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Political actors playing games: Theory and experiments

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Chapter 2

A Simultaneous Analysis of Turnout and Voting under Proportional Representation: Theory and Experiments¹

2.1 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, 2014), 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 chapter, 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 (2014) serves to illustrate this concern. Traditionally, the literature has concluded that majority voting conflicts with utilitarian welfare. This is because the median voter's

¹ This chapter is based on Kamm and Schram (2013).

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.²

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.³ 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 (i.e., it stopped enforcing the penalty for abstaining). Given the similarity of these countries in terms of political 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 2.1 shows the value of this index for the two elections preceding and succeeding the changes in voting rule.⁴

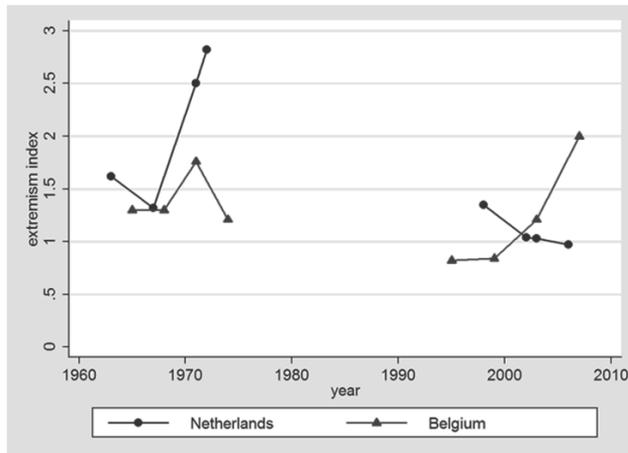


Figure 2.1: Extremism and Voluntary Voting

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).

² This example serves to illustrate the potential importance of interaction effects, but the mechanisms concerned are very different from the focus of our paper.

³ E.g., New York Times, November 6th, 2011.

⁴ 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.

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 (2014). 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.

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 chapter 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.⁵ 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.⁶ 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

⁵ By strategic voting, we mean abandoning the most preferred party to favorably influence the election outcome.

⁶ 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 should be clear from the context.

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 the interaction effect requires that voters engage in strategic voting. Given that under proportional representation the question of which party to choose is less straightforward than under majority voting, a system of proportional representation offers more scope for interaction effects. Furthermore, as argued in the following section, the question of party choice in 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 chapter is structured as follows. In the next section we will discuss the related literature. In section 2.3 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 2.4. The data from the experiment will be analyzed in section 2.5. Section 2.6 provides evidence of the generalizability of our results and section 2.7 concludes and discusses possible avenues for future research.

2.2 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).⁷ 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 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 in 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 point of view– 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

⁷ Herrera, Morelli and Palfrey (2014) are somewhat of an exception since they do not assume a linear mapping from seat shares to policy weights.

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 parties⁸ 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 (Abramson et al. 2010, 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.⁹ 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

⁸ Herrmann (2014) 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.

⁹ Kawai and Watanabe (2013) and Spenkuch (2013) offer an empirical analysis of strategic voting under plurality rule using election results and find a substantial number of strategic voters. For the case of proportional representation we are not aware of any such analysis.

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. 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 predicts them to behave sincerely.¹⁰ 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 (Herrera, Morelli and Palfrey 2014, Kartal 2014). 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.¹¹ 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 two attempts at such a joint investigation we are aware of are given by Kittel et al. (2014) and Blackwell and Calgano (2014). Kittel et al. in a ‘first-past-the-post’ setting, investigate how pre-voting communication affects the turnout decision and strategic voting. Given that their focus is

¹⁰ Of course, this may be a best response to the low levels of strategic voting by others.

¹¹ As discussed in the introduction, Weschle (2014) provides evidence that turnout interacts with economic voting. This is indicative that it interacts with party choice.

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. Blackwell and Calgano investigate the effect of different primary types on turnout and strategic voting using an experiment. They find that with high voting costs (which lead to lower turnout) less strategic voting is observed which is in line with the Polarization Effect.

2.3 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 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 $[-10,10] \in \mathfrak{R}$, which may be interpreted as capturing a left-right spectrum of the political arena.

2.3.1 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:

$$U_i = -(x_i - x^*)^2 - c_i \tag{1}$$

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.¹² 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. Conditional on deciding to vote she subsequently has to decide for which party to vote. In case of mandatory voting, the first step is (obviously) not applicable. The reasoning underlying this sequential decision process is that it seems natural that voters will only invest time and effort into making a party choice if they plan

¹² 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).

to cast a ballot.¹³ 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.

2.3.2 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.

2.3.3 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.¹⁴ 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

¹³ Schram (1992) and Thurner and Eymann (2000) report empirical evidence for this two-step decision process.

¹⁴ An alternative assumption is that the formateur is randomly chosen (as in Baron and Ferejohn, 1989) with recognition probabilities proportional to vote shares. Both assumptions find empirical support. F.i., Diermeier and Merlo (2004) find that the random formateur model fits the data better than recognition in order of seat share but the largest party has a disproportionately high probability of being recognized first. Furthermore, Ansolabehere et al. (2005) find that controlling for vote shares the largest party is twice as likely to be the formateur.

coalitions that keep a majority even if one party would leave are not permitted.¹⁵ The reason that we restrict attention to coalitions that are not excessively large is that one rarely observes such coalitions in reality.¹⁶ A reason could be that parties are also office-motivated (as we will discuss in chapters three and four) 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.

2.3.4 Equilibrium analysis

We solve the model using the quantal response equilibrium (QRE) concept (McKelvey and Palfrey 1995). In particular, we apply ‘logit equilibrium’. In this equilibrium, conditional on casting a ballot the probability that a voter votes for party j ($j = 1; 2; 3$) given a position x and costs c is given by the following expression:

$$P_j(x) = \frac{\exp(\lambda * EU(\text{vote for party } j))}{\sum_k \exp(\lambda * EU(\text{vote for party } k))} \quad (2)$$

In case that voting is voluntary the probability of casting a ballot is given by:

$$p^{\text{turnout}}(x, c) = \frac{\sum_j \exp(\lambda * P_j(x) * EU(\text{vote for party } j))}{\exp(\lambda * EU(\text{abstain})) + \sum_j \exp(\lambda * P_j(x) * EU(\text{vote for party } j))} \quad (3)$$

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.¹⁷ 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

¹⁵ 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.

¹⁶ Ström 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.

¹⁷ More specifically, this holds for the so-called ‘principal branch’ of the Multinomial Logit Correspondence (see McKelvey and Palfrey 1995).

logit equilibrium is then found by solving the set of equations in (2) for the vector of probabilities P_j . Appendix 2.A 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 2.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 $\lambda=3.7$.

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 0) to study whether this matters for the interaction effect between turnout and party choice. Figure 2.2 summarizes how parties are distributed in the policy space.



Figure 2.2: Parties in the Policy Space

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

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.

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 2.3 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., $\alpha = -1.5$).

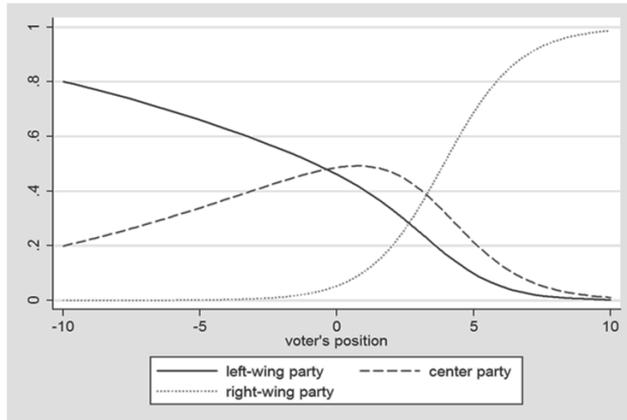


Figure 2.3: Equilibrium Probabilities of Voting for Parties

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.

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 2.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. This is illustrated in Figure 2.4.

The figure shows that, 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 center 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.

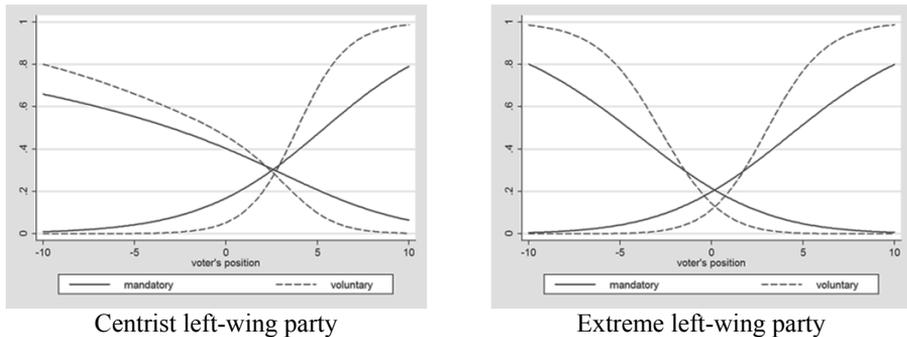


Figure 2.4: Predicted party choice (voluntary versus mandatory voting)

Notes. The figures compare the predicted probability of voting for each of the extreme parties between compulsory and voluntary voting as the voter's position varies along the horizontal axis. The predictions are based on the QRE model with $\lambda=3.7$. The left panel depicts the case for $\alpha = -1.5$ (a 'centrist' left-wing party) and the panel on the right depicts the case for $\alpha = -1.5$ (an 'extreme' left-wing party).

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 (see Figure 2.5). 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. 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 (compare the two curves in Figure 2.5). 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.

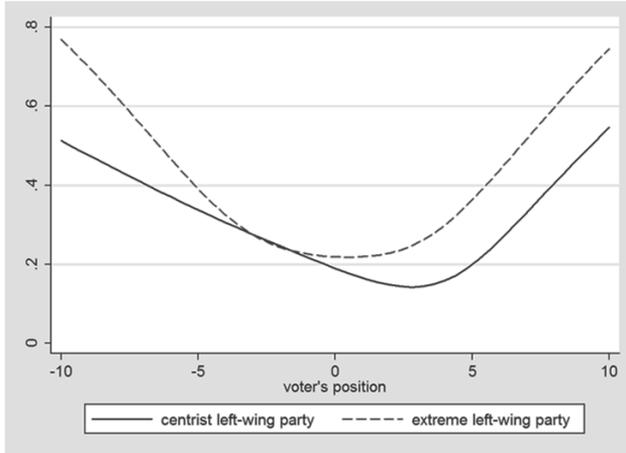


Figure 2.5: Predicted turnout rates

Notes. The figure shows the predicted turnout rates as the voter's position varies along the horizontal axis. The predictions are based on the QRE model with $\lambda=3.7$.

The equilibrium analysis 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.¹⁸

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

2.4 Experimental design

2.4.1 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

¹⁸ The Extremist Effect and Turnout Effect are also independent of the equilibrium concept used; they are predicted by the Nash equilibrium outcomes (see Appendix 2.B). As for the Polarization Effect, more sincere voting when turnout is voluntary is also predicted by the Nash equilibrium but this only implies more votes for extreme parties when the parties are far apart; not when the left-wing party is centrist.

of the 230 subjects in the experiment were undergraduate students of various disciplines.¹⁹ 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).

After all subjects have arrived at the laboratory, they are randomly assigned to one of the computers. Once everyone is seated they are shown the instructions on their screen. After everyone has read these and the experimenter has privately answered questions, a summary of the instructions is distributed. This summary included a table that specifies which coalition would be formed for each possible configuration of votes (for an example see Appendix 2.D). Then, all subjects have to answer quiz questions that test their understanding of the instructions. After everyone has successfully finished this quiz, the experiment starts. At the end of the session, all subjects answer a short questionnaire and are subsequently paid their earnings in private.

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.²⁰ 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 subjects²¹ (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. To aid comparison, we use the same realizations of positions in all sessions. 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.²² In all treatments we give the subjects the option to see the complete history in which they took part by clicking on a button.²³ 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 2.D.

¹⁹ 127 out of 228 (two did not give information on their field of study) majored in economics or business.

²⁰ 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.

²¹ Subjects are told that they are randomly re-matched every period, without specifying the matching groups.

²² This option was presented above the three parties such as to visually separate the two types of behavior (voting or abstaining).

²³ 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.

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.

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

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

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.

2.4.2 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 2.1 gives a summary of the treatments.

We implement two distinct positions for the left-wing party: In one case –denoted by ‘Centrist’–, the party is relatively close to the center ($\alpha = -1.5$) and in the other case – ‘Extreme’–, it is much more left-wing ($\alpha = -7.0$). 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.

Table 2.1: Treatment Summary

	Mandatory voting	Voluntary voting
Centrist left-wing party ($\alpha = -1.5$)	CentMand N=6	CentVolu N=5
Extreme left-wing party ($\alpha = -7.0$)	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.

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. Like 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.²⁴

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.

2.5 Results

We will focus on the aggregate behavior in each treatment. 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).

2.5.1 Observed Party Choice

Figure 2.4 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 2.E for the underlying estimates). All four figures show aggregate behavior close to cut-point

²⁴ 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.

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.

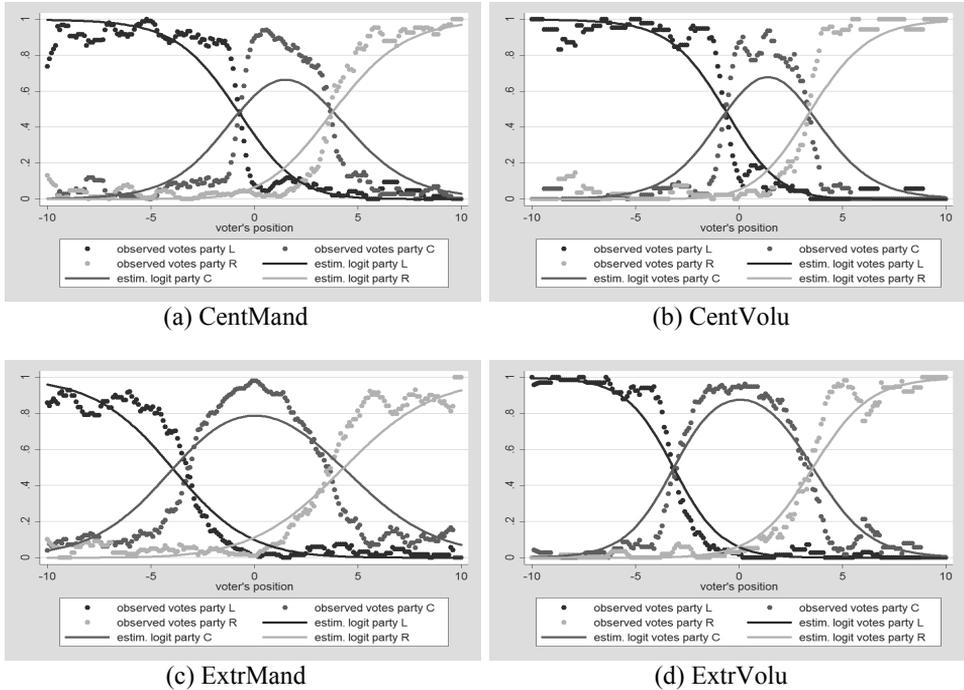


Figure 2.4: Party choice

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 2.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 steeper 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. At the same time, estimating the λ parameter from our data yields a value of 3.3, which is close to the value taken from the pilot (3.7) and

therefore not the reason for differences between the prediction and the QRE on the data (see appendix 2.A).²⁵

2.5.2 Comparative Statics

We start with the Polarization effect, by considering the extent to which voters opt for extreme parties. Figure 2.5 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 2.2.

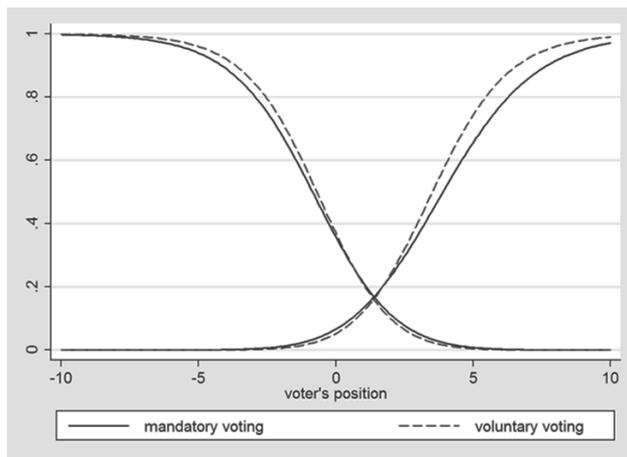


Figure 2.5 Extremist Voting, Centrist Left-wing

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.

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.

²⁵ We also estimated parameters for a QRE model that allows for different values of λ in the turnout and party choice decisions. This yields much more noise in the turnout decision than in party choice. The estimate for turnout is close to estimates from turnout experiments reported in Goeree and Holt (2005) and Großer and Schram (2010). See Appendix 2.A for more details.

Table 2.2: 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*** (0.108)		-2.27*** (0.449)
Voter's position	-0.66*** (0.147)	Benchmark	0.60*** (0.114)
Voluntary	0.12 (0.119)		.18 (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.

A different way of testing prediction 1a) is to focus directly on the proportion of votes for the center party. Since one has to take into account the different turnout rates it is not possible to simply compare across treatments the observed votes for the center party. Due to the ‘Extremist Effect’ this would bias the analysis in favor of concluding that voluntary voting leads to less voting for the center party. To circumvent this problem we divide the policy space into twenty intervals of length one and compute for each matching group and interval the proportion of votes for the center party. A Wilcoxon signed-rank test then gives strong support for prediction 1a) (p-value: <0.01).²⁶

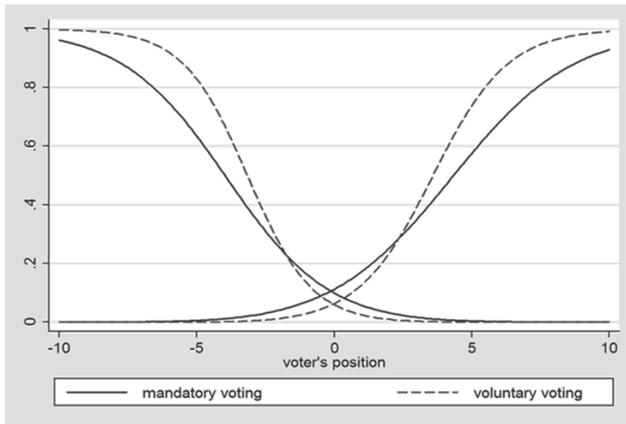


Figure 2.6: Extremist Voting, Extreme Left-Wing

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.

²⁶ The matched pairs used in this test are constructed by averaging over the matching groups with the same realization of voter positions and voting costs.

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 8.6% of the votes are strategic while in CentVolu the fraction is 7.9%.²⁷ While the fact that the proportion is higher for CentMand is in line with our prediction, a Wilcoxon ranksum test cannot reject that there is no 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 2.6 shows a substantially higher probability of voting for an extreme party when voting is voluntary.

This result is supported by the regression analysis reported in Table 2.3. 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. A Wilcoxon signed-rank test, using the procedure outlined above gives further support for prediction 1b) (p-value: <0.01).

Table 2.3: 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*** (0.459)		-2.18*** (0.529)
Voter's position	-0.61*** (0.141)	Base outcome	0.53*** (0.151)
Voluntary	0.34*** (0.129)		.20 (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 (15.7%) than in ExtrVolu (11.3%).²⁸ A Wilcoxon ranksum test shows that this is a significant difference (p-value< 0.01).

²⁷ These frequencies are much lower than predicted by QRE (36.7% for CentMand and 32.6 for CentVolu, respectively).

²⁸ Again, these frequencies are much lower than predicted by QRE (33.0% for ExtrMand and 23.4 for ExtrVolu).

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

2.5.3 Turnout

Figure 2.7 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).

In line with the Extremist Effect (predictions 2a and 2b), Figure 2.7 also shows that extreme voters vote at higher rates than centrist voters. Table 2.4 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.

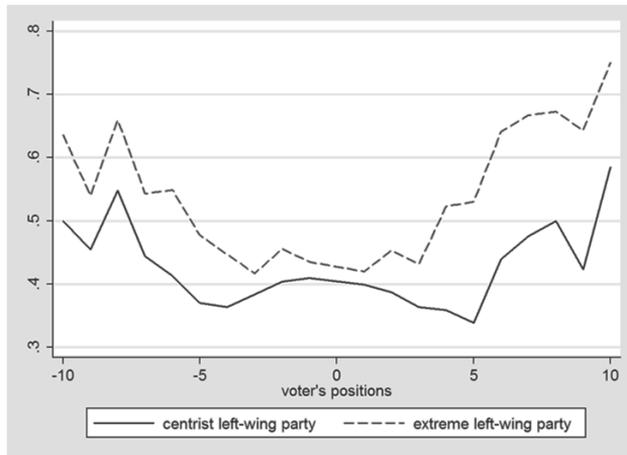


Figure 2.7: Turnout

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.

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 2.8). The main reason is that centrist voters turn out at much higher rates than predicted. Finally, Table 2.4 also exhibits (as expected) that the turnout probability is negatively and statistically significantly related to a voter's voting costs.

Table 2.4: Logit results

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

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.

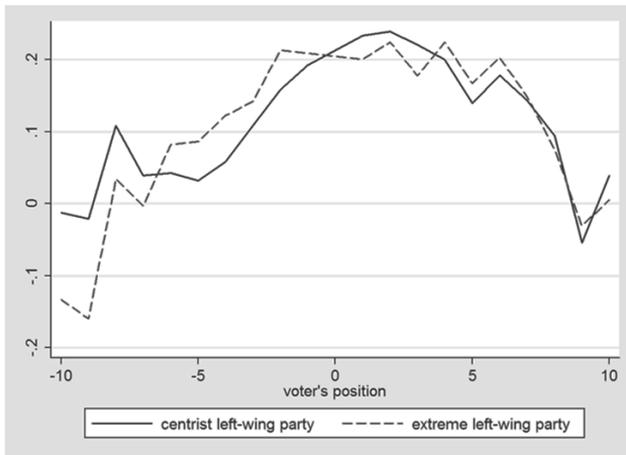


Figure 2.8: Comparison observed vs. predicted turnout rates

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.

2.6 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.²⁹ 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.

Table 2.5: Empirics on Extremist Effect

Data from the CSES			
	Extreme left-wing voters	Centrist voters	Extreme right-wing voters
Wave I (1996-2001) 37 surveys in 32 countries	.894	.860	.907
Wave II (2001-2006) 39 surveys in 36 countries	.842	.835	.852
Wave III (2006-2011) 45 surveys in 35 countries	.876	.849	.864
Eurobarometer Study (1979-1995); Biannual survey in the EU member states			
	.886	.871	.919
Dutch Election Study ³⁰			
1977	.926	.901	.928
1981	.898	.886	.907
1982	.909	.905	.907
1986	.943	.911	.966
1989	.934	.897	.961
1994	.930	.888	.898
1998	.894	.880	.905
2002	.926	.921	.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 1% level using a Wilcoxon signed rank test with matching of turnout rates by survey.

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-

²⁹ 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.

³⁰ Pooling the data across years, the difference is strongly significant. A Wilcoxon ranksum 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.

placement we divide respondents into extreme and centrist voters³¹ and compare the average abstention rates across these groups. Table 2.5 shows the results for each of the three studies.

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.

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 2.9 shows the results.

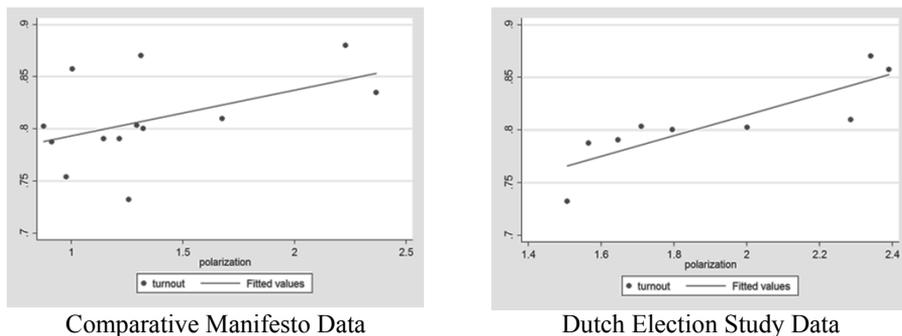


Figure 2.9: Correlation between polarization and turnout

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 a two-sided p-value: 0.09 for the Comparative Manifesto Data;

³¹ A respondent was coded to be ‘extreme’ if she chose one of the three left- or rightmost positions. For the Eurobarometer and the Dutch election study the policy space are the number from 1 to 10 and for the CSES the policy space are the numbers 0 to 10.

and .85 with a two-sided 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.

2.7 Conclusions

In this chapter 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 chapter 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 chapter 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.

Appendix 2.A: Additional analysis QRE

2.A.1 Computation of equilibrium for mandatory voting

As a point of departure we use that in the logit equilibrium the probability of voting for party j given a position x and costs of voting c is described by the following expression (eq 2 in the main text):³²

$$\Pr(\text{vote for party } j|x) = \frac{\exp(\lambda * EU(\text{vote for party } j|x))}{\sum_i \exp(\lambda * EU(\text{vote for party } i|x))} \quad (\text{A.1})$$

This implies that the ex-ante probability of voting for a given party is given by:

$$\Pr(\text{vote for party } j) = \int_x \Pr(\text{vote for party } j|x) f(x) dx \quad (\text{A.2})$$

where f is the distribution of ideal points (a truncated t-distribution with 0.05 degrees of freedom).

The expected utility of a vote is obtained by computing the payoff of this vote for all possible configurations of votes by the other four voters, weighted by the ex-ante probabilities. One can capture this in the following expression:

$$\sum_{a=0}^4 \sum_{b=0}^{4-a} \frac{4!}{a!b!(4-a-b)!} P_L^a P_C^b P_R^{4-a-b} (-2 * [x^*(a, b, j) - x]^2), j=L, C, R \quad (\text{A.3})$$

where x is the voter's position, P_j is the ex-ante probability of voting for party j , $a(b)$ is the number of other voters voting for party $L(C)$ (leaving $4-a-b$ to vote for R) and $x^*(a, b, j)$ is the implemented policy given the other voters behavior and the voter voting for party j .

Plugging equations A.2 and A.3 into A.1 yields three expressions (a voting probability for each party), which set-up a fixed point problem for the vector of probabilities. The set of equations was solved numerically and to account for the possibility of equilibrium multiplicity a wide range of initial conditions was checked. Because these all converge to the same equilibrium, we tentatively conclude that the results likely are unique.

2.A.2 Computation of equilibrium for voluntary voting

The case of voluntary voting is slightly more involved. While eq. (A.1) remains the same (A.2) becomes more complex. The reason is that the distribution of positions and voting costs for the voters may be different from the ex-ante distribution of these quantities. For instance, extreme voters are more likely to vote and therefore the distribution of ideal points for those who vote has fatter tails than the ex-ante distribution of ideal points. We therefore have to use the expression for the probability of turnout specified in equation (3) of the main text:

³² For notational convenience we drop the costs of voting c since they do not influence the party choice.

$$\Pr(\text{turnout}|x, c) = \frac{\sum_j \exp(\lambda * \Pr(\text{vote for party } j|x) * EU(\text{vote for party } j|x))}{\exp(\lambda * EU(\text{abstain}|x)) + \sum_j \Pr(\text{vote for party } j|x) * \exp(\lambda * EU(\text{vote for party } j|x))}$$

To capture the sequential voting decision (a voter first makes a decision whether to cast a ballot and only then decides for which party to vote) this expressions compares the expected payoff from turning out (which is the average of the expected payoff of voting for party j ($j=L, C, R$) weighted by the probability of voting for party j) to the expected payoff of abstaining.

The ex-ante probability of voting for party j (conditional on voting) is then given by the following expression:

$$\Pr(\text{vote for party } j) = \int_c \int_x \Pr(\text{vote for party } j|x) * \Pr(\text{turnout}|x, c) f(x)g(c) dx dc$$

where f is the distribution of ideal points (a truncated t-distribution with 0.05 degrees of freedom) and g the distribution of voting costs (uniform on [-15:200]).

The expression for the expected utility of voting for a specific party (eq. A.3) also becomes more involved since we now have to take abstentions into account and therefore do not know how many other votes will be cast. The expression used is as follows:

$$\left\{ \sum_{n=0}^4 \binom{4}{n} P_V^n (1 - P_V)^{4-n} \sum_{a=0}^n \sum_{b=0}^{n-a} \frac{n!}{a! b! (n - a - b)!} P_L^a P_C^b P_R^{n-a-b} (-2 * [x^*(a, b, j) - x]^2) \right\} - j * c$$

where the variables are defined as before, n is the number of votes cast by other voters and P_V is the ex-ante probability of turning out. The negative term $j*c$ appears since now voting costs matter because voting for party zero (i.e. abstention) avoids them.

Combining all the expressions yields a fixed point problem that was solved numerically. Again a large range of different initial conditions was checked that all converged to the same equilibrium.

2.A.3 Detailed predictions for the four treatments

Using the method described, we obtained the logit equilibria for the various treatments of our experiment. Figure 2A.1 shows these.

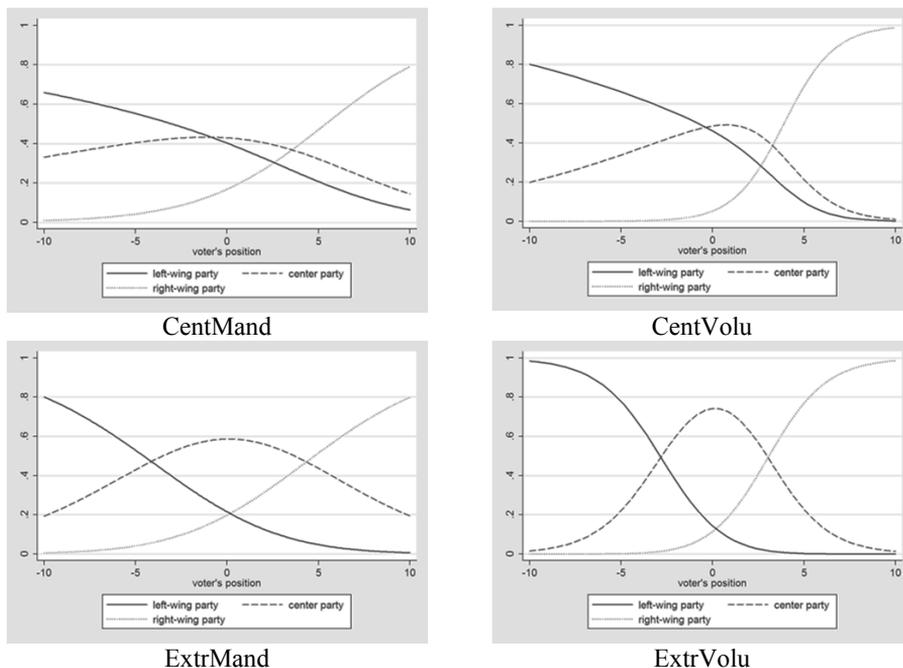


Figure 2A.1: Predicted party choice

Notes. The figures show the predicted probability of voting for each of the three parties as the voter's position varies along the horizontal-axis. The predictions are based on the QRE model with $\lambda=3.7$.

2.A.4 QRE predictions compared to observed behavior

Figure 2A.2 compares the QRE predictions to observed party choice. Though it shows that voting follows the general equilibrium pattern, there are also substantial deviations from the QRE prediction. In particular, extreme voters deviate much less from the party that yields the highest expected utility (i.e., the extreme party on their side of the spectrum) than is predicted by the 'noisy' logit equilibrium. Moreover, the slopes of the observed party choice functions are much steeper than predicted. As indicated in the main text, one possible explanation for these deviations is that behavior is less noisy than in the pilot in Kamm (2012) that was used to obtain an out-of-sample estimate of λ . To investigate this possibility, we explore the parameters that we can estimate from the data from our experiment.

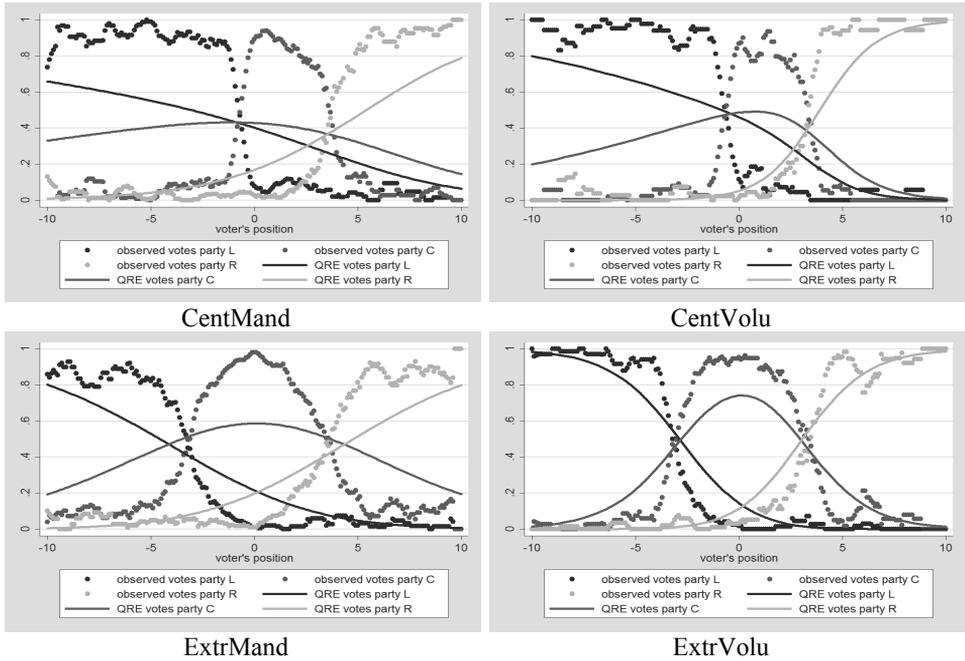


Figure 2A.2: Predicted compared to observed party choice

Notes. Dots (Lines) show the observed (predicted) probability of voting for each of the three parties as the voter's position varies along the horizontal-axis. The predictions are based on the QRE model with $\lambda=3.7$. To improve readability the observed data are averaged over ± 0.2 the value on the horizontal-axis.

2.A.5 QRE estimated on observed behavior

Combining the data from the party choice and turnout decisions, we estimate the noise level that yields the quantal response equilibrium that best fits the observed data. We allow for different levels of noise in the party choice and turnout decisions. The reason for doing so is that given the relatively high rates of observed turnout, a model with a single noise parameter would not be able to explain party choice very well since the noise parameter needs to be very low (implying a lot of noise) to explain the turnout rates. This would conflict with our observation that party choice is not very noisy. Indeed, if we estimate a model with a single noise parameter we find an ML estimate of $\lambda=3.3$. This is very close to the noise level taken from Kamm (2012) with $\lambda=3.7$ that we used thus far. Splitting the noise levels, yields an estimate of the noise parameter in the turnout decision of $\lambda_T=1.8$. This is similar to the noise levels observed in other experiments on turnout where estimated noise levels vary between 1.25 and 2.5 depending on the subjects' experience (Goeree and Holt 2005; Grosser and Schram 2010). The ML parameter for party choice is estimated to be $\lambda_P=8.2$ in our data. Hence, we observe much more noise in the turnout decision than in the party choice. A likelihood ratio test reveals that the model with two distinct noise parameters significantly improves the fit ($p\text{-value}<0.01$).

Figure 2A.3 compares the new QRE predictions with the estimated party choice. The estimated party choice is obtained from a multinomial logit regression of party choice on voter position (cf. Appendix 2.E). We find that with an extreme left-wing party the new predictions fit the observed party choice reasonably well. When the left-wing party is centrist we again find that quantal response underestimates the probability of voting sincerely for the left-wing party. As conjectured in the main text, this may be attributed to the powerful heuristic of voting sincerely.

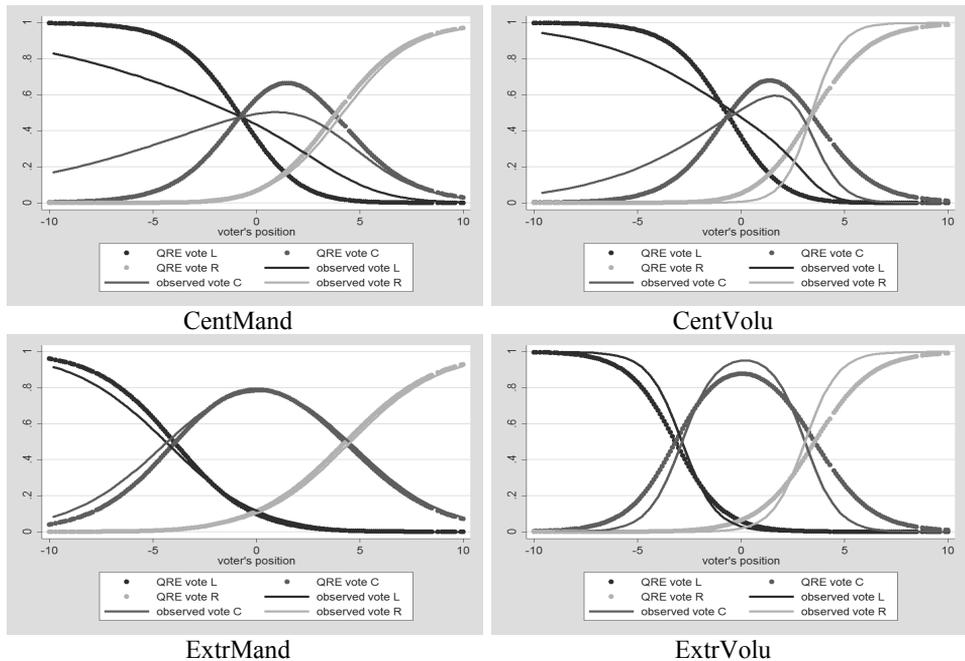


Figure 2A.3: New predicted compared to observed party choice

Notes. The thick (thin) lines show the estimated (predicted) probability of voting for each of the three parties as the voter's position varies along the horizontal axis. The predictions are based on the two-parameter QRE model estimated on observed behavior.

Finally, figure 2A.4 shows the revised QRE predictions for the turnout decision. While these new estimates naturally improve over the predictions using out-of-sample parameter estimates, it still is not able to capture the relatively moderate degree to which centrist voters vote less than extreme voters.

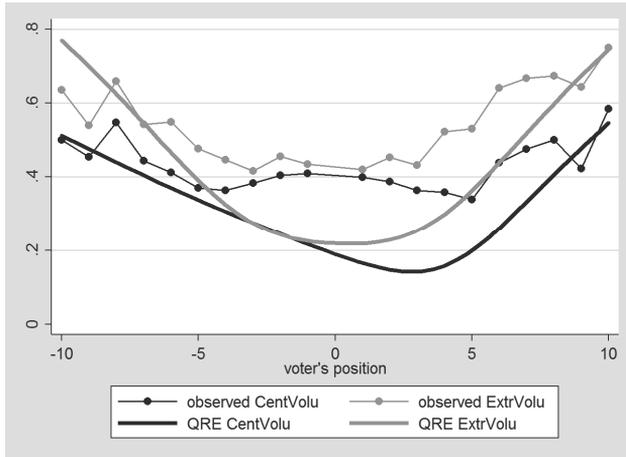


Figure 2A.4: Estimated turnout rates

Notes. The figure compares the observed and predicted turnout rates in CentVolu and ExtrVolu as the voter's position varies along the x-axis. For the observed behavior data are averaged over ± 0.2 of the value on the horizontal-axis and the predictions are based on the two-parameter QRE model estimated on observed behavior.

Appendix 2.B: Nash Equilibria

2.B.1 Mandatory voting

We solve for symmetric cut-point equilibria, which implies that voters with a position to the left of x_L vote for the left-wing party, voters between x_L and x_R vote for the central party and voters to the right of x_R vote for the right-wing party.

When voting is mandatory the equilibrium is therefore the solution to the following set of equations

- (i) $EU(\text{vote left}|\text{position is } x_L) = EU(\text{vote center}|\text{position is } x_L)$
- (ii) $EU(\text{vote right}|\text{position is } x_R) = EU(\text{vote center}|\text{position is } x_R)$
- (iii) $P(\text{vote left}) = P(\text{voters position to the left of } x_L)$
- (iv) $P(\text{vote right}) = P(\text{voters position to the right of } x_R)$
- (v) $EU(\text{vote left}|\text{position is } x) = f_L(P(\text{vote left}), P(\text{vote right}))$
- (vi) $EU(\text{vote center}|\text{position is } x) = f_C(P(\text{vote left}), P(\text{vote right}))$
- (vii) $EU(\text{vote right}|\text{position is } x) = f_R(P(\text{vote left}), P(\text{vote right}))$

Here EU is the expected payoff from an action and P denotes the probability of a certain event. The functions f_L , f_C and f_R compute the expected payoffs by going through all possible election outcomes, computing the resulting payoffs for the voter and weighting them by their respective probabilities given the probability that a vote will be for a certain party.

Numerical solution yields the Nash equilibria depicted in Table 2B.1.

Table 2B.1: Nash Equilibria Mandatory Voting

	CentMand	ExtrMand
Equilibrium 1 (selected by QRE)	$X_L=-0.65; X_R=3.65$	$X_L=-5.04; X_R=4.52$
Equilibrium 2	$X_L=-0.77; X_R=7.94$	$X_L=-4.07; X_R=6.01$
Equilibrium 3	$X_L=-3.56; X_R=3.63$	

Notes. Cells give the Nash equilibrium cut points for party choice when voting is mandatory. Voters with an ideal point to the left of X_L vote for the left-wing party, voters to the right of X_R vote for the right-wing party and voters in between vote for the central party.

The table shows multiple equilibria. One way to refine these is to solve for the quantal response equilibrium letting λ go to infinity along the principle branch of the Multinomial Logit Correspondence (McKelvey and Palfrey 1995). This selects the Nash equilibria shown in the top row.

2.B.2 Voluntary Voting

We again solve for symmetric cut-point equilibria with cut points x_L and x_R . Note that these cut-points are independent of the costs of voting since such costs only influence

whether a voter abstains or not but not for which party she will vote given that she turns out. The turnout decision is also described by a cut-point where a voter with position x votes if her voting costs are below a threshold $\bar{c}(x)$.

With voluntary voting the equilibrium is therefore the solution to the following set of equations

$$\begin{aligned}
 & (i) \ EU(\text{vote left}|\text{position is } x_L) = EU(\text{vote center}|\text{position is } x_L) \\
 & (ii) \ EU(\text{vote right}|\text{position is } x_R) = EU(\text{vote center}|\text{position is } x_R) \\
 & (iii) \ P(\text{vote left}) = \\
 & \quad P(\text{voters position to the right of } x_L) * \frac{P(\text{a voter to the right of } x_L \text{ votes})}{P(\text{a random voter votes})} \\
 & (iv) \ P(\text{vote right}) = \\
 & \quad P(\text{voters position to the right of } x_R) * \frac{P(\text{a voter to the right of } x_R \text{ votes})}{P(\text{a random voter votes})} \\
 & (v) \ EU(\text{vote left}|\text{position is } x) = f_L(P(\text{vote left}), P(\text{vote right})) \\
 & (vi) \ EU(\text{vote center}|\text{position is } x) = f_C(P(\text{vote left}), P(\text{vote right})) \\
 & (vii) \ EU(\text{vote right}|\text{position is } x) = f_R(P(\text{vote left}), P(\text{vote right})) \\
 & (viii) \ P(\text{a voter with position } x \text{ votes}) = \\
 & \quad P(\text{costs are below } \max_j [EU(\text{vote for party } j) - EU(\text{abstain})])
 \end{aligned}$$

Compared to the situation with mandatory voting we now have to take into account that voters have different turnout rates depending on their position. Therefore the probability of, for instance, a left-wing vote is not simply the probability that a voter is to the left of x_L , it also has to be weighted by the relative turnout rate of a left-wing voter compared to the average turnout rate in the population.

Solving this set of equations leads to unique equilibria for both specifications of left-wing party positions (table 2B.2).

Table 2B.2: Nash Equilibria Voluntary Voting

CentVolu	ExtrVolu
$X_L=-0.74; X_R=3.69$	$X_L=-3.41; X_R=3.65$

Notes. Cells give the Nash equilibrium cut points for party choice when voting is voluntary. If they vote, voters with an ideal point to the left of X_L vote for the left-wing party, voters to the right of X_R vote for the right-wing party and voters in between vote for the central party.

The equilibrium for the turnout decision is characterized by a function that assigns to each voter position a critical cost for which a voter is indifferent between abstaining and voting. Figure 2B.1 plots these for our two treatments.

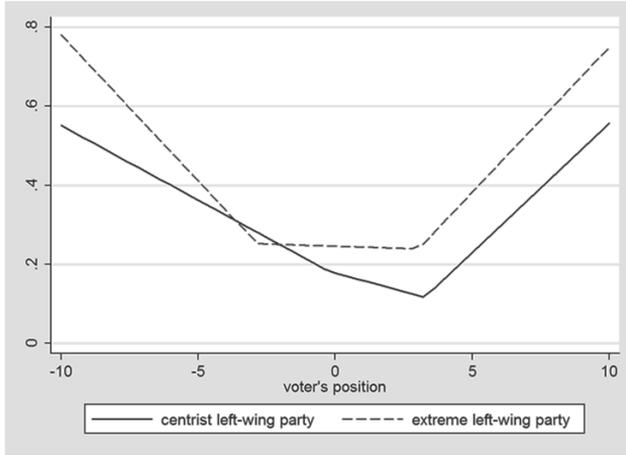


Figure 2B.1: Predicted turnout rates (Nash)

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

Figure 2B.1 illustrates both the Extremist Effect and the Turnout Effect. The former follows from the observation that the threshold (and therefore expected turnout) is higher at the extremes than in the middle of the policy space. The minimum of expected turnout is observed at position 0.25 for the polarized case of an extreme left-wing party and at position 3 for the case with a centrist left-wing party.

Appendix 2.C: Analysis for uniform distribution of voters

As a robustness check we analyze the model assuming that the voters' positions are distributed uniformly along the policy space.

Figure 2C.1 shows the QRE predictions for party choice in this model. Note the close resemblance to the QRE predictions with a t-distribution of voter preferences (cf. figure 2.10 in the main text). A consequence of this resemblance is that both specifications predict the same interaction effects. For example, Figure 2C.2 investigates the interaction between the turnout regime and party choice in the uniform distribution case by comparing the predictions of the treatment with mandatory voting to the predictions with voluntary voting. It shows that the probability of voting for an extreme party is higher when voting is voluntary than when it is mandatory. Therefore, the 'Polarization Effect' is also observed when we assume that voters' ideal points are uniformly distributed.

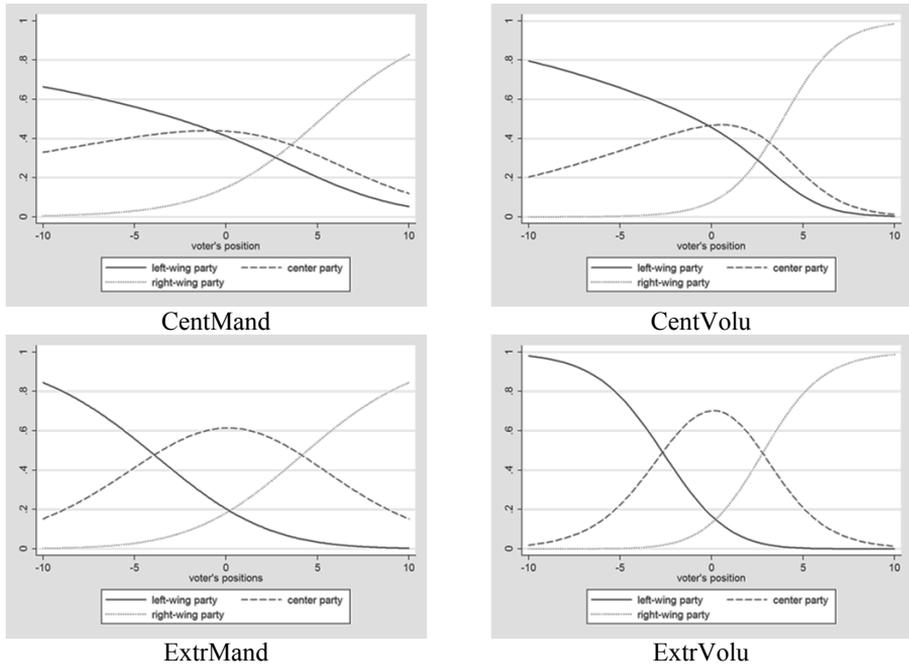
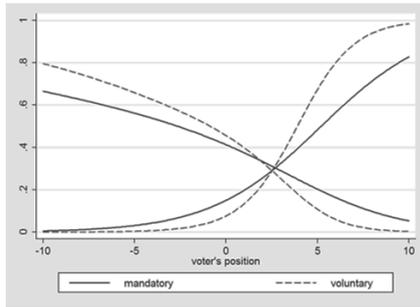
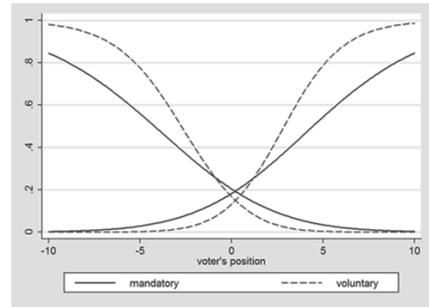


Figure 2C.1: Predicted party choice for uniform distribution

Notes. The figure shows the predicted probability of voting for each of the three parties as the voters position varies along the horizontal axis. The predictions are based on the QRE model with $\lambda=3.7$ and a uniform distribution of voter's positions.



Centrist left-wing party



Extreme left-wing party

Figure 2C.2: Predicted party choice for uniform distribution
(voluntary versus mandatory voting)

Notes. The figure compares the predicted probability of voting for each of the extreme parties (conditional on voting) between compulsory and voluntary voting as the voter's position varies along the horizontal axis. The predictions are based on the QRE model with $\lambda=3.7$ and a uniform distribution of voter's positions.

To replicate the other effects, figure 2C.3 compares the equilibrium turnout for the two levels of polarization used in the experiment. The horizontal axis shows the voter's positions and the vertical axis depicts the predicted turnout rates.

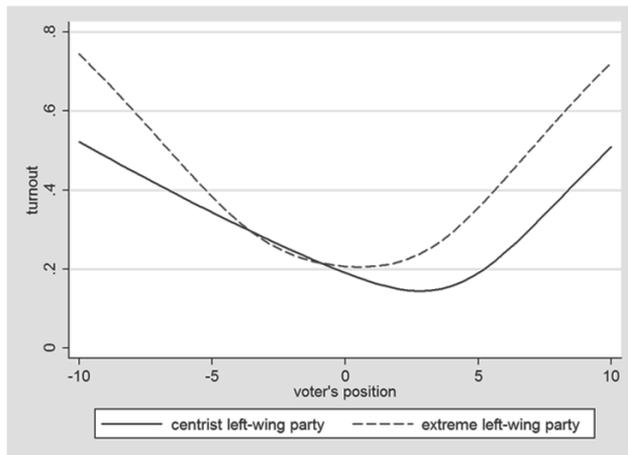


Figure 2C.3: Predicted turnout rates for uniform distribution

Notes. The figure shows the predicted turnout rates for CentVolu and ExtrVolu as the voter's position varies along the horizontal axis. The predictions are based on the QRE model with $\lambda=3.7$ and a uniform distribution of voter's positions.

This figure shows that the 'Turnout Effect' and the 'Extremist Effect' are also present when assuming a uniform distribution of policy positions.

Appendix 2.D: Instructions and screenshots of the experiment

In this appendix, we provide the instructions that the subjects read on their monitors. We also give the summary of the instructions that was handed out to subjects after they had read these on-screen instructions. Finally, we provide screenshots of the user interface of the experiment.

2.D.1 Instructions³³

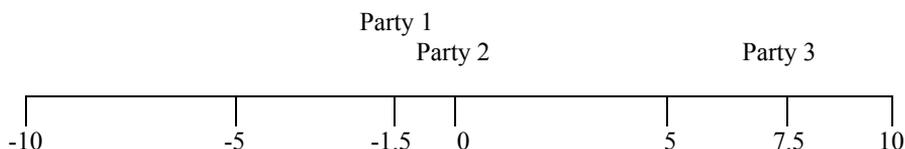
Welcome to this experiment on decision-making. Please carefully read the following instructions. If you have any questions, please raise your hand, and we will come to your table to answer your question in private.

In this experiment you will earn points. At the end of the experiment, your earnings in points will be exchanged for money at the rate 1 eurocent for each point. This means that for each 100 points you earn, you will receive 1 euro. Additionally, you will receive a show-up fee of 7 euros. Your earnings will be privately paid to you in cash at the end of the experiment.

This experiment will consist of 30 elections. In each election you will be one of five voters in the electorate that is electing a new government. Your earnings will be based on the outcome of these elections. The rest of these instructions will explain exactly how the experiment works.

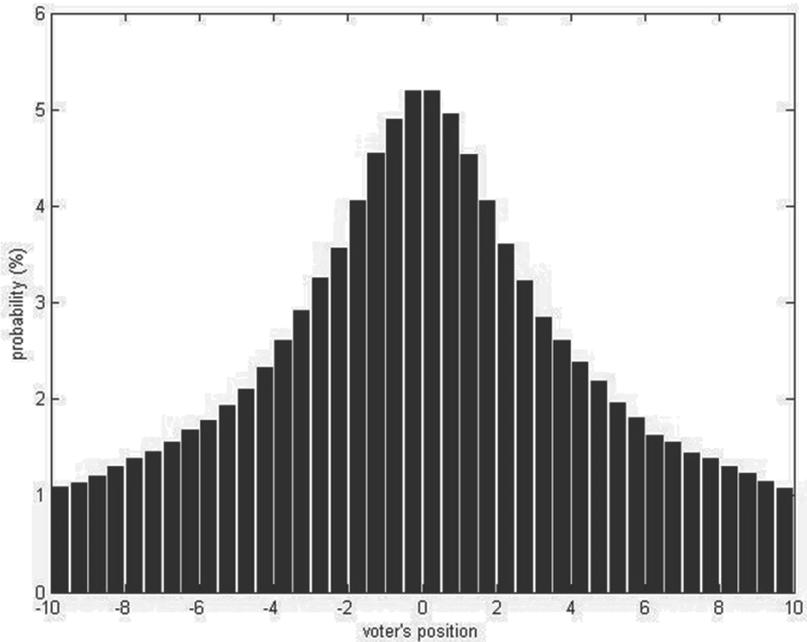
Parties and Voters

Three parties participate in the elections. Each party is described by a number between -10 and 10, which signifies their policy position. They will keep the same policy position throughout the experiment. You can see where they are located on the graph below (you will also find this graph on the handout) and on your monitor during the experiment.



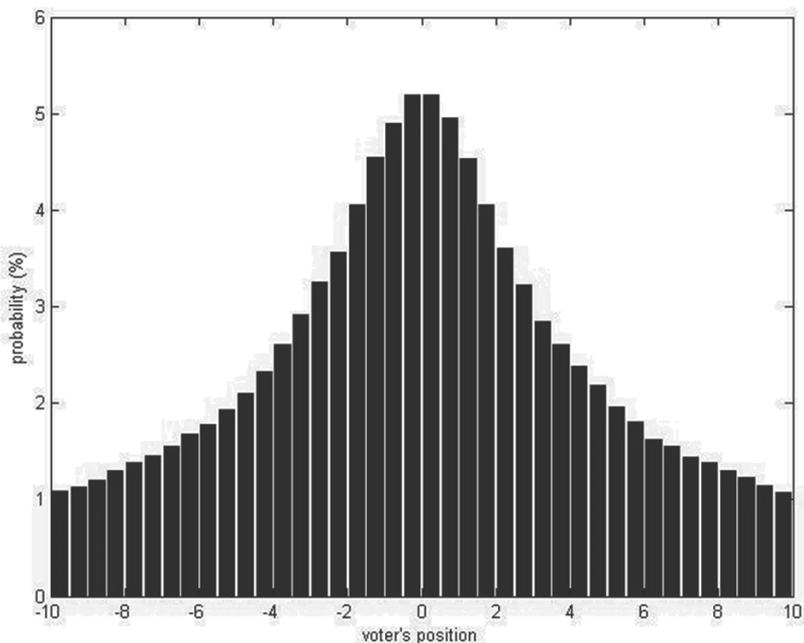
Every voter is also described by a position on the line from -10 to 10. This position corresponds to the policy that the voter would prefer to see implemented (this is her or his favorite policy). The five voters are randomly distributed over the policy space according to the distribution shown in the graph below. The height of a bar signifies how likely it is that a value occurs. In the experiment we will round the voter positions to one decimal point.

³³ We provide here the instructions used for the treatment centrist-voluntary. The instructions for other treatments are analogous and available upon request.



As you can see a position of 0 is most likely. The probability that the position is very close to zero (between -0.5 and 0.5) is 10%. This means that in (about) 10 of 100 cases the position will be in this interval.

Furthermore you can note that the distribution is symmetric around zero and therefore it is equally likely to be to the left and to the right of zero.



What follows are some further illustrating examples of the shape of the distribution

In about 45% of the cases (45 out of 100) a voter's position will be between -2.5 and 2.5.

In about 71% of the cases (71 out of 100) a voter's position will be between -5 and 5.

In about 96% of the cases (96 out of 100) a voter's position will be between -9 and 9.

In about 22% of the cases (22 out of 100) a voter's position will be between 2.5 and 7.5 and with the same probability s/he will be between -7.5 and -2.5.

In about 15% of the cases (15 out of 100) a voter's position will be between 5 and 10 and with the same probability s/he will be between -10 and -5.

If you want to know how likely it is that a voter's position is in a given interval you can use the tool below (you will also be able to use this tool during the experiment).

position is between and

For each voter, a new position will be drawn after every period and your position in the next period is completely independent of your position in the current period. You will always know your own position before making a decision but not the position of the other voters in your electorate.

Government formation

In each electorate (i.e. group of voters that form an election) there will be five voters. You will be one of them and the other four voters are some of the other subjects in the lab. The identity of the four other subjects will be randomly determined in each of the 30 periods. Hence, you are in a new electorate in each of the thirty rounds.

In each period you will have to decide whether you want to vote, and if so, for which of the three parties you want to cast your vote. If you decide to vote you have to incur costs of voting which in every period are an integer randomly drawn from the interval -15 and 200 . Every integer in this interval is equally likely to be drawn. You know your own costs of voting before making your decision, but only the distribution of the costs of voting for the other voters in your electorate. Note that there is a small chance that your costs are negative in a round. If this occurs, you will receive extra points if you vote.

The votes by the members of your electorate determine which government will be formed. When forming a government the following rules will be applied:

1. If a party receives an absolute majority (more than half) of the votes this party will form a single party government.
2. If no party receives an absolute majority, the party with the most votes forms a coalition with one of the other two parties. Which coalition will be formed for the different possible configurations of votes can be seen in the table below (you can also find this table on the handout). Coalitions are determined by assuming that the party that is forming the coalition tries to end up with a policy that is as close as possible to its own policy position.
3. If in 2. there are multiple parties with the most votes it is randomly determine which party forms the coalition.

Coalition Formation

Votes for party 1	Votes for party 2	Votes for party 3	Formed coalition	Implemented policy
2	2	1	parties 1 and 2	-0.8
2	1	2	parties 1 and 2 OR (determined by coin toss) parties 2 and 3	-1.0 5.0
1	2	2	parties 1 and 2 OR (determined by coin toss) parties 1 and 3	-0.5 4.5
2	1	1	parties 1 and 2	-1.0
1	2	1	parties 1 and 2	-0.5
1	1	2	parties 2 and 3	5.0
2	2	0	parties 1 and 2	-0.8
2	0	2	parties 1 and 3	3.0
0	2	2	parties 2 and 3	3.8
1	1	1	parties 1 and 2 OR (determined by throwing a dice; if it shows a 5 or 6 parties 2 and 3 form the coalition) parties 2 and 3	-0.8 3.8
1	1	0	parties 1 and 2	-0.8
1	0	1	parties 1 and 3	3.0
0	1	1	parties 2 and 3	3.8
0	0	0	party 1 OR (all with equal probability) party 2 OR (all with equal probability) party 3	-1.5 0 7.5

Based on the government that is formed, a policy will be implemented. If there is a single party government the implemented policy is equal to this party's policy position. If there is a coalition the implemented policy is the weighted (by votes) average of the positions of the parties in the coalition. If for instance party 3 receives two votes and forms a coalition with party 2 which received one vote than the policy position of party 3 (7.5) receives weight 2/3 and the policy position of party 2 (0) receives weight 1/3. The implemented policy is then 5.0 ($=1/3*0+2/3*7.5$). See also the table on the handout for the policy implemented by any possible coalition.

Your earnings in points in a period are computed using the following formula:

$$160 - 2 * (\text{implemented policy} - \text{favorite policy})^2 - \text{costs of voting}$$

As mentioned before, the costs of voting are an integer between -15 and 200. Every integer in this interval is equally likely to be drawn and you will have a new draw in every period. You only pay (or receive) the costs of voting if you decide to vote in a period. The second term in the formula shows that your earnings are decreasing in the squared difference between your favorite policy (i.e. position) and the implemented policy. As a consequence, your earnings are higher the smaller is the distance between the implemented policy and your favorite policy. Below you can test what your earnings are for different configurations of your own position, your costs of voting and the government elected.

Assume that the following government
Forms

<input type="text"/>	
Position <input type="text"/>	costs of voting <input type="text"/>

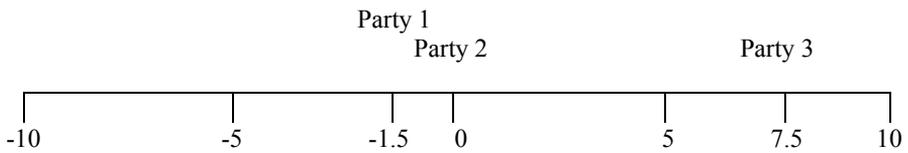
At the end of the experiment the earnings from all periods will be added up and per 100 points, you will receive 1 euro. These earnings will be paid to you privately and confidentially.

On the next screen you will be requested to answer some control questions to make sure that you have understood these instructions. Please answer these questions now.

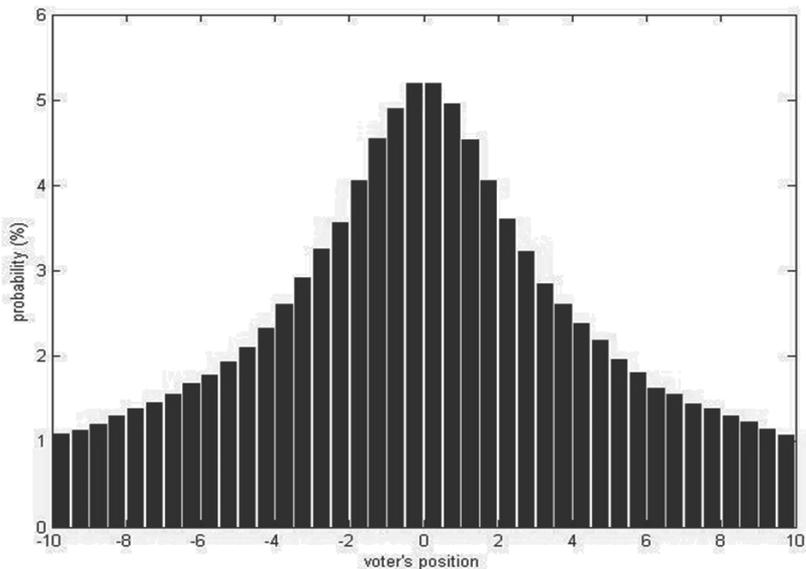
2.D.2 Printed summary of instructions

Summary Instructions

- Each electorate consists of five voters
- In each period you will be randomly rematched
- In each of the 30 periods you have to decide whether you want to vote and, if yes, for which party
- The three parties are described by policy positions as shown below



- every voter is described by a position on the line from -10 to 10. The voters are randomly distributed over the policy space according to the distribution shown in the graph below.



- In about 10% of the cases (10 out of 100) a voter's position will be between -0.5 and 0.5

- In about 45% of the cases (45 out of 100) a voter's position will be between -2.5 and 2.5
- In about 71% of the cases (71 out of 100) a voter's position will be between -5 and 5
- In about 96% of the cases (96 out of 100) a voter's position will be between -9 and 9

- Based on the votes a government will be formed
 - If a party receives an absolute majority of the votes this party will form a single party government.
 - Otherwise a coalition will be formed according to the table below
 - The implemented policy is the position of the party in government; if there is a coalition it is the vote weighted average of the positions of the members of this coalition

Votes for party 1	Votes for party 2	Votes for party 3	Formed coalition	Implemented policy
2	2	1	parties 1 and 2	-0.8
2	1	2	parties 1 and 2 OR (determined by coin toss) parties 2 and 3	-1.0 5.0
1	2	2	parties 1 and 2 OR (determined by coin toss) parties 1 and 3	-0.5 4.5
2	1	1	parties 1 and 2	-1.0
1	2	1	parties 1 and 2	-0.5
1	1	2	parties 2 and 3	5.0
2	2	0	parties 1 and 2	-0.8
2	0	2	parties 1 and 3	3.0
0	2	2	parties 2 and 3	3.8
1	1	1	parties 1 and 2 OR (determined by throwing a dice; if it shows a 5 or 6 parties 2 and 3 form the coalition) parties 2 and 3	-0.8 3.8
1	1	0	parties 1 and 2	-0.8
1	0	1	parties 1 and 3	3.0
0	1	1	parties 2 and 3	3.8
0	0	0	party 1 OR (all with equal probability) party 2 OR (all with equal probability) party 3	-1.5 0 7.5

- Your payoff per round is
 - $160 - 2 * (\text{implemented policy} - \text{favorite policy})^2 - \text{costs of voting}$**
 - The cost of voting are an integer number in the interval between -15 and 200. Every integer in this interval is equally likely to be drawn.
 - You only have to pay the costs of voting in periods where you decide to vote

Your final payoff is 1 Euro for every 100 points plus a show-up fee of 7 Euros.

Election outcome in period 1

In this period you decided to vote for party 2

The distribution of votes in this period is:



This voting pattern led to a coalition of parties 2 and 3 which implemented a policy located at 5.0

Given that your position is 3.5 and your cost of voting are 160, your payoff for this period is $160 - 2 * (5.0 - 3.5)^2 = 160 - 5$ and your accumulated payoff is 5

[Click here](#) to go to the next round.

Notes. The screen subjects saw after an election was over.

Appendix 2.E: Multinomial logit estimates

Below we report the estimation results underlying the logit choice functions for the party choice as depicted in Figure 2.4 of the main text. The variable "Voter's Position" measures a voter's position in the policy space. Standard errors are clustered at the matching group level.

Multinomial Logit Results, CentMand

Constant and Independent Variables	Coefficients		
	Vote for left-wing party	Vote for center party	Vote for right-wing party
Constant	-0.48*** (0.131)		-2.17*** (0.541)
Voter's position	-0.64*** (0.183)	Base outcome	0.57*** (0.139)

Notes. Multinomial logit estimates for the party choice decision in treatment CentMand. Standard errors are clustered at the matching group level. *(**, ***) indicates significance at the 10% (5%; 1%) level.

Multinomial Logit Results, ExtrMand

Constant and Independent Variables	Coefficients		
	Vote for left-wing party	Vote for center party	Vote for right-wing party
Constant	-2.07*** (0.519)		-1.95*** (0.610)
Voter's position	-0.53*** (0.158)	Base outcome	0.45*** (0.181)

Notes. Multinomial logit estimates for the party choice decision in treatment ExtrMand. Standard errors are clustered at the matching group level. *(**, ***) indicates significance at the 10% (5%; 1%) level.

Multinomial Logit Results, CentVolu

Constant and Independent Variables	Coefficients		
	Vote for left-wing party	Vote for center party	Vote for right-wing party
Constant	-0.45* (0.249)		-2.40*** (0.743)
Voter's position	-0.72*** (0.243)	Base outcome	0.70*** (0.195)

Notes. Multinomial logit estimates for the party choice decision in treatment CentVolu. Standard errors are clustered at the matching group level. *(**, ***) indicates significance at the 10% (5%; 1%) level.

Multinomial Logit Results, ExtrVolu

Constant and Independent Variables	Coefficients		
	Vote for left-wing party	Vote for center party	Vote for right-wing party
Constant	-2.69*** (0.610)		-2.63*** (0.689)
Voter's position	-0.85*** (0.223)	Base outcome	0.73*** (0.183)

Notes. Multinomial logit estimates for the party choice decision in treatment ExtrVolu. Standard errors are clustered at the matching group level. *(**; ***) indicates significance at the 10% (5%; 1%) level.