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Rational voting and voter turnout*

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Abstract

For voters with "social" preferences, the expected utility of voting is approximately independent of the size of the electorate, suggesting that rational voter turnouts can be substantial even in large elections. Less important elections are predicted to have lower turnout, but a feedback mechanism keeps turnout at a reasonable level under a wide range of conditions. The main contributions of this paper are: (1) to show how, for an individual with both selfish and social preferences, the social preferences will dominate in rational voting in large elections; (2) to show that rational socially-motivated voting has a feedback mechanism that stabilizes turnout at reasonable levels (e.g., 50% of the electorate); (3) to link the rational social-utility model of *voter turnout* with survey findings on socially-motivated *vote choice*; (4) to provide evidence, both from voting and from surveys, broadly consistent with rational and socially-motivated voting.

Keywords: elections, turnout, sociotropic voting, rational choice

1 Introduction

We demonstrate that voting is rational even in large elections if individuals have "social" preferences and are concerned about social benefit[1]. In a large election, the probability that a vote is decisive is small, but the social benefit associated with deciding the election outcome is large, and so the expected utility benefit of voting to an individual with social preferences can be significant. What is perhaps surprising is that the expected value of the social benefit does not approach zero or even diminish as the number of voters grows large.

The key way in which we go beyond a circular argument (of the form, "people vote because it gives them positive utility") is that we consider the perceived social benefit not simply as a psychological feature of the individual but as a utility that is proportional to the probability of being pivotal (itself endogenous) and to the number of persons affected by the election under

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[1]This can be seen as a formalization of comments by Margolis (1981, p. 266) who argued that voting could be explained as an individual acting on a social duty instead of to satisfy individual interest.

consideration. We believe that this calculation is roughly consistent with the way citizens perceive voting and participation—not simply as a (possibly) enjoyable act or as a discrete duty, but as a potential contribution to the general good. The larger the jurisdiction in which the election applies, the larger the potential effect of the election outcome on the general welfare.

Agents in rational-choice models are typically assumed to have "selfish" preferences. We argue that separating the rationality assumption from the selfishness assumption reveals that (a) the act of voting can be rational, and (b) a rational voter will decide which candidate or option to vote for based on the voter's judgment of the expected social consequences of the election outcome as distinct from the direct consequences to that voter. We show this for a simple model in which voters decide whether to vote, and how to vote, based on maximizing an expected utility with both selfish and social terms.

More important than explaining that it is rational for people to vote (if they have social preferences) is our observation that for the very reasons it is rational to vote in a large election, even a mostly-selfish person who votes should as a descriptive matter vote for what he or she perceives to be the common good, or at the least the good of a large affinity group, but not for direct individual gain. Thus our model explains not just *why* but also *how* rational people vote. This voting theory suggests that models of the vote choices of rational individuals should work with social rather than selfish utility functions. Survey findings on voters' motivations are, in fact, broadly consistent with rational models of voting (see Section 4.3). The two modeling approaches are not entirely contrary, to the extent that individuals bias their views of what will help others by what will help themselves.

It is well known that voting in large elections cannot be explained in terms of the selfish benefits of voting to the individual: the probability that a vote is decisive is too low for voting to be "worth it" in an expected utility sense (see Downs, 1957, Riker and Ordeshook, 1968, Ferejohn and Fiorina, 1974, Meehl, 1977, Aldrich, 1993, Green and Shapiro, 1994, and Gelman, King, and Boscardin, 1998). Intrinsic theories of voting understand voting as an experience that provides psychological benefits, but such explanations do not help us predict variations in voter turnout, such as high turnout in close elections and Presidential elections. Nor do they provide guidance in understanding which candidates a voter will prefer.

We claim that one reason a voter would support George Bush for U.S. President in 2000, for example, was because the voter thought that Bush would be better for the country as a whole, even if most Americans did not see that. The voter is *not* updating based upon the opinions of the other voters in order to judge the quality or social utility of Bush. Instead, we model the voter's subjective social benefits as proportional to the number of citizens, and independent of the way other citizens vote[2].

[2]A failure to update reflects that the voter feels strongly enough about which candidate is best for the country

As the probability of being pivotal shrinks, people will be less apt to vote (though there is a feedback here, because as fewer vote, the chance of being pivotal increases; see Section 2.2). As the stakes and importance of the election increases (say because candidates are farther apart on the issues or because it is a Presidential election), more will vote. Likewise, as the cost of voting declines, more people, and importantly more people who are poorly informed, will find it rational to vote. Finally, our model predicts that holding constant these other factors, election size will not substantially influence turnout rates[3], except among very small elections where selfish concerns may play a role.

We present our model in Section 2 of this paper and review broadly supporting evidence in Section 3 and 4. We conclude in Section 5 with a discussion of the implications of our results for vote choices as well as voter turnout.

2 A social-benefit model of rational voter turnout

2.1 If one cares about others, it can be rational to vote

Suppose n persons vote in an election that affects a jurisdiction with a population of $N_{\text{population}}$; then the benefit of having the preferred candidate win the election is proportional to $N_{\text{population}}$. This is multiplied by a probability of decisiveness that is proportional to $1/n$, and thus the expected utility of voting is proportional to $N_{\text{population}}/n$, which is approximately independent of the size of the electorate.

In the basic rational-choice model of voting and political participation (see Blais, 2000, for an overview and many references), the relative utility of voting, for a particular eligible voter, is

$$\Delta U = pB - c, \tag{1}$$

where p is the probability that a single vote will be decisive, B is the relative benefit associated with your desired candidate winning the election, and c is the net cost of voting—that is, the costs, minus the direct benefit of voting (whether or not your candidate wins)[4].

Acting in a manner consistent with this sort of cost-benefit analysis is the standard definition of rationality as utility maximization. Traditionally, B is understood to refer to direct benefits to the voter. This is the assumption of self-interest. We keep the rationality but break the link to

that his or her mind will not be changed simply because the majority of voters disagree. In this framework, the two groups of voters in an election do not represent competing *interests* but rather competing *perspectives* about what is best for the country.

[3]This is different from some game-theoretic calculations assuming purely selfish utilities that predict positive turnout that would be below 1% in a large election (see, Ledyard, 1984, Green and Shapiro, 1994, and Feddersen and Pesendorfer, 1996, for discussions of such models).

[4]This last term is often written in two parts, separating the direct costs C and direct benefits D, but we shall only need to work with the difference or net cost, $c = C - D$.

pure self-interest by expanding the benefit term in (1) to include individual benefits B_{self} and social benefits B_{soc} for an affected population, represented by N eligible voters:

$$B = B_{\text{self}} + \alpha N B_{\text{soc}}. \tag{2}$$

Here, B_{soc} is the average benefit per eligible voter if the preferred candidate wins, and α is a discounting factor to reflect that benefits to others are less important than benefits to self; thus, we would expect $\alpha < 1$ for most people. The factor B_{soc} represents the benefit to others *as perceived by the person making the decision whether to vote*; it is not an averaging of the actual utilities or preferences of the N persons in the population affected by the election.

Definition. A voter is *selfish* if $\alpha = 0$ and *social* if $\alpha > 0$ in (2).

Assumption. The probability of a pivotal vote is inversely proportional to the number of voters, n. (The closeness of elections, in percentage terms, does not depend strongly on the number of voters, n. Hence the probability that an individual vote is decisive—which essentially is the probability that an election is exactly tied—is of order $1/n$. See the Appendix for further discussion of this point.)

We write the probability that a vote is decisive as,

$$p = K/n, \tag{3}$$

where K represents the competitiveness of the election. As discussed in the Appendix, $K = 10$ is a reasonable value for close elections, with smaller values in elections that are not expected to be close.

Proposition 1. For a *selfish voter*, the expected benefits from being pivotal and swinging the election vanish as n grows. As a result, voting in large elections only makes sense for selfish voters if they enjoy the act of voting itself (that is, if $c < 0$ in (1)).

For example, consider a two-candidate election with n voters representing a jurisdiction with N eligible voters. Suppose the election is anticipated to be close, and each candidate is expected to get between 47 and 53 percent of the vote (and thus the vote differential is expected to be in the range $\pm 6\%$). The probability that a single vote is decisive is then about $1/(0.12n)$.[5] So for a selfish voter, the expected utility gain from potentially swinging the outcome of the election is about $B_{\text{self}}/(0.12n)$, which even for a moderately large election (e.g., $n = 1$ million) is minor: even if the

[5] This assumes that the probability distribution for the vote differential is approximately uniform in the range of uncertainty. Using a different distributional form would change the coefficient but not the proportionality to $1/n$.

outcome of the election is worth \$10,000 to a particular voter, the expected utility gain is less than 10 cents. This point has been widely recognized (see the references at the beginning of this paper). Given that the act of voting has a nonzero cost, voter turnout is thus usually attributed to some mix of irrationality, confusion, and the direct gratifications of voting (including the performance of a civic duty); that is, a negative net cost c of the act of voting. However, these motivations do not explain observed variations in voter turnout between elections. In addition, voting is an act with large-scale consequences beyond any immediate satisfaction it gives to the voter. At the very least, many voters seem to consider their voting actions with more seriousness than other low-cost consumption decisions.

> **Proposition 2.** For a *social voter*, the expected benefits of being pivotal and swinging the election have a nonzero asymptote proportional to αB_{soc}, which does *not* vanish as n increases.

For example, consider the same hypothetical election as above, in which the n voters represent a jurisdiction with population N. Further suppose that one-third of the eligible voters turn out; that is, $n/N = 1/3$. If you, as a potential voter, think that the net benefit to your fellow citizens of candidate A winning the election is the equivalent of $B_{\text{soc}} = \$10$ per citizen, then you are effectively giving them a total of $\$10N/(0.12n) = \$10N/(0.12(N/3)) = \$250$ in expected value by voting. Voting in such a circumstance is a perfectly reasonable thing to do, regardless of population size: a small effort yields a substantial expected social gain, equivalent in some ways to giving \$250 to a national charity. For example, if your discounting factor for benefits to others is $\alpha = 0.1$, then your net utility gain from voting is positive as long as your cost of voting c is less than \$25. In many elections with issues such as national security, global warming, and nuclear weapons proliferation, a rational citizen could think that the superiority of his or her candidate might deliver an expected value per citizen far in excess of \$10, and thus an expected return on voting far in excess of \$250.

By separating rationality and selfish preferences—two assumptions that have usually been linked, but that have no logical connection—we see that voting in large populations is perfectly rational. Our model also leads to a different prediction of the choices people make when they vote. As the size of the population increases, the expected social contribution to utility comes to dominate the direct individual utility, which shrinks to 0. As a result, as population size grows, an individual may change his or her vote and begin to vote for the social good instead of the individual good. Hence a shareholder in a privately held company with four shareholders might vote for his own interest. However, in a national election if a voter makes a rational decision to vote, he or she will vote for policies that he perceives to be in others' interests. Of course most people have a natural bias to think that what interests them will interest others, so the two motivations may be easily confused

in practice.

2.2 Feedback mechanism keeps voter turnout relatively stable

Our social-benefit model of voter motivation has a feedback mechanism that explains why turnout settles to a stable level at a sizeable fraction of the electorate. If turnout becomes very low, then n decreases, and thus the factor N/n increases, and it becomes more reasonable to vote[6]. We explore the feedback in detail using our model.

In our notation, the rate of voter turnout is

$$T = n/n_{\text{elig}}.$$

Inserting this and (3) into equation (1) yields,

$$\Delta U = \frac{Kb}{T} - c, \tag{4}$$

where b is defined as the expected benefit, *per eligible voter*, of changing the election outcome,

$$b = \alpha B_{\text{soc}} + \frac{1}{N} B_{\text{self}}. \tag{5}$$

If N is large (as in most elections of interest), then $b \approx \alpha B_{\text{soc}}$ and does not depend on N. In general, b should be positive, but c can be either positive or negative. The ratio c/b can be considered the net cost of voting, for a particular voter, per unit gain in the population.

In the notation of (1), it is rational for a person to vote if $\Delta U > 0$; from (4),

$$\Delta U > 0 \quad \text{if} \quad \frac{c}{b} < \frac{KN}{n_{\text{elig}} T}. \tag{6}$$

We can assume a distribution of c/b among the population of eligible voters and then use the model to explore how turnout should vary among elections. The model has a stable equilibrium turnout rate, which we explore by working with expression (6) which expresses the conditions under which it is rational to vote.

For less important elections, b will decrease, and thus c/b increases, and so fewer people will want to vote. But with this decrease in T, it becomes rational for some people on the margin to vote. The equilibrium point is defined by,

$$T = \Pr\left(\frac{c}{Kb} < \frac{1}{T}\right), \tag{7}$$

where the probability calculation averages over the distribution of c/b among the voters, and the factor $1/K$ is considered a constant for any particular election. In an election anticipated to be

[6]This feedback also occurs with the instrumental-benefit model, but there the expected utility of voting is so low that voter turnout will stabilize at less then 1% in large elections (Ledyard, 1984).

close, it is reasonable to set $K = 10$ (see the Appendix). Given these factors and a distribution for c/b, we can solve for the turnout rate T.

To get a sense of the dependence of turnout on the importance of the election, we consider a specific two-parameter family of probability distributions for c/b that allows for a nonsymmetrical distribution of net utilities for voting that can be both positive and negative[7]. We shall examine how turnout (as solved for in (7)) depends on the two parameters of this distribution:

- The noncentrality parameter δ determines the skew in the distribution. In the context of voting, it can be mapped to the proportion of the population for which net direct cost (the term c in (4)) is positive and the proportion for which c is negative (these are the people for which the direct benefits of voting exceed its costs, irrespective of who wins). We set δ to be positive (meaning that the net costs of voting are positive for more than half the population) and consider a range of values. If $\delta = 1$, then $\Pr(c > 0) = 0.16$, which means that 60% of the eligible voters would vote, even in an election with no importance. We consider values of δ from 0.5 (in which case 31% of the people would vote under any circumstances) to 1.5 (6.7% would always vote).

- The scale parameter s represents the average importance of the election, as perceived by the potential voters. We consider how the turnout varies as a function of s with the other parameters in the model held constant.

Figure 1 shows the results for this model. Each curve in the figure represents the possible elections in a hypothetical population, with the different elections differing in importance (as measured by the scale parameter s of the noncentral Cauchy distribution) but otherwise held under similar circumstances; that is, with a fixed noncentrality parameter (0.5, 1.0, or 1.5) and K fixed at 10 (corresponding to an election that is anticipated to be fairly close). All these curves are characterized by a fundamental *stability*: the importance of the election can change by over an order of magnitude, with turnout staying in a reasonable range. This shows how the feedback mechanism works, under this model, to keep turnout at a reasonable level.

3 Supporting evidence from political participation

Our potentially controversial claim is not the Benthamite idea of defining social utility as proportional to the number of people benefiting but rather the assumption that individual voters might

[7] We use the noncentral Cauchy distribution (that is, the noncentral t with 1 degree of freedom), which is appropriate for a ratio in which the numerator can be positive or negative (Johnson and Kotz, 1970). The noncentral Cauchy is defined as a normal distribution with mean δ and standard deviation 1, divided by the square root of a scaled χ^2_1 distribution with scale parameter s.

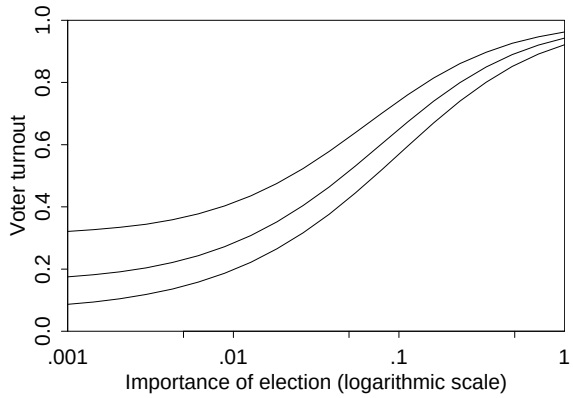

Figure 1: Stable level of turnout as a function of the relative importance s of the election, for different values of δ in the distribution of cost/benefit ratios (see Section 2.2). (From top to bottom, the three curves correspond to $\delta = 0.5, 1.0, 1.5$.) Because of the feedback mechanism (when turnout decreases, the probability of a decisive vote increases), the expected turnout remains in a plausible range (between 20% and 80%), even as the importance of the election varies by two orders of magnitude.

be motivated by such a social utility. We cannot prove this claim but do want to provide some suggestive evidence.

Our supporting evidence is of two types. In Sections 3.1–3.4, we consider information on the rate at which people engage in political activities—such as voting and responding to surveys—that have a small chance of affecting large-scale policies. Sections 4.1–4.3 address how people vote, with evidence that vote choices are based on judgments of social goods, not selfish benefits.

3.1 Small contributions to national campaigns

In addition to voting, millions of people contribute small amounts of money to national political campaigns (see Verba, Schlozman, and Brady, 1995). Volunteer work could be motivated as enjoyable in itself. Large contributions, or contributions to local elections, could conceivably be justified as providing access or the opportunity to directly influence policy. But small-dollar contributions to national elections, like voting, can be better motivated by the possibility of large social benefit than by direct instrumental benefit to the voter. Such civically-motivated behavior is of course perfectly consistent with both small and large anonymous contributions to charity.

3.2 Declining response rates in opinion polls

Responding to opinion polls can be thought of as another form of political participation in that policymakers and candidates use poll results as factors in making decisions. (For example, consider the role of opinion polls and perceived opinion changes in issues including abortion, gun control,

health care, the death penalty, and Bill Clinton's impeachment.)

In the 1950s, when mass opinion polling was rare, we would argue that it was more rational to respond to a survey than to vote in an election: for example, as one of 1000 respondents to a Gallup poll, there was a real chance that your response could noticeably affect the poll numbers (for example, changing a poll result from 49% to 50%, or changing a result from not statistically significant to significant). Nowadays, polls are so common that a telephone poll was done recently to estimate how often individuals are surveyed (the answer was about once per year). It is thus unlikely that a response to a single survey will have much impact, and so it is perhaps no surprise that response rates have declined dramatically in recent decades (Steeh, 1981, Groves and Couper, 1998, Smith, 1995, and De Leeuw and De Heer, 2002). There are of course other reasons (e.g., irritation at telemarketers) for the increasing nonresponse; our point here is that this pattern is consistent with our model in which political participation is motivated by expected utility of the social outcome.

3.3 Turnout is higher, not lower, in large elections

Voter turnout tends to be higher in large elections—in the United States, highest for presidential elections, then congressional and state, then finally local elections tend to have the lowest turnout. Theories of voting that focus on instrumental benefits (e.g., the theory that says that voters are instrumental utility-maximizers who happen to overestimate small probabilities) would tend to predict higher turnouts in small elections. In contrast, the social-benefit theory predicts a slight increase in turnout for national elections, if the issues at stake are perceived as more important, on a per-voter level, than in local elections.

More specifically, one might expect local elections to be more relevant for individual benefits and national elections to have a greater effect on social benefits. But the $1/N$ factor in the second term of (5) ensures that the individual-benefit term will be close to zero except in the most local elections. The gradual decline of the $\frac{1}{N}B_{\text{self}}$ term in (5) in fact would predict a very slight decline in turnout as population increases, at least for small jurisdictions, as was in fact found by Darvish and Rosenberg (1988) for a set of Israeli municipal elections. However, this decline would be expected only if all other factors in the election were held constant. Since national elections typically address more important issues, it makes sense under our model for them to have higher turnout.

3.4 Turnout is higher in close elections

Turnout tends to be higher in close elections, or, to be more precise, in elections that are anticipated to be close, and there is some evidence to suggest that the probability of voting increases for potential voters who perceive an election to be close. These effects have been much studied (e.g., Campbell

et al., 1960, Barzel and Silberberg, 1973) and have been taken as support for the decision-theoretic motivation for voting. However, it has been pointed out from both proponents and opponents of the rational choice model (e.g., Aldrich, 1993, and Green and Shapiro, 1994) that for large elections, the probability of a single vote being decisive is miniscule even if the election is anticipated to be close. And if voting is motivated by personal satisfaction, it is not clear why voting should give more satisfaction or discharge more civic duty in close elections.

In contrast, the increased turnout from closer elections makes perfect sense from the social-benefit theory, where even small probabilities of decisiveness are important when multiplied by the social benefit, which is proportional to N.

4 Supporting evidence from political vote choices

Our theory predicts not only that rational people will vote but that a rational person who votes—even a mostly-selfish rational person—will decide whom to vote for based on social considerations. In this section we discuss some observations about vote choices that are consistent with rational and socially-motivated voting. This evidence is important because it recognizes voting as a serious act of citizenship rather than simply a fulfillment of a civic duty.

4.1 Strategic voting

A strong piece of evidence that vote choices are perceived as consequential (and thus amenable to decision-analytic treatment) is that voters sometimes act strategically (see, for example, Alvarez and Nagler, 2000, Abramson et al., 1992, and Johnston and Pattie, 1991). For example, in three-candidate races for seats in the House of Commons in the United Kingdom, it is common for supporters of the third candidate to vote for one of the leaders, and political parties account for these voting patterns in their strategies. Strategic voting behavior is consistent with our model because it suggests that at least some voters are acting based on the anticipated consequences if their vote is decisive. So it's not merely the act of voting that motivates turnout, it's also the potential for affecting the outcome.

4.2 Voting based on issues without direct instrumental benefits to the voter

Another piece of evidence that voting is motivated by social benefit is that, in surveys, many voters say their vote choices are strongly influenced by non-economic issues that do not affect them directly (for example, if you oppose abortion, then you will not be directly affected by abortion laws). It is true that some contentious issues (for example, Social Security benefits) do involve instrumental benefits to voters, but what is important for our model is that these are not the *only* issues of importance to voters.

Voting is a way for citizens to get their opinions heard and respected. For that matter, it seems quite plausible that, if Americans could vote on the Academy Awards, turnout would be high despite the lack of personal benefits from influencing such an election.

4.3 Surveys of voter motivations

Strong evidence for our model comes from surveys of potential voters. Voters' preferences on national candidates and issues are strongly correlated with views on what would be desirable for the country, and more weakly correlated with opinions about personal gain. Hence in political science, the standard view (to which we subscribe) is that voters are socially motivated in their preferences (see Kinder and Kiewiet, 1979, 1981, Weatherford, 1983, and Funk and Garcia-Monet, 1997). Funk (2000) extends the idea of social-benefit motivations to public opinion. These findings address who you might vote for, not whether you turn out to vote—but if your vote choice is determined by social-benefit concerns, then it is reasonable for any decision-theoretic model of voting to include anticipated social benefit in the utility function.

For a recent example, in the 2001 British Election Study (University of Essex, 2002), only 25% of respondents thought of political activity as a good way to get "benefits for me and my family," whereas 66% thought it a good way to obtain "benefits for groups that people care about like pensioners and the disabled."

5 Discussion

5.1 Social motivations and rational voting

Voters think in terms of group and national benefits. We know this from survey responses and, as we have shown in this paper, with such motivations it makes sense for many people to vote, as contributions to collective entities. In surveys, voters say they are motivated by national conditions, and their turnout is consistent with this assumption, so perhaps we should believe them. Conversely, rational *and purely selfish* people should not vote.

Survey results on socially-motivated voting are actually consistent with rational political behavior although they are sometimes seen as an anomaly[8]. For example, Kramer (1983) explains poll findings of sociotropic voting as a statistical artifact that is "perfectly compatible with the null hypothesis of self-interested, pocketbook voting." As we have shown in this paper, however (see also Meehl, 1977, and Margolis, 1981), voting and vote choice (including related actions such as

[8]Some research in political science and public opinion has identified rationality with civic-mindedeness; for example, Key (1966) wrote of a "rational" electorate concerned with "central and relevant questions of public policy, of governmental performance, and of exective personality." However, the literature on voter turnout has tended to associate rationality with selfishness.

the decision to gather information in order to make an informed vote) is rational in large elections only to the extent that voters are *not selfish*. Thus, there is no good rational reason to consider "self-interested, pocketbook voting" as a default or null hypothesis. After all, sociotropic voting is also perfectly consistent with the null hypothesis of rational voting, social preferences, and sincere survey respondents.

Thus far, we have primarily emphasized our theory as explaining the "mystery" that people vote. However, it also has implications for vote choices. *Why* you vote and *how* you vote are closely connected. If you are voting because of the possibility that you will decide the election and benefit others, then you will vote for the policy that you think will lead to the largest average benefit. There is no reason to vote for a policy that has idiosyncratic benefits to you because the individual-benefit term in your utility is essentially irrelevant for large electorates. This observation explains why the rhetoric of politics tends to be phrased as benefits to society generally or to large deserving groups, rather than naked appeals to self interest. No doubt many people are biased to think that what benefits them will benefit others, but we predict that most people will try to vote to benefit society at large or some large affinity group that they are passionate about. Our contention therefore runs counter to much of the political economy work of the past few decades. Except in very small elections, a rational person who votes will choose the candidate or party with the best perceived social benefits to the population.

5.2 Psychological explanations for voting

Our model of voting for anticipated social benefits is consistent with what we know about voter preferences and turnout. However, other theories could work just as well. Following Aldrich (1993), we believe that the rational model is complementary with a psychological understanding of voters.

In psychological explanations of voter turnout, most of the electorate is motivated to vote by some mix of personal appeals and encouragement by the media. When a particular election becomes particularly "salient" to you (because of publicity, and possibly a connection to an issue of personal interest), you are more likely to vote. Interest in elections rises as the election approaches in the same way that the public gets excited about the World Series, the Academy Awards, and so forth. Turnout is higher in Presidential elections because they receive the most publicity; similarly for close elections, where the act of voting receives more positive pre-election publicity. Voting is a way of involving oneself in the political process, which is desirable, especially if the election seems important, is getting a lot of publicity, and is being talked about. This story is consistent with survey findings on motivations for political participation (Schlozman, Verba, and Brady, 1995, Verba, Schlozman, and Brady, 1995) but focuses on the differences between elections rather than between voters or between modes of participation.

The other side of the psychological-political explanation is that turnout is affected by political advertising and other partisan and bipartisan efforts at persuasion (Gosnell, 1927, Gerber and Green, 2000). In close elections and important elections, it makes sense for candidates and interest groups to put more effort into persuading voters, which will increase the perceived salience of the election and thus increase the psychological motivation to vote. Aldrich (1993) makes this point to illustrate how political parties and interest groups can raise the psychological stakes in close elections, which happen to be those in which the probability of a decisive vote is highest.

From the perspective of the rational model based on perceived social benefits, we recognize that all human actions, including those that are rational, need some psychological motivation, and it makes perfect sense that a beneficial action will feel pleasant also; higher perceived salience corresponds to greater social benefit from voting. Conversely, the psychological explanation does not stand alone—voter turnout (unlike Academy Award voting) has direct political effects, and it is reasonable and appropriate to study the benefits from voting, even if from a psychological perspective they are perceived only indirectly. Politically, it is also important to understand the factors that influence participation, since political actors are continually trying to manipulate them.

5.3 Generalizations of the model

Like all formal models of human actions, ours is a drastic oversimplification. Our key point is not that the curves in Figure 1, for example, exactly fit turnout behavior in specific U.S. elections, but that the model is consistent with such behavior. Now that the model includes the social-benefit term, it has the potential to be be expanded in various ways already suggested in the political science literature. For example, Uhlaner (1989) suggests that voters consider themselves as members of large groups. In Converse's famous article noting that relatively few in the public are what he calls "ideologues," he emphasizes that many people do think in terms of "group benefits." Recent papers extending the idea of group motivation include Leighley (1996) and Mutz and Mondak (1997).

The social-benefit model (applied now to groups rather than all persons in the population) then explains why voter turnout remains stable even when the number of voters within each group becomes large, as in national elections. Aldrich (1993) discusses a variety of interactions between rational voting behavior and political strategists, and these interactions become clearer when individuals' preferences are allowed to include social benefits proportional to population size. Indeed, as a first step, future experimental research should begin to map the relationships between social preferences and individual concerns. Finally, a consideration of social as well as instrumental benefits can allow models to address a wider variety of contentious political issues as factors in the turnout decision (and also in the vote choice decision, as we discuss in Section 5.1).

Appendix: Why the probability of a decisive vote is of order $1/n$

If n individuals vote in an election, then the probability of a vote being decisive is roughly proportional to $1/n$ (see Good and Meyer, 1975, and Chamberlain and Rothchild, 1981). This result is derived based on the empirical fact that elections are unpredictable. Let $f(d)$ be the predictive or forecast uncertainty distribution of the vote differential d (the difference in the vote proportions received by the two leading candidates). If n is not tiny, $f(d)$ can be written, in practice, as a continuous distribution (e.g., a normal distribution with mean 0.04 and standard deviation 0.03). The probability of a decisive vote is then half the probability that a single vote can make or break an exact tie, or $f(0)/n$.[9]

For example, if a Democrat is running against a Republican, and the difference between the two candidates' vote shares is expected to be in the range $\pm 10\%$, then the probability is about $1/(0.2n) = 5/n$ that a single added vote could create or break a tie[10]. The exact probability of decisiveness depends on the election and one's knowledge about it, but even if an election is expected ahead of time to be close it is hard to imagine a forecast vote differential more precise than $\pm 2\%$, in which case the probability of a decisive vote is still at most $1/(0.04n) = 25/n$. In practice, we see $10/n$ as a reasonable approximate probability of decisiveness in close elections, with lower probabilities for elections not anticipated to be close. Gelman, King, and Boscardin (1998), Mulligan and Hunter (2002), and Gelman, Katz, and Bafumi (2002) estimate these probabilities in more detail for elections for Presidential, Congressional, and other elections.

Some game-theoretic models have been proposed that suggest instrumental benefits for voter turnout (e.g., Feddersen and Pesendorfer, 1996), but these models also imply that large elections will be extremely close, and so they are not appropriate for real elections where the margin of victory varies by several percentage points from year to year. Under a coin-flipping model of voting, the probability of decisiveness is proportional to $1/\sqrt{n}$, but this model once again implies elections that are much closer than actually occur (see Mulligan and Hunter, 2002, and Gelman, Katz, and Bafumi, 2002).

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[9]The assumption here is that an exact tie vote will be decided by a coin flip. More realistically, if an election is possibly subject to recounts—so that an exact tie in the original vote is not a necessary or sufficient condition for a decisive vote—this result is still valid and can be obtained by integrating over the range of votes for which a recount is possible (see the appendix of Gelman, Katz, and Bafumi, 2002).

[10]See footnote 4 on page 4.

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