Behavioural Anomalies Explain Variation in Voter Turnout

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Abstract

Individuals regularly behave in ways inconsistent with expected utility theory. We propose that three such behavioural anomalies – ambiguity aversion, insensitivity to sample size, and self-control problems – should be related to voter turnout. Using a survey of Swedish citizens we show that self-control problems and ambiguity aversion are related to voter turnout in the expected direction.

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1 Introduction

Individuals regularly diverge from the courses of action prescribed by expected utility theory or rational choice prescriptions. Some individuals exhibit very high discount rates. Such individuals will take a payment today when an appreciably larger payment a short time later is offered. Others make decisions which suggest a misunderstanding of probability theory. Examples abound, and not only among those who purchase lottery tickets. Such divergences – collectively termed *behavioural anomalies* – are widespread and consistently present. Indeed, they lie at the centre of various behavioural and psychological approaches to social science. Despite this, theories of voter turnout have largely ignored the regularity with which citizens do not behave according to the dictums of expected utility. This may not be for the better. As we show in this chapter, such anomalies help explain variation in the decision to vote, an action central to the study of politics and a question central to political science (and especially the work of Blais [2000]).

The apparent paradox of voter turnout has been a central challenge to political science at least since Downs [1957], and certainly since Riker and Ordeshook [1968] presented their calculus of voter turnout. Why do individuals choose to vote in elections, in particular when their vote cannot be thought to be decisive, and when the expected benefits of voting are thus so small? The answer, following Riker and Ordreshook, is that citizens experience personal gratification by voting and fulfilling their sense of civic duty.[1] While Riker and Ordeshook's model does highlight this problem and propose a solution, its greater function is organizational [Clarke and Primo, 2011]. Their offer-

[1]The duty aspect of turnout, we note, has been long neglected, but is taken up in recent field experimental work (see Green's review in the related conference chapter) and the recent review of the political theory of citizen duty and its empirical implications, by Achen and Blais. For work on the origins of individual differences in duty, see Loewen and Dawes [2012].

ing collects in one model several factors thought to explain voter turnout, namely the probability of being decisive (which encompasses the empirical regularity of competition increasing turnout); the benefits of election (which captures among other things the empirical regularity of higher turnout in more consequential elections); the sense of a duty to vote (which potentially covers several different psychological effects); and the costs of casting a ballot (which can cover both the costs incurred in casting a ballot and the costs incurred in preparing to make a decision). This model, then, brings together several empirical regularities of voter turnout.

Our own reading of the literature suggests that most investigation has occurred around the C, P and D terms (Blais [2000] provides a comprehensive review). Comparatively less work has been undertaken on the comparative effects of election benefits, or B. A few exceptions exist, namely work on social preferences and voter turnout [Edlin et al., 2007, Fowler and Kam, 2007, Fowler, 2006, Loewen, 2010, Dawes et al., 2011]. This work has demonstrated that concern for others reduces the degree to which benefits are discounted by the probability of being decisive, allowing benefits to drive the decision to vote. To the extent that P has been investigated, it has typically been in the context of the effects of the competitiveness of an election, i.e. as something exogenous to individuals, though important exceptions exist [Blais and Rheault, 2010].

Here we explicitly consider anomalies related to the P and B terms at the level of individual voters, rather than at some higher, aggregate level. We thus ask not how exogenous variation in the benefits of an election or the probability of being decisive matter for an election. Instead, we look to differences between individuals that matter for these terms. In doing so, we build on recent work that recognizes the potentially central role of such individual differences for political participation and political behaviour more generally [e.g. Fowler et al., 2011, Mondak, 2010]

We focus on three behaviour anomalies: ambiguity bias, sensitivity to sample size, and self-control problems. In what follows, we explain each of these anomalies and draw out their relationship to the traditional vote calculus. We then describe our subjects, measures, and models. We then present our results and conclude. To anticipate, we find broad support for the claim that behavioural anomalies partially explain the decision to participate in elections.

2 *P* Anomalies

We consider two anomalies related to probability in the vote calculus. The first is ambiguity aversion; the second is insensitivity to sample size. Individuals who exhibit ambiguity aversion reveal a preference for known risks over unknown risks. When confronted with a choice in which probabilities are either certain or uncertain, individuals with ambiguity aversion are more likely choose certain probabilities, even if this decision is less optimal according to expected utility theory. The classic task to draw out ambiguity aversion, as first proposed by Ellsberg [1961], is to allow individuals to participate in a lottery in which they can choose an outcome based on some number of red balls or a larger number of yellow and black balls, all placed in the same Greek urn.[2] The exact number of yellow balls (and thus black balls) is not specified, only that there is a larger combined number of yellow and black balls than red balls. An individual who is ambiguity averse will choose the lower expected payoff of the red ball. Ambiguity aversion may be negatively related to voter turnout in the cases where an individual has uncertainty over the outcome of an election, or the differences between parties or the potential coalition formations are uncertain [see Ghirardato and Katz, 2006]. However, in

[2] An aside: What's a Greek urn? About a thousand euros a week, on average.

general we hypothesize that since ambiguity aversion is likely correlated with a reduced ability to properly evaluate probabilistic information, those who demonstrate ambiguity aversion will, *ceteris paribus*, be more likely to cast a ballot.[3]

Insensitivity to sample size is an anomaly in which an individual displays a lack of understanding of the law of large numbers. The classic example is provided by Kahneman and Tversky [1972] in which respondents are asked which of two hospitals – one of which delivers a large number of babies each day and the other a small number – is more likely to deliver an unusually large share of baby boys in a given day. Those who ignore size of a sample fail to appreciate that larger samples are less likely to produce large deviations from the mean than smaller samples. Those sensitive to the sample size will factor this into their decision-making. Therefore, we posit that insensitivity to sample size may be positively correlated with voter turnout, as those who are less familiar with basic statistical principles will overestimate their own probability of being decisive, *ceteris paribus*.

3 *B* Anomalies

We consider two measures of an anomaly related to the benefits of an election. The two measures are closely related and follow on earlier work on the relationship between self-control and turnout [Fowler and Kam, 2006, Loewen and Dawes, 2011]. The first measure of self-control problems is excessive discounting; individuals prefer an immediate payment over future payments of a substantially larger value. The second measure is self-reported procrastination: individuals put off paying a cost now, instead accepting

[3]We are, then, not advancing a specific claim about ambiguity aversion and its relationship to voter turnout. Instead, we are taking evidence of this anomaly as a proxy for an individual's ability to make accurate inferences about the probability of some event.

a larger cost in the future. The logic by which both of these anomalies are related to vote choice are the same as those expressed in Fowler and Kam [2006] and Loewen and Dawes [2011]. Elections ask individuals to incur costs now – through both information search and attention as well as through the actual physical costs of voting – to realize benefits in the future. Individuals who more steeply discount future payoffs will thus be less likely to vote. We note that this applies with equal felicity to a turnout calculus which incorporates benefits accrued to others, provided those benefits are in the future. It also applies to models of turnout in which the benefit of voting is the maintenance of democracy, provided that maintenance occurs at some future date.

We expect, *ceteris paribus*, that those individuals who exhibit greater discount rates and/or greater procrastination will be less likely to vote.

4 Data and Methods

Our study relies on the Swedish Twin Registry, the largest twin registry in the world. The survey we use (called SALTY), was administered on this sample from the fall of 2008 to the spring of 2010. We include approximately 9000 subjects who completed the survey. The instrument asked subjects whether they voted in the last Swedish general parliamentary election in 2006. SALTY subjects were matched to administrative records in order to include measures of their income and years of education. A more detailed description of the sample and the SALTY survey can be found in Cesarini et al. [2010].

4.1 Measures

We make use of four sets of questions designed to measure our key predictors. Ambiguity aversion relies on a modified version of Ellsberg's urn problem. Subjects are told that

the urn is filled with 30 red balls and 60 yellow and black balls, whose proportion is unknown. They are then given a choice between a lottery of paying 900 SEK for a red balk, 1000 SEK for a yellow ball, or 1000 SEK for a black ball.[4] Those are are ambiguity averse would choose the red ball lottery, despite choosing a yellow or black ball both having a higher expected value. Those who choose the red ball are classified as ambiguity averse. We create a dichotomous measure of this, with the averse reading 1 and the non-averse reading 0.

Closely following Kahneman and Tversky [1973], insensitivity to sample size is measured by asking subjects in which hospital, large or small, is it more likely that 60% of babies born would be boys. Those who responded that this would occur in a large hospital were classified as insensitive to sample size, and given a value of 1 on a dichotomous variable.

Discounting is measured by asking subjects whether they would choose an immediate payoff of 5000 SEK today or another, larger amount in a week. Subjects were presented with three larger amounts: 5500, 6000 or 7000 SEK. We created a categorical variable ranging from 0 to 3, where the variable indicates how many times a subject chose an immediate reward .

Procrastination is measured by asking respondents how often they fail to pay their bills on time. Subjects could offer responses ranging from "Never" to "Several Times a Month". These responses are coded dichotomously, where 1 indicates that a subject fails to pay their bills on time once every six months or more often.

We note that all of our measures have higher values when the subject does display the anomaly, meaning we expect the ambiguity aversion and insensitivity variables to be positively related to turnout and the self-control variables to be negatively related to

[4] 1 SEK is approximately equal to 0.15 Canadian dollars.

turnout.

4.2 Models and specifications

We specify random effects logit models which account for the fact that observations in our data set are correlated within families. For the time being, we include minimal controls for age, years of education, income, and gender. The models take the form (for individual i in family j where X is a matrix containing the control variables):

$$P(y_i = 1) = logit^{-1}(\alpha_j + \beta_{Anomaly} Anomaly_i + \beta_{X_k} X_{ik}) \tag{1}$$

$$\alpha_j \sim N(0, \sigma^2_{Family}) \tag{2}$$

5 Results

Our results pertaining to the P term are presented in Tables 1-2. Our results conform to our expectations in one of two cases. Those who exhibit ambiguity aversion are more likely to vote that those who do not. The odds ratio (not reported) suggests that the odds of voting over not voting are 35% larger for those who are ambiguity averse compared to those who are not. By contrast, those who do not reason properly about sample sizes appear less likely to vote in the election, with odds of voting over not voting only 75% as large as those who do not exhibit an insensitivity to sample size. This is plainly contrary to our expectations.

Tables 3-4 present our results for our B measures. These provide unambiguous support for our expectations. Those who exhibit higher discount rates are less likely to have voted in the parliamentary elections in question. For each immediate payoff a subject ac-

cepts, their odds of voting over not voting decrease by 13%. Similarly, those who exhibit more procrastination in their bill payments have odds of turning out over not turning out which are just 60% as large as those who do not exhibit procrastination. Finally, we note that all of our control variables perform as expected, following conventional turnout models. Turnout increases with income, years of education, and age. It is occasionally higher for men, though never impressively so.

6 Conclusion

Individuals differ in the consistency and frequency with which they violate the precepts of expected utility. Such differences have been consistently and widely demonstrated. We argue that these differences should be related to the decision to vote. In doing so, we are effectively advancing two arguments. First, models of voter turnout should take account of not only characteristics of the political environment individuals are constrained by as well as and individual differences in their political preferences and attitudes. They should also take account of perhaps more fundamental predispositions that likely extend beyond the political realm. Second, while admittedly more a matter of analytical organization, we should take as a starting point extant models of turnout as a framework for understanding how these differences will matter for turnout. More specifically, how may these individual differences influence the parameter values in the rational-choice model of voting . We hope this paper serves as a good illustration of how this approach may be implemented.

Our results are clearly mixed. We find that discounting behaviour affects turnout in the expected fashion, and in accordance with previous work. It should be pointed out that our analysis is the first to study time preferences outside of a laboratory setting with

a large sample.[5] However, findings around the probability of being decisive are much less clear. This is, perhaps, the logical function of an electoral system in which pivotality is difficult to define, let alone compute [Rheault et al., 2011, Blais and Rheault, 2010]. Nonetheless, these results remain to be explained.

Going forward, we suggest three courses of action. First, these results should be replicated in other countries. While each country is unique, Sweden is characterized by a party system which resembles few others, in addition to strong social norms of voting. Indeed, turnout rates over 90% in the absence of compulsory voting underline this exceptionality. Second, we should consider additional behavioural anomalies. The list of this deviations is long and many can be easily extended to questions of voter turnout, vote choice, and more general political preferences. Third, provided that these anomalies can be shown to consistently explain variation in voter turnout and other political behaviour, we think they may be candidates for mediators of the genetic basis of political participation [Fowler et al., 2008, 2011].

[5] Fowler and Kam [2007] studied 235 undergraduates in a laboratory setting.

7 Tables

Table 1: Ambiguity aversion and voter turnout

Variable	**Coefficient**	**(Std. Err.)**
Ambiguity Aversion	0.300**	(0.107)
Income	0.250**	(0.074)
Years of Education	0.206**	(0.026)
Age	0.035**	(0.012)
Male	0.227†	(0.132)
Intercept	-10.028**	(2.588)
N	9104	
Log-likelihood	-1609.143	
$\chi^2_{(5)}$	107.222	

Significance levels : † : 10% * : 5% ** : 1%

Table 2: Insensitivity to sample size and voter turnout

Variable	**Coefficient**	**(Std. Err.)**
Insensitivity	-0.300**	(0.111)
Income	0.221**	(0.073)
Years of Education	0.196**	(0.026)
Age	0.032**	(0.012)
Male	0.214	(0.132)
Intercept	-8.948**	(2.563)
N	9007	
Log-likelihood	-1655.051	
$\chi^2_{(5)}$	97.604	

Significance levels : † : 10% * : 5% ** : 1%

Table 3: Discounting and voter turnout

Variable	**Coefficient**	**(Std. Err.)**
Discounting	-0.129*	(0.062)
Income	0.252**	(0.073)
Years of Education	0.196**	(0.025)
Age	0.030*	(0.012)
Male	0.269*	(0.130)
Intercept	-10.231**	(2.541)
N	9294	
Log-likelihood	-1684.358	
$\chi^2_{(5)}$	98.057	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

Table 4: Procrastination and voter turnout

Variable	**Coefficient**	**(Std. Err.)**
Procrastination	-0.520*	(0.220)
Income	0.247**	(0.073)
Years of Education	0.204**	(0.026)
Age	0.029*	(0.012)
Male	0.231†	(0.131)
Intercept	-10.063**	(2.542)
N	9419	
Log-likelihood	-1717.386	
$\chi^2_{(5)}$	100.387	

Significance levels : † : 10% ∗ : 5% ∗∗ : 1%

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