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A Simultaneous Analysis of Turnout and Voting under Proportional Representation: Theory and Experiments

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November 29, 2013

Abstract. In a system of proportional representation, we study the interaction between a voter's turnout decision and her party choice, and how these relate to party polarization. Quantal response equilibria predict such interaction effects. In particular they predict (i) a Polarization Effect: reduced strategic party choice when voting is voluntary makes voters more likely to vote for extreme parties (conditional on voting at all); (ii) an Extremist Effect: voters supporting extreme parties are most likely to vote; (iii) a Turnout Effect: party polarization increases voter turnout. We provide data from a laboratory experiment that support these theoretical predictions. In addition, we provide supporting empirical evidence from real world elections. Hence, the interaction between turnout and strategic voting that has been neglected in most of the previous literature is shown to be important.

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1. Introduction

Do voters' turnout decision and their selection of a party (or candidate) interact? For example, is an extreme vote more likely to be observed when voting is voluntary than in systems of compulsory voting? Does the voluntary or mandatory nature of turnout affect strategic voting? How does the interaction between turnout and party choice depend on the polarization of party positions?

Surprisingly, such questions have rarely been addressed in voting studies (Kittel, Luhan and Morton, 2013), even though voting has been an important part of the research agenda for over five decades. Most of this literature has focused on either analyzing the determinants of a voter's turnout decision or on trying to explain her party choice but not on both questions simultaneously. This may miss important dynamics. In fact, in his seminal 1957 contribution Anthony Downs already expressed the view that the two decisions are intertwined (Downs 1957: 271). In this paper, we therefore simultaneously study the decision whether or not to cast a vote and the decision of which party to vote for. We do so both theoretically and with data from a controlled laboratory experiment.

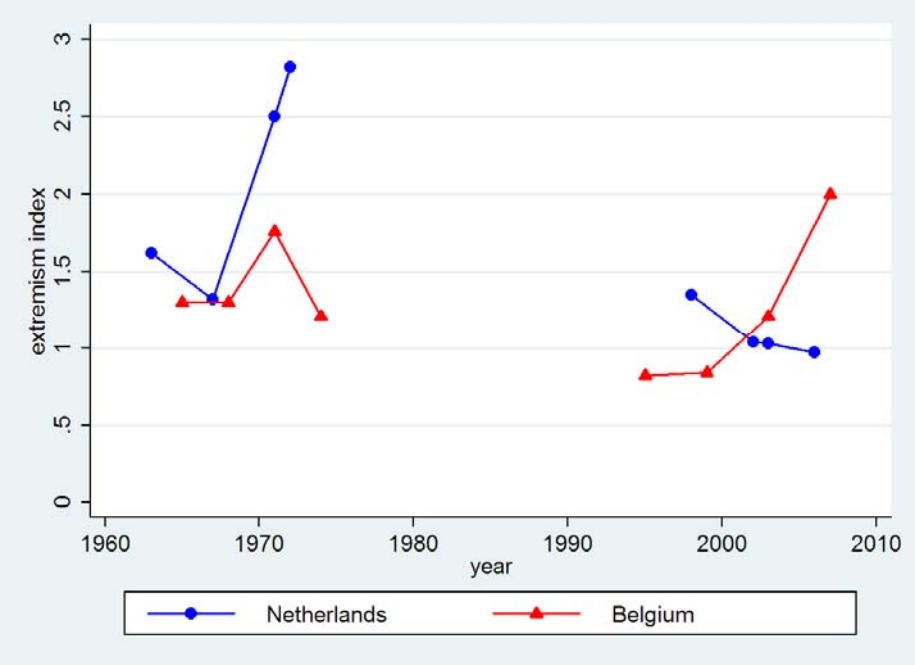
A possible reason for this gap in the literature is that a study of this interaction is quite challenging from a theoretical point of view. This does not make it less important, however. The mere fact that many models in the political realm take results from voting studies as primitives is a good reason to tackle the challenge. Since the conclusion of such models often crucially rests on the assumptions regarding the voting stage, it might well be that a very different picture than currently found would emerge if the interaction effects between turnout and party choice were taken into account. A recent paper by Krishna and Morgan (2012) serves to illustrate this concern. Traditionally, the literature has concluded that majority voting conflicts with utilitarian welfare. This is because the median voter's preferences dominate in majority rule, leaving other voters' preferences immaterial for the outcome (irrespective of the strength of these preferences). These authors show that when turnout is endogenous and costly, majority voting leads to a utilitarian outcome, since now the strength of preferences matters. Endogenizing turnout thus fundamentally changes the conclusions regarding a very basic and well-studied question.[1]

There is some evidence from the field that turnout and party choice interact. In particular, it appears that voluntary voting leads to more extreme party choice than mandatory voting. This also seems to be a conventional wisdom[2]. In other words, the party choice is different when abstention is an option than when it is not. To illustrate, we consider election results in the Netherlands and Belgium. In both countries, voting was for many decades compulsory. However, the Netherlands abandoned this system in 1970 (i.e., introduced voluntary voting) and Belgium did so in 2003. Given the similarity of these countries in terms of political

[1] This example serves to illustrate the potential importance of interaction effects, but the mechanisms concerned are very different from the focus of our paper.
[2] E.g., New York Times, November 6th, 2011.

system and political views, we compare the extent of extreme voting between the two countries in the two elections following the policy change in one. To make this comparison we constructed an extremism index that consists of the vote weighted average of the absolute value of the left-right score (from -10 to 10) taken from the Manifesto Project Database (Volkens et al. 2010). Hence, a higher number indicates more extreme voting. Figure 1 shows the value of this index for the two elections preceding and succeeding the changes in voting rule[3].

Figure 1: Extremism and Voluntary Voting



Notes. For each country, the lines show the value of the extremism index in the two elections before and after 1970 (when compulsory voting was abolished in the Netherlands) and 2003 (idem, Belgium).

The index increases dramatically in the country that abolished compulsory voting while no substantial change in the index is observed in the comparison country. Furthermore, this effect persists and even increases in the second election after the rule change.

Further evidence of an interaction effect from the field comes from a recent study by Weschle (2013). Using observational field data from four different countries, he shows that abstention is an important element of economic voting (i.e., rewarding or punishing incumbent parties based on economic performance). In other words, economic conditions jointly affect the turnout and party choice decisions.

[3] Data for all elections since the Second World War are available from the authors. One noticeable observation is a monotonic decrease in the extremism index in the Netherlands from 1959 to 1986, with the exception of the two elections immediately after the rule change in 1970.

Hence, theoretical results, conventional wisdom, casual empiricism and empirical analysis all point to the importance of studying the interaction between voter turnout and party choice. With this in mind this paper tackles this issue. To do so, we employ a theoretical model that explores whether an interaction effect is to be expected and, if so, what it looks like. In addition, we address the role of party positions by asking whether the extent of party polarization is related to the turnout decision. Our theoretical analysis allows us to predict three effects. First, there is a *Polarization Effect*. This predicts that voters who cast a vote are more likely to vote for an extreme party when there is a possibility to abstain than when voting is mandatory. The mechanism underlying this effect is that voluntary voting reduces the extent of strategic voting by the more extreme voters.[4] The intuition for this effect is related to the fact that extremist voters are more likely to cast a vote (the second effect). As a consequence, the election becomes more of a run-off between the extreme parties than in the mandatory voting case. In turn, this reduces the expected benefit from voting strategically for a more moderate party. We denote the second effect as the *Extremist Effect*. The intuition is that there is more at stake for extreme voters because the worst-case scenario (the other extreme winning the election) is worse than for centrist voters. The third effect we derive is the *Turnout Effect*. This is that voters are more likely to vote when the polarization of party positions increases[5]. Here, the reason is that increased differences across parties put more at stake in the elections for all voters.

We complement the theoretical analysis with a laboratory experiment. The experiment allows us to test the model's theoretical predictions (in particular, the three effects that we derive) in a controlled environment. We use a laboratory experiment and not an empirical test based on observational data from real elections for testing the theory since these data are rife with confounding factors. Laboratory control allows us to isolate those factors that are relevant for the theory. Moreover, it enables a measurement of causal processes that is not possible with observational field data. In the laboratory, the experimenter can implement ceteris paribus variations to isolate the effects one is interested in. Nevertheless, to obtain an indication of the generalizability of our results, we also provide evidence of the three effects from real world elections. Both our experimental results and the additional empirical evidence provide support for the three interaction effects that we derived.

Finally, we note that our focus in this paper is on a system of proportional representation. This is because the existence of equilibria where some voters vote strategically makes the question of which party to choose less straightforward than under majority voting. As a consequence, a system of proportional representation offers more scope for interaction effects. Furthermore, as argued in the following section, the question of party choice in

[4]By strategic voting, we mean abandoning the most preferred party to favorably influence the election outcome.

[5] Note that the term 'polarization' is used here to indicate party position, whereas it refers to voters' party choice in the Polarization Effect. Whether polarization refers to voters or parties in this paper should be clear from the context.

systems of proportional representation has been under-studied, which is surprising since this system is used in many countries (including a large majority of the members of the European Union). We therefore also hope to contribute to the literature concerning strategic voting in a system of proportional representation An important element of such systems is that many governments are formed as coalitions of various parties. This has consequences for the incentives that voters face when deciding whether or not to vote, and for whom. Our model takes these incentives into account.

The remainder of this paper is structured as follows. In the next section we will discuss the related literature. In section 3 we will present the theoretical model and its equilibrium predictions before testing these predictions with a laboratory experiment whose design will be presented in section 4. The data from the experiment will be analyzed in section 5. Section 6 provides evidence of the generalizability of our results and section 7 concludes and discusses possible avenues for future research.

2. State of the Art

A necessary condition for the occurrence of an interaction effect is that voters are strategic in their voting decision and do not vote sincerely for the party closest to their preferences. Therefore the literature on strategic voting in systems of proportional representation is relevant for our research question.

We therefore start with discussing the literature on the determinants of party choice in a system of proportional representation. Until recently, surprisingly little attention had been paid to this question. The main reasons can be traced back to two pioneers in the study of party choice in proportional representation.

On one side is the view expressed by Duverger in his seminal 1955 contribution. He argues that in a system of proportional representation the votes more or less continuously translate into seats in the legislature. As a consequence, no incentive for strategic voting exists. Based on this view, for many years the standard way to model the implemented policy resulting from a system of proportional representation was to assume that it is the average of the policy positions of the parties in parliament weighted by their share of seats (see for instance Cox and Shugart, 1996, Cox, 1997, Kedar, 2009)[6]. Under this assumption there is little reason to vote strategically.

Underlying Duverger´s reasoning is the notion that voters care about who is represented in parliament. Yet, Downs (1957) already pointed out that it is more reasonable to think about voters trying to influence the final policy that the parliament enacts. If so, then influencing which parties are in parliament is only a proximate goal. A full analysis requires shifting attention to the manner in which parliamentary seat distributions translate to implemented

[6] Herrera, Morelli and Palfrey (2012) are somewhat of an exception since they do not assume a linear mapping from vote shares to seat shares.

policies (e.g., Indridason 2011). In this respect, it is doubtful whether it is reasonable to assume that the implemented policy is a weighted average of the policy positions of all parties in parliament. This assumes that all parties have an influence on the final policy, which is predominantly not the case. Based on such insights, Indridason (2011) investigates how robust conclusions drawn from models where every party has an influence on the final policy are to introducing the majoritarian decision rules that parliaments tend to employ. He shows that assuming that a party with an absolute majority can implement its own policy platform is already enough to lead to substantially different model predictions. If coalition governments are also added to the model, the predictions are even further away from those of the original models. Additionally (and especially relevant for our research question) he shows that strategic voting can be an equilibrium strategy is such models.

Indridason's results imply that Duverger's reasons to discount strategic voting in systems of proportional representation do not hold if people care about policy outcomes instead of election outcomes per se. Though this insight can be traced back to Downs' work, it is interesting to note that –while not sharing Duverger's reasoning– Downs was also skeptical about whether strategic voting would be a relevant phenomenon in a system of proportional representation. Because of the complex reasoning involved in strategic voting, he concluded that in this setting a voter would use sincere voting as a heuristic (Downs, 1957: 163).

Recent evidence shows that this task might be easier than Downs thought, however. One example is given by Irwin and van Holsteyn (2012) who study behavior by Dutch voters. Based on the Dutch Parliamentary Election Study 2002-2003 (a survey) they investigate whether voters have the expectations needed to behave strategically. They show that voters can predict before elections the most likely coalitions to form and can also anticipate the compromises that parties will make when forming the coalition. Given that the positions of the different parties were well-known, the authors argue that the voters can make an educated guess concerning the policy outcome that will result from a coalition.

Since voters both have the information needed to behave strategically as well as an incentive to do so if they care about final policy, we conclude that there are sound reasons to investigate strategic voting in a system of proportional representation. In turn, this may well interact with the endogeneity of the turnout decision, leading to distinct levels of strategic voting in systems of mandatory versus voluntary turnout.

This research agenda where voters are assumed to care about policy outcomes can be subsumed under the heading of "coalitional voting". On the theoretical side a seminal contribution is by Austen-Smith and Banks (1988). Using a game theoretic model, they analyze a three-party model with a minimum vote threshold in a one-dimensional policy space and mandatory voting. The coalition formation process is modeled as a bargaining game between the parties in parliament. In equilibrium, the largest and smallest parties form a coalition. Hence, a party's influence on the final policy is non-monotonic in the

number of votes it receives. In a second step, Austen-Smith and Banks solve for the optimal (possibly strategic) voter behavior given the equilibrium bargaining outcome that will ensue for a given distribution of votes. Finally, they close the model by allowing the parties to choose their positions in the policy space to optimize their chances of winning the election. An important result is that voters behave strategically in equilibrium. Though this study provides a comprehensive analysis of party and voter behavior in proportional representation, it remains unclear whether it generalizes to more parties[7] or a different coalition formation process. Moreover, the model does not allow for abstention. More generally, much work remains to be done on the theory side.

There is by now abundant evidence that voters' party choice is significantly affected by the probabilities of different coalitions forming after an election. Examples include the 2006 elections in Austria (Herrmann 2008, Meffert and Geschwend 2010), and the 2003 (Blais et al. 2006) and 2006 (Bargsted and Kedar 2009) Israeli parliamentary elections. More generally, there is no evidence of less strategic voting in countries with proportional representation than in majoritarian systems (Bargsted and Kedar 2009; Hobolt and Karp 2010). The most comprehensive cross-country analysis of coalitional voting is given by Duch et al. (2010) who estimate a model of party choice using data from 23 countries. They apply a decision theoretic model, where voters on the one hand care about the policy position of a specific party and on the other hand about how a vote for this party will influence the final policy. They then estimate how important the two factors are in determining the party choice and find strong support for the hypothesis that reasoning about possible coalition governments plays an important role.

Though all these studies seem to indicate that coalitional voting is pervasive, their conclusions are based on survey data and may be blurred by confounding factors. Further evidence stems from experimental investigations, which allow for greater control, making it easier to isolate the effects one is interested in. An example closely related to survey-based research is Irwin and Holsteyn (2012). In a survey, they first ask for the respondent's preferred party and then present different electoral scenarios (consisting of poll numbers and a statement concerning the coalitions the parties would like or not like to form) framed in terms of the 2002 Dutch parliamentary elections. They report clear evidence that voters change their party choice depending on the electoral scenario and the likely coalitions associated with it. A more traditional experiment (in the sense of being a laboratory experiment with monetary incentives) is reported by McCuen and Morton (2010). They implement the Austen-Smith and Banks (1988) model in the laboratory and find that voters indeed behave strategically as predicted. They do so much less frequently than predicted by the theory, however, and often vote naively for the party closest to them. On the other hand, there are also voters who abandon their most preferred party even though the model

[7] Herrmann (2013) investigates a decision theoretic model of coalitional voting with four or more parties. Given that his focus is on investigating the effect of polls, the model is quite specific, however, and would need to be adapted to more generally explain strategic voting with four or more parties.

predicts them to behave sincerely[8]. The authors conclude that coalitions have an effect on party choice and conjecture that the observed deviations from the predictions can be attributed to their American subjects being unfamiliar with a system of proportional representation.

These experimental studies show that many subjects behave strategically in a system of proportional representation. This implies that there is scope for the interaction effect between party choice and turnout that we are interested in

The interaction effect not only implies that turnout may affect the party choice, it also means the reverse: the decision to vote may depend on the party one prefers. A seminal contribution to understanding voter turnout is due to Palfrey and Rosenthal (1983) who model turnout as a participation game. In a participation game individual members of groups have to decide whether or not to participate in an activity. The members of the group with the highest participation all get a prize irrespective of whether or not they participated themselves. Laboratory studies of voter turnout typically apply the participation game (e.g., Schram and Sonnemans 1996a). The comparative statics predicted by the theory are observed in the laboratory as well as in the field (Levine and Palfrey 2007). Though most studies have focused on the majoritarian case, a few consider a system of proportional representation. These find that turnout is higher in the majoritarian case than in a proportional representation system (Schram and Sonnemans 1996b), unless the majority is much larger than the minority (Kartal 2011, Herrera, Morelli and Palfrey, 2012). A shortcoming of these studies is that they only investigate cases with two parties and assume a linear mapping from votes to payoffs. As argued above, this neglects a main feature of systems of proportional representation, which is the occurrence of coalition governments.

This discussion on voter turnout shows that a joint investigation of turnout and party choice for systems of proportional representation is still missing for the most interesting case of more than two parties.[9] In fact, as far as theory is concerned, we are not aware of any formal model that combines the two in this setting. The only attempt at such a joint investigation is given by Kittel et al. (2013). In a 'first-past-the-post' setting, they investigate how pre-voting communication affects the turnout decision and strategic voting. Given that their focus is on communication and not on exploring the interaction between turnout and party choice, their study (while a very important first step) unfortunately gives no indication on what this interaction effect might look like.

3. The model

We model the situation at hand in the long tradition of spatial voting (Downs, 1957; Black, 1958) which assumes that parties and voters are located in a policy space and that the

[8] Of course, this may be a best response to the low levels of strategic voting by others.

[9] As discussed in the introduction, Weschle (2013) provides evidence that turnout interacts with economic voting. This is indicative that it interacts with party choice per se.

payoff to a voter is decreasing in the distance between her position (her ideal point) and the implemented policy. Specifically we assume that the policy space is one-dimensional and can be described by the line segment $[-10,10] \in \Re$, which may be seen as capturing a left-right spectrum of the political arena.

Voters

Five voters are randomly and independently located across the policy space. The distribution function from which their positions are drawn is discussed below. We follow the standard approach and assume that the utility a voter receives is decreasing in the squared difference between her ideal policy (given by her location in the policy space, x_i) and the implemented policy x^*. This leads to the following utility function:

$$U_i = -(x_i - x^*)^2 - c_i \quad (1)$$

Here c_i represents the net costs that a voter has to incur if she casts a ballot. The net costs of voting are given by the difference between the costs and benefits of casting a ballot, other than the benefits derived from influencing the policy outcome[10]. We do not specifically model the costs and benefits of voting but make only an assumption concerning the net costs. These are assumed to be i.i.d. uniformly distributed on a domain that - due to the potential utility gains from the act of voting per se – may include negative values.

In every election, each voter has to decide whether or not she wants to cast a vote and thereby incur the net costs of voting. If she intends to vote she also has to decide for which party to vote. In case of mandatory voting, the first step is (obviously) not applicable. All voters make these decisions simultaneously and given that both the voters' positions as well as their voting costs are private knowledge, the decision can only be conditioned on the distribution of costs and positions, which is common knowledge. Furthermore, voters are unaware of how many voters decided to vote when making their party choice.

Parties

At the other side of the election there are three parties described by a policy position in the one-dimensional policy space. Since our focus in this paper is on voter behavior these positions are exogenously given and cannot be changed by the parties. Furthermore, the rules of coalition formation are fixed and therefore the parties have no choice regarding the coalition to form.

[10] The costs can be divided into two main categories: on the one hand it takes costly effort to get informed about the party positions and to decide for which party to vote. On the other hand there are the opportunity costs associated with attending the election.. The benefits of voting measure utility that a voter gets from the act of voting per se. These are generally interpreted to be due to a sense of civic duty (Riker and Ordeshook 1968), which is based on the notion that a voter 'feels good' when doing her civic duty of voting (and thereby avoiding the costs that are associated with violating the social norm of voting).

Government formation

The rules of government formation are the following (these rules are inspired by Austen-Smith and Banks, 1988 and Indridasson, 2011):

1. If a party receives an absolute majority of votes cast this party unilaterally forms a government and the implemented policy x^* is equal to this party's policy position.

2. If no party receives an absolute majority of votes cast, the largest party is assigned the role of government formateur. This party then proposes a coalition to the parties it wants to cooperate with; if all these parties agree, the coalition is formed and the implemented policy is the average of the policy positions of the parties in the coalition weighted by the number of votes they received. When forming a coalition, the formateur tries to keep the implemented policy as close as possible to its own policy position while not including more parties in the coalition than needed for a majority.

3. If multiple parties have the most votes a fair random draw decides which of the largest parties is assigned the role of formateur.

4. If the coalition is rejected, bargaining breaks down and every party receives a payoff of $-\infty$.

Two things are important to note regarding these rules. Firstly, the rule that there are no more parties than necessary in the coalition does not mean that a minimal-winning coalition (i.e. the coalition with the smallest majority) is formed. Instead, it implies that coalitions that keep a majority even if one party would leave are not permitted[11]. The reason that we restrict attention to coalitions that are not excessively large is that one rarely observes such coalitions in reality[12]. A reason could be that parties are also office motivated and do not like to share the spoils of office with unnecessarily many other parties. The second important thing to note is that rule 4 makes sure that any proposal in line with rule 2 will be accepted. We may therefore abstract from the bargaining process itself. Obviously, one could set up a more elaborate bargaining process like in Austen-Smith and Banks (1988), but given that parties are not active players in our model this very simple process seems adequate. Finally, one can think of the rule that the policy implemented by a coalition is the vote weighted average of the policy positions of the parties in the coalition as reflecting the outcome of a bargaining process that is not modeled explicitly.

[11] The difference can be seen in the following example: Suppose that there are 4 parties; parties 1 and 2 receive 5 votes each, 3 receives 10 votes and 4 receives 15 votes. The minimum-winning coalition would be a coalition with 20 votes (parties 1 and 4, 2 and 4 or 1, 2 and 3). We also allow a coalition of parties 3 and 4 and only rule out coalitions like 1, 2 and 4.

[12] Strøm et al. (2008) report that in 80% of the cases a minimum winning coalition is formed. In the remaining cases one rarely observes super-majorities.

Equilibrium analysis

We solve the model using the quantal response equilibrium (QRE) concept (McKelvey and Palfrey 1995). In particular, we apply the 'logit equilibrium' concept. In this equilibrium the probability that a voter votes for party i (i=0;1;2;3, where party 0 denotes abstention, if allowed) given a position x_i and costs c_i is given by the following expression:

$$P_i(x_i, c_i) = \frac{\exp(\lambda * EU(vote\ for\ party\ i))}{\sum_i \exp(\lambda * EU(vote\ for\ party\ i))} \quad (2)$$

Here, λ is a so-called 'noise parameter' that captures the extent of noise in individual voters' decisions. As the noise decreases, λ increases and the QRE converges to a Nash equilibrium.[13] In QRE the probability of choosing an action is increasing in the expected (relative) payoff of an action and the speed of this change is measured by λ. If it is very small, the expected performance of an action does not matter very much and behavior is close to random while when λ is very large we are close to Nash behavior where the best action is chosen with certainty. Furthermore, EU denotes the expected utility (as defined in eq. 1) of an action, which is a function of the probabilities with which the other voters vote for the different parties, as well as the voter's policy position and her costs of voting. We assume that the equilibrium is symmetric in the sense that voters with the same policy position and costs of voting have the same probability of choosing the different parties. A logit equilibrium is then found by solving the set of equations in (2) for the vector of probabilities P_i. Appendix A[14] provides an overview of the equilibria for our game.

Choosing QRE over Nash as a solution concept has two advantages in our application. Firstly, it has a better track record than Nash in explaining experimental data in voting experiments (e.g., Goeree and Holt 2005; Grosser and Schram 2010). Secondly, QRE provides an equilibrium selection in case of multiple Nash equilibria. This is important because of the multiplicity of equilibria that are present when using Nash equilibrium in this type of voting games (see Appendix B for the Nash predictions for our game).

To derive predictions, we use an out-of-sample estimate of the noise parameter (λ). Using data from a pilot experiment with a similar set-up but with fixed voter positions (see Kamm, 2012), we obtain an estimate λ=3.7.

In our analysis we will assume (as in the experimental design) that parties are located at 7.5 (a right-wing party), 0 (a central party) and α (a left-wing party), where α is between –7.5 and 0. The reason for only varying the left-wing party's position is that parties' relative positions matter more than their absolute positions. By varying α we can investigate both a situation with polarized parties (α is close to –7.5) and a more centrist situation (α is close to

[13] More specifically, this holds for the so-called 'principal branch' of the Multinomial Logit Correspondence (see McKelvey and Palfrey 1995).
[14] All appendices can be found here.

Figure 2: Parties in the Policy Space

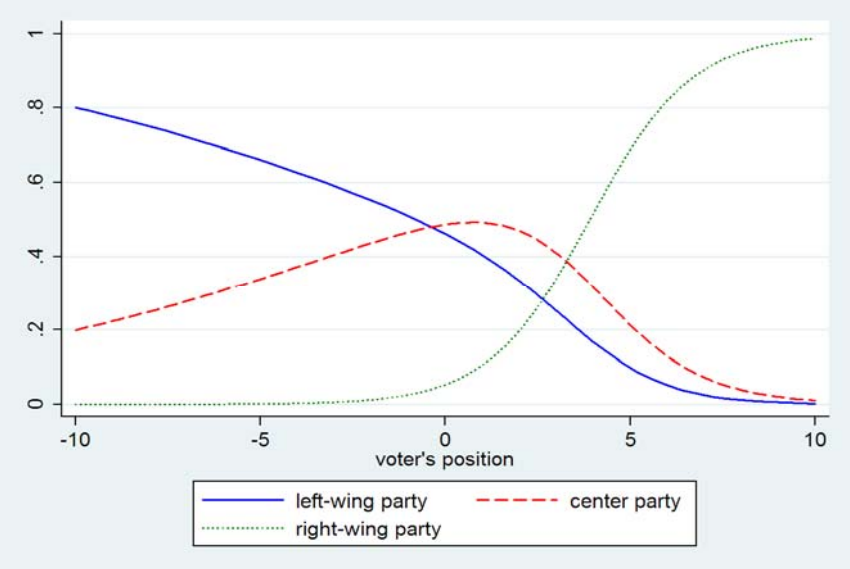
Notes. The line indicates the policy space. Party positions are given above the line.

0) to study whether this matters for the interaction effect between turnout and party choice. Figure 2 summarizes how parties are distributed in the policy space.

Furthermore, we assume that the voters are distributed on the one-dimensional policy space according to a truncated t-distribution with 0.05 degrees of freedom. This specific parameterization was chosen to fit the distribution of voter preference taken from the German Longitudinal Election Study 2009 and the Dutch Parliamentary Election Study 2006.[15]

With these assumptions, we can determine the QRE. This describes for each possible voter position in the left-right policy space, the probabilities that she will vote for the left-wing, central or right-wing party. As an example, figure 3 shows the equilibrium party choices (conditional on voting) for one of the parameter values used in the experiment. In this case, voting is voluntary and the left-wing party's policy position is located close to the central party's position (i.e., $\alpha = -1.5$).

Figure 3: Equilibrium Probabilities of Voting for Parties



Notes. The figure shows the predicted probability of voting for each of the three parties in the treatment voluntary-centrist as the voter's position varies along the horizontal-axis.

[15] More information is available from the authors, upon request.

This graph shows that extreme left (right-) wing parties have a high probability of voting for the party on 'their wing' of the spectrum. This sincere voting is not symmetric, however: any voter with an ideal point between 8 and 10 votes for the right–wing party with a probability of at least 80%, whereas the probability of voting for the left-wing counterpart is less than 80% for any voter positioned between –8 and –10 (the probability of voting strategically for the center party is more than 20%). As the voter moves towards the right (left) of the policy space the probability of voting for the left-wing (right-wing) party decreases. Note that the QRE allows for a very small probability that an extreme voter will vote for the party at the other end of the spectrum. Finally, note that the mode for the central party's support is to the right of its own position (which is 0). It is more likely to get votes from extreme left wing voters than from extreme right wing voters, however.

Similarly, one can determine the equilibrium turnout probabilities for each voter position and for different positions of the left-wing party (cf. Appendix A). This allows for the derivation of comparative statics predictions. A first thing that such an analysis shows is that (conditional on voting) voters have higher probabilities of voting for an extreme party when there is a possibility to abstain. Hence, compared to mandatory voting regimes, voluntary voting is predicted to increase the probability that a voter who turns out will vote for an extreme party. The intuition for this prediction is that when voting, a voter faces a tradeoff between two objectives. On the one hand she wants to give her favorite party (the one located closest to her) a strong position in the coalition formation process by voting sincerely. At the same time, a voter tries to minimize the risk that the party that is farthest away becomes part of the government. When voting is mandatory, it is often worthwhile for a voter with a sincere preference for an extreme party to vote strategically for the central party in order to weaken the position of the party at the other extreme. When voting is voluntary this incentive is weaker (in equilibrium) due to abstention by other voters (see below) and we therefore see less strategic voting by extreme voters and hence more extreme voting.

The success rate for extreme parties is further increased by a second comparative static, which is that voters close to the extremes of the policy space have higher equilibrium turnout rates than voters close to the median voter's position. The reason is that extreme voters have more to lose. Their worst-case scenario is a situation where the party on the other side of the policy spectrum is in power. They therefore have a large incentive to participate in the election to reduce the probability of this happening. Centrist voters, on the other hand, have less to lose. For them, it does not matter as much if an extreme party obtains power and therefore they have less of an incentive to incur the costs of voting. As a consequence, turnout is a u-shaped function of the voter's position.

However, the minimum of this function is not necessarily at the median position. In particular, turnout rates for the case where the left-wing party is relatively 'centrist' are not symmetric around a position of zero. The voter with the lowest probability of turning out is

not the median voter but the voter that is halfway between the two extreme parties. This is because such a voter has the lowest incentive to turnout since she is indifferent as to which of the two extreme parties is in power. Combining this observation with a situation where the left-wing party is much less extreme than the right-wing party means that the point of minimum turnout is to the right of the median voter. In contrast, when the left-wing party is extreme the situation is almost symmetric and therefore the point of minimum turnout is close to the median voter.

Finally, for almost all voter positions equilibrium turnout rates are higher when parties are more polarized. The intuition is rather obvious. The higher the polarization, the larger are the differences in utility between the different possible outcomes. These larger incentives make it worthwhile to incur larger voting costs leading to higher turnout rates.

The equilibrium analysis in Appendix A thus yields three stylized results:

Polarization Effect: *Party choice (conditional on voting) is less strategic and therefore more extreme when voting is voluntary.*

Extremist Effect*: Extreme voters have higher turnout rates than centrist voters.*

Turnout Effect*: Turnout rates are higher when parties are more polarized.*

It is important to note that these stylized results are robust to variations in the specific levels of polarization (i.e. the position of the left-wing party) and the particular distribution of costs imposed. Moreover, the results are also obtained when using a uniform distribution of voters' positions as opposed to the t-distribution.[16]

We will test the three stylized results with laboratory data. The following section presents our experimental design.

4. Experimental design

Experimental Protocol

The experiment was conducted at the CREED laboratory at the University of Amsterdam in February 2013 and implemented using php/mysql. Participants were recruited using CREED's subject database. In each of eight sessions, 25 or 30 subjects participated. Most of the 230 subjects in the experiment were undergraduate students of various disciplines[17]. Earnings in the experiment are in 'points', which are converted to euros at the end of the experiment at an exchange rate of 100 points = 1€. The experiment lasted on average 100 minutes and the average earnings were €23.90 (including a 7€ show-up fee).

[16] The Extremist Effect and Turnout Effect are also independent of the equilibrium concept used; they are predicted by the Nash equilibrium outcomes (see Appendix B). Similarly, the Polarization Effect is also observed in the Nash equilibrium when the parties are far apart; but not when the left-wing party is centrist.
[17] 127 out of 228 (two did not give information on their field of study) majored in economics or business.

After all subjects had arrived at the laboratory, they were randomly assigned to one of the computers. Once everyone was seated they were shown the instructions on their screen. After everyone had read these and the experimenter had privately answered questions, a summary of the instructions was distributed. This summary also contained a table that specified which coalition would be formed for each possible configuration of votes (for an example see Appendix C). Then, all subjects had to answer quiz questions that tested their understanding of the instructions. After everyone had successfully finished this quiz, the experiment started. At the end of the session, all subjects answered a short questionnaire and were subsequently privately paid their earnings.

Each session consists of thirty rounds and in each round subjects are in electorates of five where each group is confronted with the task of electing a new government[18]. Electorates are rematched in every round. This serves the purpose of avoiding repeated game effects and reduces the influence of noise players. For this re-matching, we use matching groups of ten or fifteen subjects[19] (depending on whether a session consisted of 30 or 25 subjects). As a consequence, each session generates two or three independent matching group-level observations.

The specific task in each round is presented as follows: in all treatments subjects are informed in every round about their draw of the net voting costs as well as their position in the policy space. In the treatments with mandatory voting subjects are asked to decide for which of the three parties (labeled party 1, party 2 and party 3) they would like to vote. In the treatments with voluntary voting they had a fourth option, abstention[20]. In all treatments we give the subjects the option to see the complete history in which they took part by clicking on a button[21]. Hence, they can see what they did in the past for different voting costs, what the distribution of votes was and what the resulting government was. Furthermore, we provide them with a payoff calculator such that they can compute the payoffs they would get from different coalitions, given their parameters in the current round. For an example of what the interface looks like, see Appendix C.

After everyone has voted, the computer counts the votes and shows each subject the distribution of votes (and number of abstentions, if applicable), the government that is formed and what policy it implements, and the payoff from the current round as well as the accumulated payoffs from past rounds.

[18] We decided to frame the task in terms of an election since otherwise the setting would be quite complicated to explain. We think that this framing will not substantially affect behavior, though this could be tested, of course (Levine and Palfrey, 2007; n. 9, report finding no framing effects in their turnout experiment). Note that we do not use terms like “left-wing” in the instructions but refer to voters and parties by numbers.

[19] Subjects are told that they are randomly re-matched every period, without specifying the matching groups.

[20] This option was presented above the three parties such as to visually separate the two types of behavior (voting or abstaining).

[21] Subjects did not use this option very much. In the first 15 rounds subjects looked at the history 4.7% of the time. For the last 15 rounds this was 2.9%. These probabilities did not vary much across treatments.

The per round payoffs (which are in terms of points) are determined by:

$$160 - 2*(x^* - x_i)^2 - c_i$$

where x^* is the implemented policy, x_i is the subject's position in the policy space and c_i is the realization of voting costs in the round concerned.

We implement the costs (which may be negative) of voting as real costs that are deducted from the payoff and not as opportunity costs (represented by a bonus if one decides to abstain) since this seems the more appropriate framing of the decision problem. The constant 160 is used to ensure that the subjects rarely have a negative aggregate payoff from past rounds, since otherwise (unmeasured) loss aversion could lead to uncontrolled effects.

Treatments and predictions

To test for the stylized facts outlined in the previous session the experiment employs a full 2x2 design where in the first treatment dimension we vary the position of the left-wing party and in the second dimension whether voting is voluntary or mandatory. Table 1 gives a summary of the treatments.

Table 1: Treatment Summary

	Mandatory voting	Voluntary voting
Centrist left-wing party (α=–1.5)	CentMand N=6	CentVolu N=5
Extreme left-wing party (α=–7.0)	ExtrMand N=5	ExtrVolu N=6

Notes. Cell entries give the treatment acronym used throughout this paper and the number of independent observations (N=# matching groups as discussed in the main text) for each treatment.

We implement two distinct positions for the left-wing party: In one case –denoted by 'Centrist'–, the party is relatively close to the center (α=–1.5) and in the other case –'Extreme'–, it is much more left-wing (α=–7.0). The reasoning underlying the choice of these two specific values of α is to create sufficient difference in polarization between the two situations to yield a difference in predicted turnout rates that is large enough to be measured even when subjects' behavior is noisy.

Having specified the distribution of voters' ideal points and parties' policy positions, the model will be completely specified after choosing a distribution for the net voting costs. As mentioned in the theory section, we assume a uniform distribution. Aside from greatly

simplifying the equilibrium analysis, this has as the advantage that it is a distribution that is quite easily explained to subjects. As bounds for the uniform distribution, we choose –15 and 200. While these numbers are meaningless per se, one should note that they indeed allow for subjects to have a net benefit from voting[22].

Applying the equilibrium analysis to our design yields predictions that are parallel to the stylized results of the previous section:

Prediction 1 (Polarization Effect):

a) *The probability of voting for the central party (conditional on voting at all) is lower in CentVolu than in CentMand;*
b) *The probability of voting for the central party (conditional on voting at all) is lower in ExtrVolu than in ExtrMand*
c) *The extent of strategic voting is lower in CentVolu than in CentMand;*
d) *The extent of strategic voting is lower in ExtrVolu than in ExtrMand.*

Prediction 2 (Extremist Effect):

a) *In CentVolu, voters with positions near 0 vote at lower rates than voters with more extreme positions;*
b) *In ExtrVolu, voters with positions near 3 vote at lower rates than voters with more extreme positions.*

Prediction 3 (Turnout Effect):
Turnout is higher in ExtrVolu than in CentVolu.

5. Results

We will focus on the aggregate behavior in each treatment[23]. We will begin by offering a description of the party choice per treatments. Then, we will look for differences across treatments and compare these to our predictions 1a-d. Subsequently, we will analyze the turnout decision, again going from a description of the data to a comparison across treatments and a test of the predictions (2a and 2b, 3).

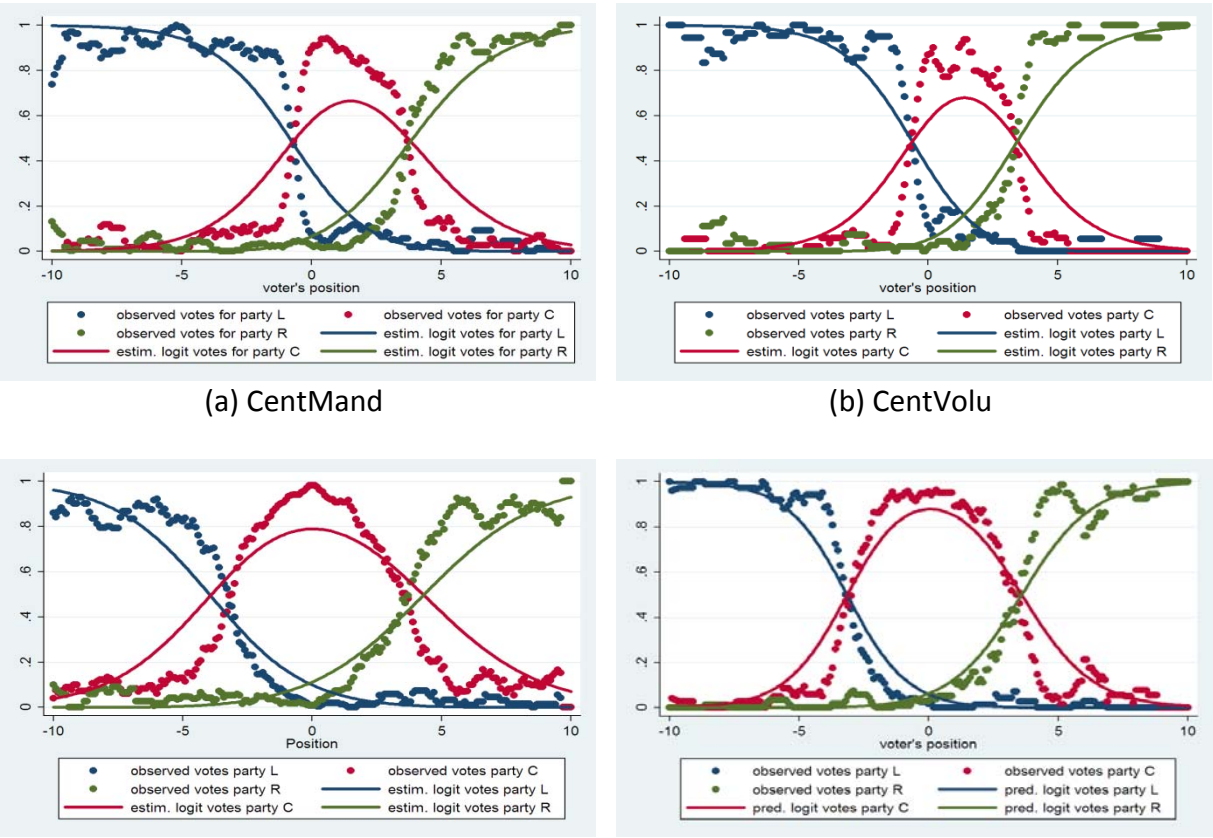
Observed Party Choice

Figure 4 shows the aggregate party choice per treatment. Dots indicate for each position the observed fractions of votes for the different parties (smoothed by using the average fractions for positions +/-0.2 of the value on the horizontal axis). In addition, the figures show the estimated (multinomial) logit curves that fit the data (see Appendix D for the

[22] This will be the case for (on average) seven percent of the subjects. It does not seem completely unreasonable to think that such a proportion of the population might have such a high value of 'civic duty' that it overcompensates for the costs of voting.
[23] An analysis of data at the individual level is available from the authors on request.

underlying estimates). All four figures show aggregate behavior close to cut-point strategies since the slopes are either close to zero or very steep. At the same time even at the extremes of the policy space we find that subjects do not always vote sincerely. To accommodate these extreme points, the estimated logit functions have a less steep slope than the observed data.

Figure 4: Party choice



(a) CentMand (b) CentVolu

(c) ExtrMand (d) ExtrVolu

Notes. Dots (lines) show the observed (estimated) probability of voting for each of the three parties as the voter's position varies along the horizontal axis. Data are averaged over +/-0.2 of the value on the x-axis. The data for CentVolu and ExtrVolu are conditional on turning out.

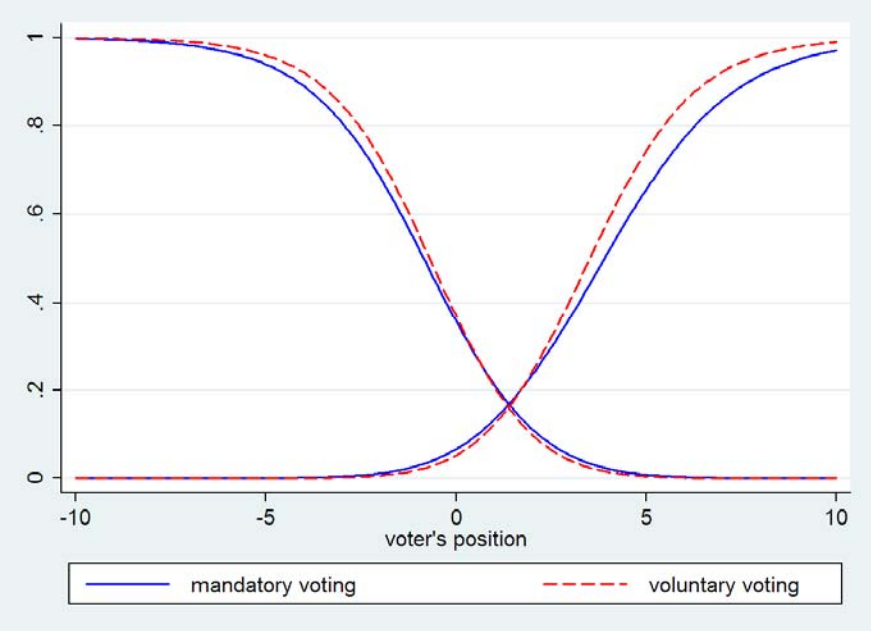
Comparing observed behavior to the QRE (see Appendix A for a graphical representation) allows for two conclusions. First, the equilibrium shows for CentValu and CentMand a pronounced asymmetry between the extreme left and extreme right positions (where even for the most extreme left-wing voters behavior is not always sincere). This effect is not observed in the data. Second, in all treatments the observed slope near the cut-point is much larger than predicted by QRE. Both findings may be attributed to the fact that quantal response does not take into account that sincere voting is a powerful heuristic. Therefore, when voting sincerely coincides with optimal behavior, voters behave optimally much more often than predicted. Another reason for the larger slope than predicted may be that the noise parameter λ in this experiment is larger (implying less random behavior) than in Kamm

(2012) that was used to generate the predictions. Indeed, when fitting the QRE model to the data from our experiment (see appendix A for details) we find a much larger λ.

Comparative Statics

We start with the Polarization effect, by considering the extent to which voters opt for extreme parties. Figure 5 compares the estimated probability functions of voting for the left-wing and right-wing parties in CentValu and CentMand. These show more extreme party choices when voting is voluntary, as predicted (Prediction 1a). This effect is most pronounced for moderately right-wing voters, but overall the effect is quite small. To formally test prediction 1a), we estimate a multinomial logit of party choice with the central party as the benchmark (with robust standard errors clustered at the level of matching groups). The results are presented in table 2.

Figure 5: Extremist Voting, Centrist Left-Wing



Notes. The figure compares the estimated probability of voting for the left- and right-wing party between CentMand and CentVolu as the voter's position varies along the horizontal axis.

Table 2: Multinomial Logit Results, Centrist Left-Wing

Constant and Independent Variables	Coefficients		
	Vote for left-wing party	Vote for center party	Vote for right-wing party
Constant	–0.50***	Benchmark	–2.27***
	(0.108)		(0.449)
Voter's position	–0.66***		0.60***
	(0.147)		(0.114)
Voluntary	0.12		.18
	(0.119)		(0.154)

Notes. The table provides multinomial logit estimates of the determinants of party choice when the left-wing party is centrist. "Voluntary" is a dummy variable that is 1 if voting is voluntary. Standard errors given in brackets are clustered at the matching group level. For the voluntary voting treatments, only subjects who chose to vote for a party are included. *(**; ***) indicates significance at the 10% (5%; 1%) level.

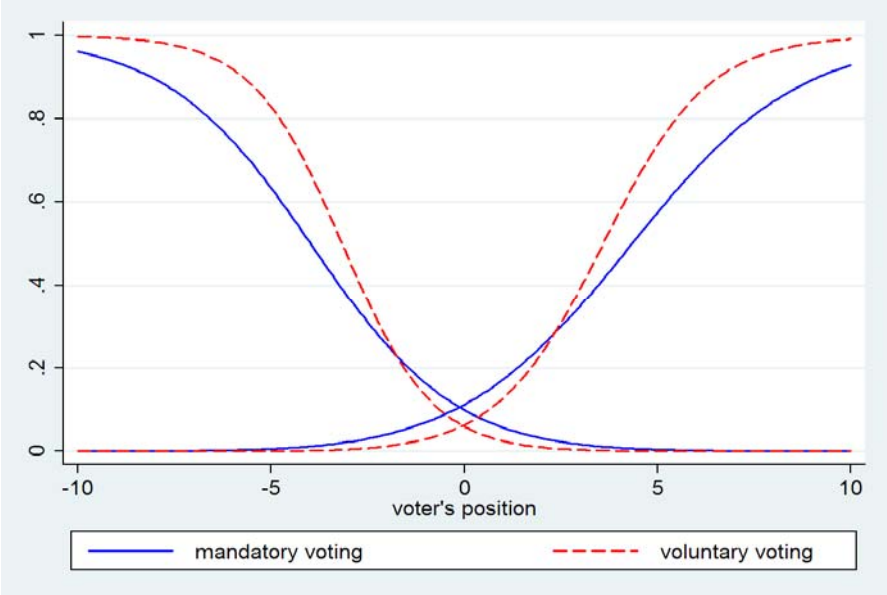
These regressions include a dummy variable to distinguish between the voluntary and mandatory treatments. The results show that both coefficients for this variable are positive as predicted, but neither is statistically significant when considered in isolation. Considered jointly, a two-sided Wald test can only marginally reject the hypothesis that the treatment has no effect on voting for the extreme parties at all (p=0.10). Finally, note that the effect of a voter's position and her party choice is as predicted, as voters are more likely to vote for the left- (right-)wing party, the more left (right) their position is. As was to be expected, this effect is statistically very strong.

Next, consider prediction 1c), that there is more strategic voting with mandatory turnout. To test this, we compute the proportion of strategic votes (defined as voting for the second favorite party). In CentMand 9.0% of the votes are strategic while in CentVolu the fraction is 8.2%[24]. While the fact that the proportion is higher for CentMand is in line with our prediction, a Wilcoxon ranksum test rejects that there is a significant difference between the two proportions (p-value: 0.52) and therefore prediction 1c) is not supported.

Turning now to the case with an extreme left-wing party (ExtrValu versus ExtrMand), figure 6 shows a substantially higher probability of voting for an extreme party when voting is voluntary.

[24] These frequencies are much lower than predicted by QRE (36.7% for CentMand and 32.6 for CentVolu, respectively).

Figure 6: Extremist Voting, Extreme Left-Wing



Notes. The figure compares the estimated probability of voting for the left- and right-wing party between ExtrMand and ExtrVolu as the voter's position varies along the horizontal-axis.

This result is supported by the regression analysis reported in table 3. Here, both coefficients for the voluntary voting treatment dummy are positive, and the effect on voting for the left-wing party is highly significant when considered independently (p-value: <0.01). The effect for the right-wing party is not significant at the 10%-level (p-value: 0.16) in isolation. A two-sided Wald test for the joint significance of the two coefficients finds them to be significant at the 5%-level (p-value: 0.03). This provides support for prediction 1b. Once again, voters' positions affect their party choice in the intuitive way.

Table 3: Multinomial Logit Results, Extreme Left-Wing

Constant and Independent Variables	**Coefficients**		
	Vote for left-wing party	**Vote for center party**	**Vote for right-wing party**
Constant	–2.33***	Base outcome	–2.18***
	(0.459)		(0.529)
Voter's position	–0.61***		0.53***
	(0.141)		(0.151)
Voluntary	0.34***		.20
	(0.129)		(0.143)

Notes. The table provides multinomial logit estimates of the determinants of party choice when the left-wing party is extreme. "Voluntary" is a dummy variable that is 1 if voting is voluntary. Standard errors given in brackets are clustered at the matching group level. For the voluntary voting treatments, only subjects who chose to vote for a party are included. **(**; ***) indicates significance at the 10% (5%; 1%) level.*

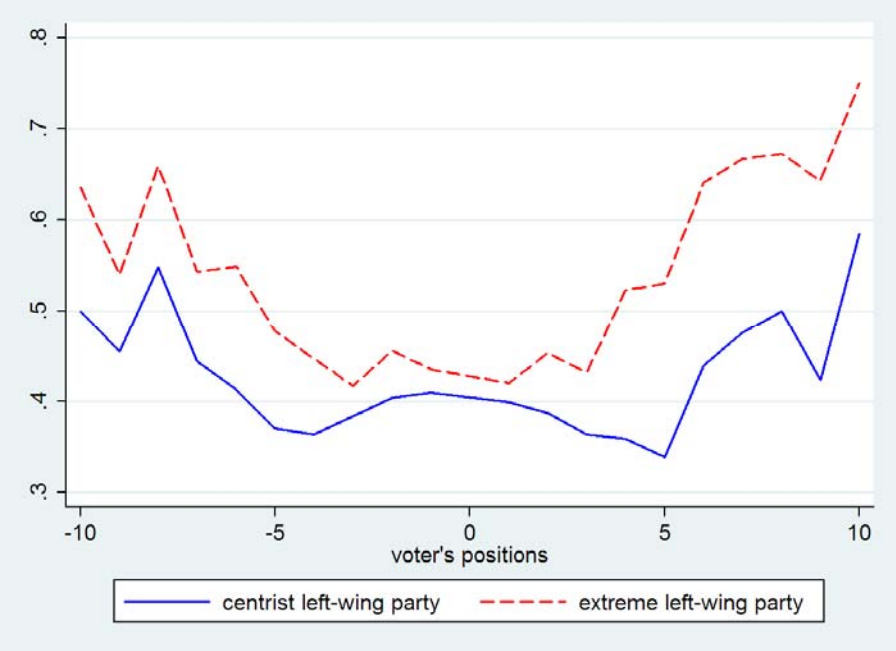
Prediction 1d) (more strategic voting with mandatory turnout) is also supported. The proportion of strategic votes is significantly higher in ExtrMand (12.4%) than in ExtrVolu (8.0%)[25]. A Wilcoxon ranksum test shows that this is a significant difference (p-value: 0.01).

In summary, our results provide support for the Polarization Effect when the left-wing party is relatively extreme (1b+d), but only marginally so when it is more centrist (1a+c).

Turnout Behavior

Figure 7 shows the (smoothed) turnout rates observed in our experiment. As predicted by the Turnout Effect (Prediction 3) we observe that turnout rates are consistently higher in the extreme treatment and that this difference is for most positions quite substantial (in the order of magnitude of at least ten percentage points). A Wilcoxon rank-sum test comparing average turnout per matching group in the two treatments shows that turnout rates are significantly higher in ExtrVolu than in CentVolu (p-value <0.01).

Figure 7: Turnout



Notes. The figure compares the observed turnout rates in CentVolu and ExtrVolu as the voter's position varies along the x-axis. Data are averaged over +/-0.2 of the value on the horizontal-axis.

In line with the Extremist Effect (predictions 2a and 2b), Figure 7 also shows that extreme voters vote at higher rates than centrist voters. Table 4 provides statistical support for this observation. It shows (separately for CentValu and ExtrValu) logit regression results for the decision to vote, with the (absolute) distance between a voter's position and the position with (theoretically) minimal turnout as an independent variable.

[25] Again, these frequencies are much lower than predicted by QRE (33.0% for ExtrMand and 23.4 for ExtrVolu).

Table 4: Logit results

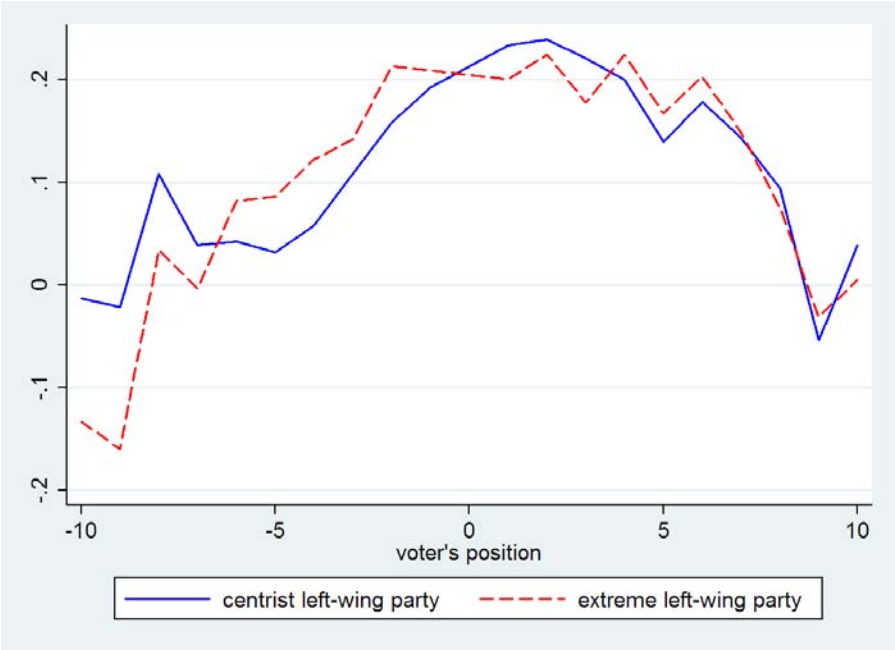
Constant and Independent Variables	Coefficients	
	Centrist left-wing party	Extreme left-wing party
Constant	–1.58***	2.42***
	(0.309)	(0.221)
Voting costs	–0.03***	–0.03***
	(0.003)	(0.002)
Distance	0.06***	0.24***
	(0.022)	(0.035)

Notes. Cells give the estimated coefficients of a logit regression of the decision to vote (the dependent variable is 1, if the subject voted in a given period). 'Distance' is the absolute value of the distance between voter's position and the position with (theoretically) minimal turnout (0.25 for ExtrValu and 3 for CentValu). Standard errors given in brackets are clustered at the matching group level. *(**; ***) indicates significance at the 10% (5%; 1%) level.

The results indicate that the farther away a voter is from the point of minimal turnout, the higher is her probability of voting (p-value <0.01 for both treatments). This is direct support for predictions 2a and 2b. Though strongly significant, the effect is smaller than the QRE predicts. A comparison of the observed levels of turnout with the predicted levels shows that turnout changes at a much slower rate than predicted when moving along the policy space (figure 8). The main reason is that centrist voters turn out at much higher rates than predicted. Finally, table 4 also exhibits (as expected) that the turnout probability is negatively and statistically significantly related to a voter's turnout costs.

All in all, our laboratory results provide support for both the Extremist Effect and the Turnout Effect. We therefore find evidence in support of all of our stylized (theoretical) results. In the following section, we offer a discussion of the generalizability of these effects.

Figure 8: Comparison observed vs. predicted turnout rates



Notes. The figure shows the difference between the predicted and observed turnout rates for CentVolu and ExtrVolu as the voter's position varies along the horizontal-axis.

6. Generalizability

Though we find support for the predicted interaction effects between turnout and party choice in our small laboratory elections, one may wonder how general our conclusions are. In other words, is there evidence of the Polarization Effect, Extremist Effect, and Turnout Effect in large-scale elections outside of the laboratory?

The empirical exercise for the Netherlands and Belgium presented in the introduction provides some evidence of the kind of interaction between turnout and party choice that these effects describe[26]. The increased extremism following the switch from mandatory to voluntary voting may be a consequence of the Polarization Effect (conditional on voting voters are more likely to vote for the extreme parties), the Extremist Effect (supporters of extreme parties are more likely to vote), or a combination of the two. Though this provides some external validity to our results, it also shows the difficulties related to using observational field data for an analysis of distinct mechanisms. In fact, the wish to disentangle such effects is one of the main reasons why we chose to run experiments in the first place.

[26] Obviously, more such case studies would strengthen the external validity of our results. Countries rarely switch from compulsory to voluntary voting or *vice versa*, however.

One can also consider survey data to investigate the validity of the interaction effects. Here, we do so for the Extremist Effect. To test this, we use survey data from the Comparative Study of Electoral Systems (CSES), the Eurobarometer and the Dutch Election Study. These are surveys that ask voters about their self-placement on the left-right scale and about their vote intentions and past voting behavior. Based on their self-placement we divide respondents into extreme and centrist voters and compare the average abstention rates across these groups. Table 5 shows the results for each of the three studies[27].

Table 5: Empirics on Extremist Effect

Data from the CSES			
	Extreme left-wing voters	Centrist voters	Extreme right-wing voters
Wave I (1996-2001) 39 surveys in 33 countries	**.893**	.863	**.906**
Wave II (2001-2006) 41 surveys in 38 countries	**.889**	.858	**.873**
Wave III (2006-2011) 50 surveys in 41 countries	**.890**	.856	**.886**
Eurobarometer Study (1982-1995); Biannual survey in the EU member states			
	.969	.954	**.982**
Dutch Election Study[28]			
1974	.926	.901	**.928**
1981	.898	.886	.907
1982	.909	.905	.907
1986	**.943**	.911	**.966**
1989	**.934**	.897	**.961**
1994	**.930**	.888	.898
1998	**.908**	.873	.905
2002	.935	.918	.925

Notes. Average self-reported turnout rates compared between extreme left-wing, centrist and extreme right-wing voters. Entries in bold are significantly different from the centrist turnout rates at the 5% level.

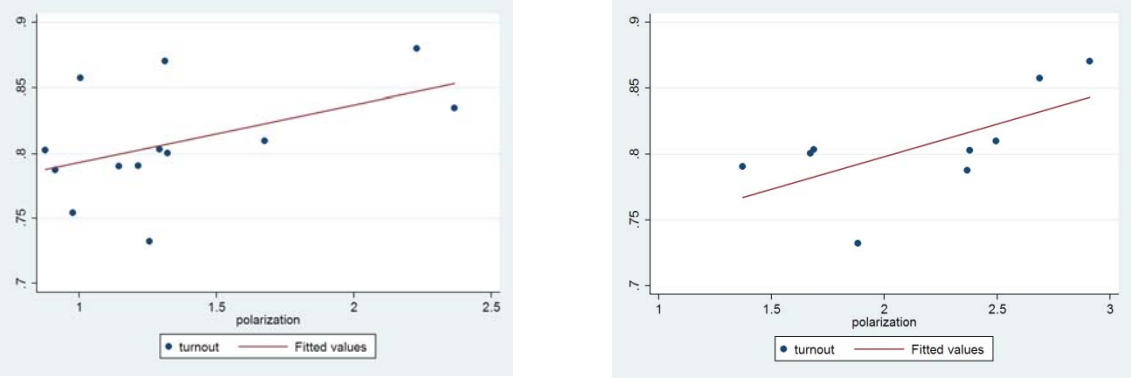
Given that the turnout decisions are self-reported, we expect them to be overstated (see for instance: Karp and Brockington, 2005) but as long as there is no difference across groups in the propensity of overstating turnout, this will not affect our comparison. The empirical data give strong support for the model prediction that extreme voters vote more often. In each observed year in each study, extreme voters have higher turnout rates than centrist voters. Many of these differences are statistically significant.

[27] More details are available from the authors upon request.

[28] Pooling the data across years, the difference is strongly significant. A Wilcoxon rank -sum test shows that the difference in turnout rates of extreme left-wing and extreme right-wing voters on the one side and centrist voters on the other is statistically significant at the 1%-level.

As a third empirical test of the generalizability of our interaction effects, we consider the Turnout Effect (polarization of the parties increases turnout rates). This is a question that has been studied in American politics for quite some time without a clear consensus developing (see Rogowski 2012 for an overview of the current state of affairs). The question has been much less studied in systems of proportional representation. We therefore conducted an analysis based on Dutch data. Following Dalton (2008) we define polarization as the vote weighted standard deviation of party positions. We conducted the analysis once using the party positions from the Comparative Manifesto Project (Volkens et al. 2010) (which we used to compute the extremism index in the introduction) and once for the Dutch Election Study. For each, we relate the measured polarization to observed turnout in various elections. Figure 9 shows the results.

Figure 9: Correlation between polarization and turnout



Comparative Manifesto Data | Dutch Election Study Data

Notes. The figure shows the relationship between the estimated polarization index and turnout rates in Dutch elections between 1971 and 2010 (Comparative Manifesto Data) and 1981 and 2006 (Dutch Election Study), respectively.

In both cases we observe a positive correlation between the polarization of party positions and turnout rates. This correlation is statistically significant and positive in both cases (a correlation of .48 with p-value: 0.05 for the Comparative Manifesto Data; and .85 with p-value < 0.01 for the Dutch Election Study Data). This provides empirical evidence of the Turnout Effect.

In summary, the results of this section provide empirical evidence from the field that is in line with each of the three effects that was derived from our theoretical analysis. This strengthens the external validity of our experimental and theoretical results.

7. Conclusions

In this paper we have analyzed the interaction between the turnout decision and party choice in a system of proportional representation. Based on a five-voter/three-party case we derived three basic predictions from the QRE. First, voluntary voting makes voters more likely to vote for extreme parties as opposed to strategically voting for the central party (a

'Polarization Effect'). Second, voters with extreme preferences are most likely to vote (an 'Extremist Effect'). Third, turnout increases with the polarization of the parties (a 'Turnout Effect').

Our experimental results provide support for these predictions, though only weak support is found for the polarization effect of voluntary voting when the parties are relatively close. The observed turnout rates exhibit the predicted feature that polarization boosts turnout and extreme voters are more likely to vote than centrist voters. This latter difference is not as pronounced as theoretically expected because centrist voters turn out substantially more often than predicted. The generalizability of our experimental and theoretical results is supported by additional empirical evidence from the field. Firstly, a case study of the Netherlands and Belgium shows that when one country abolished compulsory voting the election outcome in the next elections was more extreme while in the comparison country no such effect was observed. Secondly, data from the Comparative Study of Election Systems, the Eurobarometer and the Dutch Election Study exhibits the predicted pattern that more extreme voters have higher turnout rates. And thirdly, a case study of the Netherlands showed a positive correlation between the polarization of the party system and turnout rates.

Given our theoretical and experimental results we see this paper as making the first step on the way to understanding the interaction effect between turnout and party choice. Both on the theoretical and empirical level a lot of work remains to be done. As we argued in the introduction, this further effort is important since the results we get from the analysis of voting may have implications for a large class of models in the political economy literature. Moreover, if party positions, party choice and turnout are intertwined in the manner we observe, a proper study of party choice or turnout cannot be conducted in isolation. This points to an avenue for future theoretical and experimental work. This would be to endogenize the party positions and to analyze what the equilibrium positions in this game are. Because of the Extremist Effect, parties may want to position themselves away from the center. It is an open question whether a median voter theorem could hold where all parties converge to the center of the policy space, or whether endogenous turnout yields an equilibrium with polarized parties.

A natural next step in terms of theoretical work would also be to investigate the robustness of our result. One possible avenue to pursue is to investigate alternative coalition formation processes and see whether this influences the existence or strength of the interaction effects. Another possible extension would be to investigate how the distribution of voter preferences influences the interaction effects. The case of preferences being uniformly distributed in the policy space leads to the same conclusions as described here but perhaps electorates with a bimodal preference distribution (which could indicate a polarized electorate) would lead to different conclusions. Nevertheless, this paper has clearly established that the Polarization, Extremist and Turnout Effects are to be reckoned with

when studying voter behavior. Compared to countries with mandatory voting, nations where people can choose whether or not to go to the polls are characterized by more extremist voting and voter turnout is positively correlated with the extent of party polarization.

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