "Vote for Party A," "Vote for Party B" all in the GREEN envelope, NOTHING in the BLUE envelope.

Supplemental Online Appendix C: Additional Empirical Results

Figure C1: Abstention in SI versus S

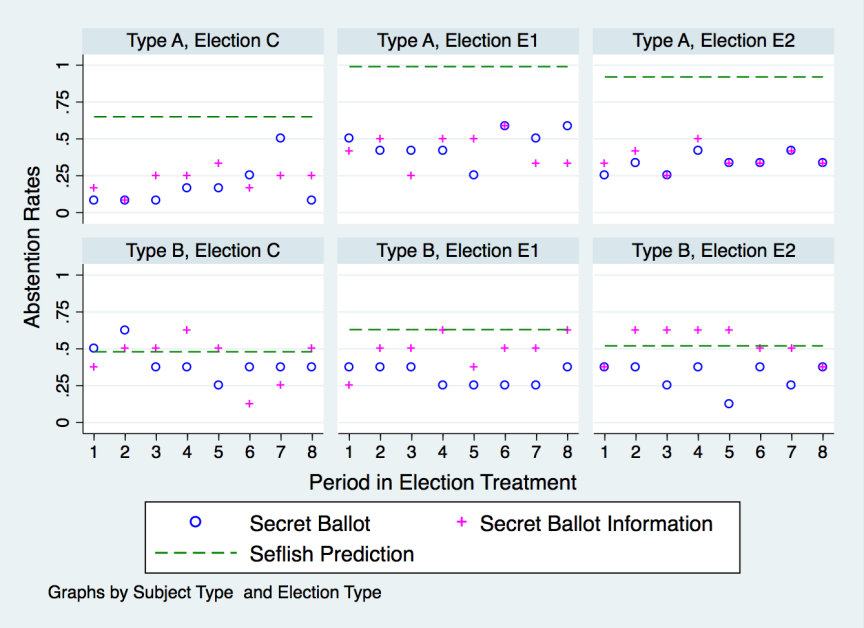


Figure C2: Other Party Voting in SI versus S

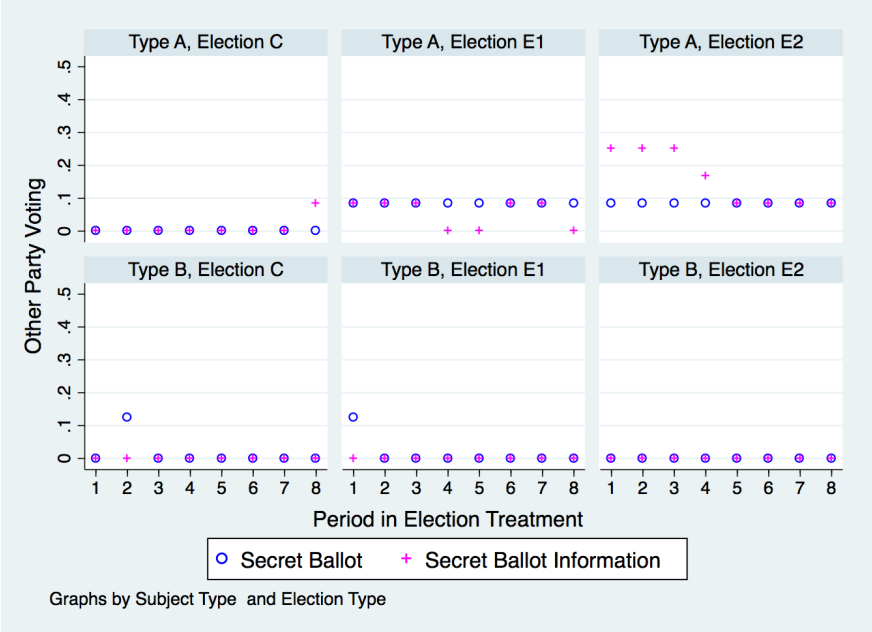


Table C1: Probits of Voting for Secret Ballots					
Type A	Dependent Variable	dF/dx	Std. Err.	z	P $>\|z\|$
	% A Wins in S - % A Wins in P	1.65	0.49	2.98	0.003
	Number of Observations = 36				
	Pseudo $R^2 = 0.29$				
Type B	Dependent Variable	dF/dx	Std. Err.	z	P $>\|z\|$
	% A Wins in S - % A Wins in P	-0.99	0.53	-1.89	0.06
	Number of Observations = 24				
	Pseudo $R^2 = 0.12$				