Political Competition and Turnout

Francesca Acacia*
University of Edinburgh

James Rockey†
University of Leicester

This Version September 22, 2011

Abstract

Much analysis has focused on why individuals vote at all. This paper focuses on why turnout varies across elections and across districts. A simple micro-founded measure of policy based party competition is developed and calculated for every district at every election in 15 European countries over the period 1947-1998. Our results suggest that a large proportion of the within-district inter-election variance in turnout levels can be attributed to differences in the intensity of district-level of political competition.

*Francesca.Acacia@ed.ac.uk
†james.rockey@le.ac.uk.

Introduction

Why do people vote? They vote in by or special elections with little or no clear consequence for the balance of power. They vote in districts which are almost never competitive. Outside of politics, individuals vote to determine the outcomes of 'reality' tv-shows, and award-ceremonies. Even though the cost of doing so is often large compared to any expected direct benefit.

Many, non-exclusive explanations have been proposed. One reason why turnout has been the subject of so much attention by economists as well as political scientists is that it has been difficult to reconcile high observed turnout levels with a satisfactory maximum expected-utility explanation. In general, high-turnout levels are not robust equilibria of large elections in which voting is motivated by a desire to affect equilibrium policy. Instead, explanations of voting have had to model citizens as receiving some intrinsic reward from voting, often called 'the warm glow', or as being boundedly rational in some way. Two important exceptions are Ferejohn and Fiorina (1974) and Gelman, Katz and Tuerlinck (2002). Ferejohn and Fiorina note that there is no reason to assume that every voter accords to a given rationality concept. They model voters as using a minmax regret criterion and show that in this setting, high-turnout levels are to be expected. Edlin, Gelman and Noah (2007) argue that voting can be seen as a rational choice if voters are modeled as being concerned about the welfare of others. Dawes, Loewen and Fowler (2012) show that those demonstrating more 'social' preferences in a dictator game laboratory experiment are more likely to participate in politics.

This paper takes an alternative approach to this question. It asks what explains variation in turnout if turnout varies across elections and across districts? In this respect it is related to other work that has sought to unpack the 'warm glow' phenomenon. Note, that unless voters use different decision rules in different elections, then appealing to different rationality concepts such as the minmax rule considered by Ferejohn and Fiorina (1974) is unlikely to be sufficient. Figure 1 reveals that whilst turnout levels exhibit some consistency, there is definitely variation within countries between elections that a successful theory of voter turnout should help to explain.

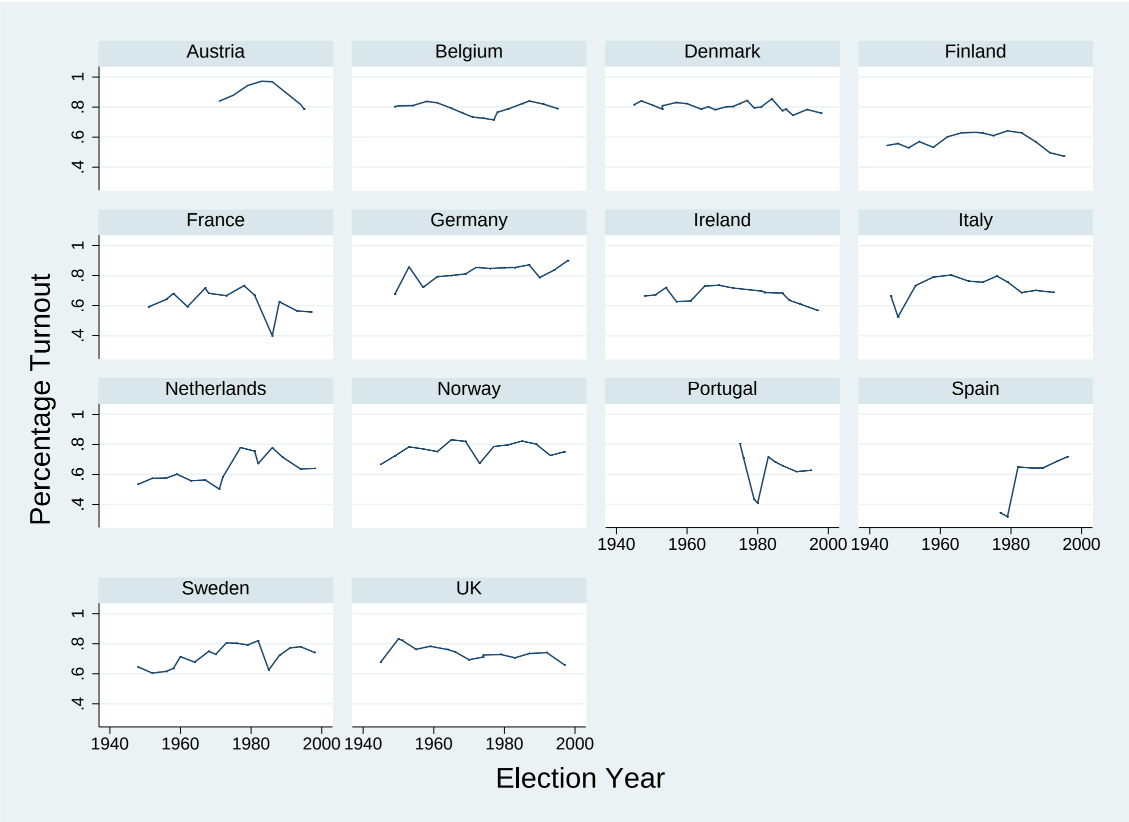


Figure 1: Turnout Varies Both Across Time and Across Countries

To properly assess what drives voters decision making, it is necessary to have data at the level at which they make decisions. For legislative elections, this normally means district level data. Whilst, this is routine in the study of US politics it is less so in the context of Europe. However, the politics of European countries are better suited to our purpose. Firstly, this is because there are almost always three and routinely many more parties standing in any given election. This provides for much more variation in the distribution and intensity of political competition. Secondly, as formalised by Persson, Roland

and Tabellini (2000) of necessity parties in the predominantly consensual (following Lijphart (1999)'s terminology) democracies of Europe are far more cohesive with strong party lists, than in the US. This constrains individual politicians to campaigning on the basis of their parties manifesto positions. Thirdly, there is much greater regional variation in news media in European democracies, with a predominance of national media. This facilitates the use of national level data on the manifesto positions of parties. [1]. This paper employs the district level election results compiled by Caramani (2004) and combines these with survey data on voters' preferences from the Eurobarometer Survey and data on parties manifestos as measured by the Comparative Manifestos Project Budge, Klingemann, Volkens, Bara and Tanenbaum (1997). Details of how these data were combined, and a description of the resultant large panel dataset are provided in Section 3.

The focus of this paper is on the impact of political competition on voting behaviour, and as such this necessitates a measure of political competition. Whilst, many increasingly sophisticated indices have been proposed, see Gelman, Katz and Tuerlinck (2002), Gelman, Katz and Joseph (2004) for an excellent discussion, these don't seem well suited to comparing variations in district level competition over time. Instead, a micro-founded version of the still widely used Effective Number of Parties (ENP) measure of Laakso and Taagepera (1979) is developed. Crucially, this allows for variation in the distribution of citizen ideology across and districts and elections. In the same way that the ENP measure is equivalent to (the reciprocal of) a Herfindahl index, the new measure is equvialent to a Herfindahl index computed allowing for different distributions of consumers' taste parameters. The elaboration of this index is outlined in Section 2.

The measure is computed for every district, in each of 15 European countries, for the period 1947-1998. Standard panel data techniques, as well

[1] In the US we could use data on individual politicians voting records such as that compiled by the NOMINATE project of Poole and Rosenthal (2006)

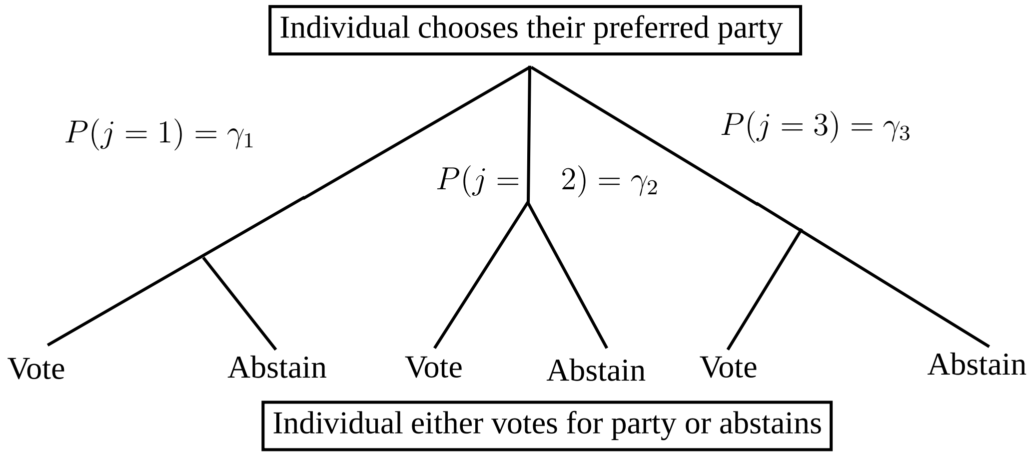
as quantile and multilevel approaches, are used to demonstrate the robust relationship between the intensity of political competition and the proportion of electors who choose to vote. Moreover, the estimated coefficients suggest that turnout is relatively sensitive to competition, a one standard-deviation increase in political competition induces a 0.2 to 0.4 standard deviation increase in turnout. The methodology employed and the results are discussed in Section 4.. Section 5. concludes.

2. Measuring Competition

As mentioned, there is already a large literature that seeks to resolve the 'paradox of (not) voting' and the reader is directed to Dhillon and Peralta (2002) for an excellent survey of the key theoretical positions, and to Geys (2006) for a comprehensive meta-analysis of previous empirical studies. Dhillon and Peralta (2002) conclude that 'costly and instrumental voting therefore seems to be inconsistent with significant turnout', whilst Geys (2006) finds that 'Electoral Closeness' and 'Electoral District Size' both predict turnout. Such an impasse admits different conclusions, but it seems natural to consider non-instrumental motivations for voting. Schuessler (2000) makes the case for Expressive voting, in which citizens derive utility from expressing their preferences in the act of voting. By introducing a model in which the calculus determining whether the benefits of expressive voting outweigh the costs are endogenously determined Schuessler (2000) is better able to explain varying electoral participation. However, his approach can less easily explain variation between districts in any given election. Moreover, modelling voting as expressive behaviour requires more than an alternative interpretation of the same independent variables. In particular, standard measures of 'electoral closeness', designed to test the instrumental framework, are no longer adequate.

The competition measure introduced is designed to be able to explain variation in turnout levels both between elections and across districts. A basic

Figure 2: The structure of a voters' decision



implication of the theory of expressive voting is that an individual should be more likely to vote if there are one or more parties with platforms close to what they prefer. It will capture and generalise this intuition that elections are more competitive when the total discrepancy in the platforms and parties and the preferences of voters for each voter, is lower on average. Voters are assumed to choose whether to vote for one of J parties or whether to abstain. To simplify the analysis, a key assumption is made. This is an Independence of Irrelevant Alternatives assumption, which states that individuals vote for their most preferred party, or they do not vote at all. This rules out strategic voting, but it entirely compatible with an expressive voting model. Therefore, we can model each voter as making their decision of how and whether to vote sequentially. That is, they first determine which is their preferred party, and then whether they wish to vote for them, or abstain altogether.

We consider a population of agents - voters - who are assumed to be distributed according to an atomless distribution with mass normalised to 1, the set of agents is denoted $\mathcal{I}$. Each individual voter i is indexed by their position on the interval $i \in [\underline{I}, \overline{I}]$. Voters' utility functions are comprised of a common and an idiosyncratic component. The common component is decreasing in the distance between their preferred outcome and the implemented policy

$V(i,j) = |i - j|$. The idiosyncratic component $\varepsilon(i,j)$ captures particular costs and benefits, including psychic, expressive, or warm glow effects, of a particular agent voting for a particular candidate. Thus U^{ij} is given by:

$$U^{ij} = V(i,j) + \varepsilon(i,j) \tag{1}$$

$$U^{ij} = |i - j| + \varepsilon(i,j) \tag{2}$$

Where, following McFadden (1974) ε has a Type-1 Extreme Value distribution with CDF:

$$P(\varepsilon(i,j) \leq \varepsilon) = e^{-e^{\varepsilon(i,j)}} \tag{3}$$

Thus, the likelihood of voter i casting their ballot for party j, rather than abstaining, is given by the Logit function:

$$P(i,j) = \gamma_j \cdot \frac{e^{-(i-j)}}{1 + e^{-(i-j)}}\, di \tag{4}$$

$$\tag{5}$$

A corollary of this is the average probability of a citizen choosing to vote for party j is equal to γ_j as required.

$$\overline{P(j)} = \int_{\mathcal{I}} \gamma_j \cdot \frac{e^{-(i-j)}}{1 + e^{-(i-j)}}\, di \tag{6}$$

$$= \gamma_j \cdot 1 = \gamma_j \tag{7}$$

Similarly, total turnout, Γ is given by:

$$\Gamma = \sum_j \int_{\mathcal{I}} \gamma_j \frac{e^{-i-j}}{1 + e^{-i-j}} = \sum_j \gamma_j \tag{8}$$

There are two main approaches to modelling the degree of electoral competition. Firstly, there are those following Laakso and Taagepera (1979) which focus on an appropriate summary statistic for the size distribution of parties. The second class of approaches emphasise the importance of power within a legislature rather than party size, and traces its origins to Mann and Shapley (1964) and Banzhaf (1968) and has recently been critiqued by Gelman, Katz and Tuerlinck (2002). This paper focuses on the former set of models and in particular on the 'Effective Number of Parties' popularised by Laakso and Taagepera (1979). They proposed two measures which correspond to (the reciprocal of) a Herfindahl-Hirschmann index, and an Entropy measure, as special cases of a general class of power-indices. Here we focus on the former as it is more commonly used.[2] Moreover, as noted by Laakso and Taagepera (1979) whilst neither index can be recovered from the other, the qualitative interpretation is normally similar.

Using this simple framework, it's possible to move from the decision facing an individual voter, to a measure of how intense the competition is for a given citizen's vote. A standard Herfindahl-Hirschmann concentration index can be expressed as follows:

$$H^* = \sum_j \gamma_j^2 \tag{9}$$

$$= \sum_j (\gamma_j \int_{\mathcal{I}} \frac{e^{-(i-j)}}{1+e^{-(i-j)}})^2 \tag{10}$$

Of course, if $\mathcal{I}$ were uniformly distributed then there will be no implications of considering individual voter's preferences for the computation of competition indices. However, there is no reason to suppose that the distribution of voters' preferences is indeed uniform. Figure 3 describes five different configurations of party and voter location that would have the same Herfindahl index. Comparison of the Figures 4(a) and 4(b) reveals the problem, there is more competition for individuals' votes in 4(b) because both parties are

[2]Extending the approach here to entropy-based measures will be the subject of future work.

on average nearer to voters, increasing the likelihood of voting. Figure 4(c) describes the case of a uniform preference distribution in which the relative locations of the parties is unimportant. Figures 4(d) and 4(e) are designed to emphasise that it is both the location of voters and parties that is important, not merely an issue of how close to the mean voter parties are. Finally, 4(f) describes the case of an additional party. Now, inference about the likely consequences is much more difficult although it is clear that if the party were located anywhere else it would increase competition by more.

Clearly, then, if variation in preference distributions is to be taken seriously then the relative coincidence of the locations of parties and voters needs to be taken into account. But, simultaneously, the requirements imposed by Laakso and Taagepera (1979) remain paramount. The approach taken here is to calculate a Herfindahl index for different parts of the population and in turn derive an overall measure. In particular, H^* is calculated for A disjoint subintervals of the ideological spectrum $\mathcal{I} = I_1 \cup I_2 \cdots \cup I_A$.

Competition for the votes of citizens with preferences in the interval a is therefore:

$$H_a = \sum_j (\gamma_j \int_{i \in I_a} \frac{e^{-(i-j)}}{1+e^{-(i-j)}})^2 \tag{11}$$

Recall that the Distribution Function of the logit is given by

$$F(i) = \int_{\underline{I}}^{i} \frac{e^{-(i-j)}}{1+e^{-(i-j)}} \tag{12}$$

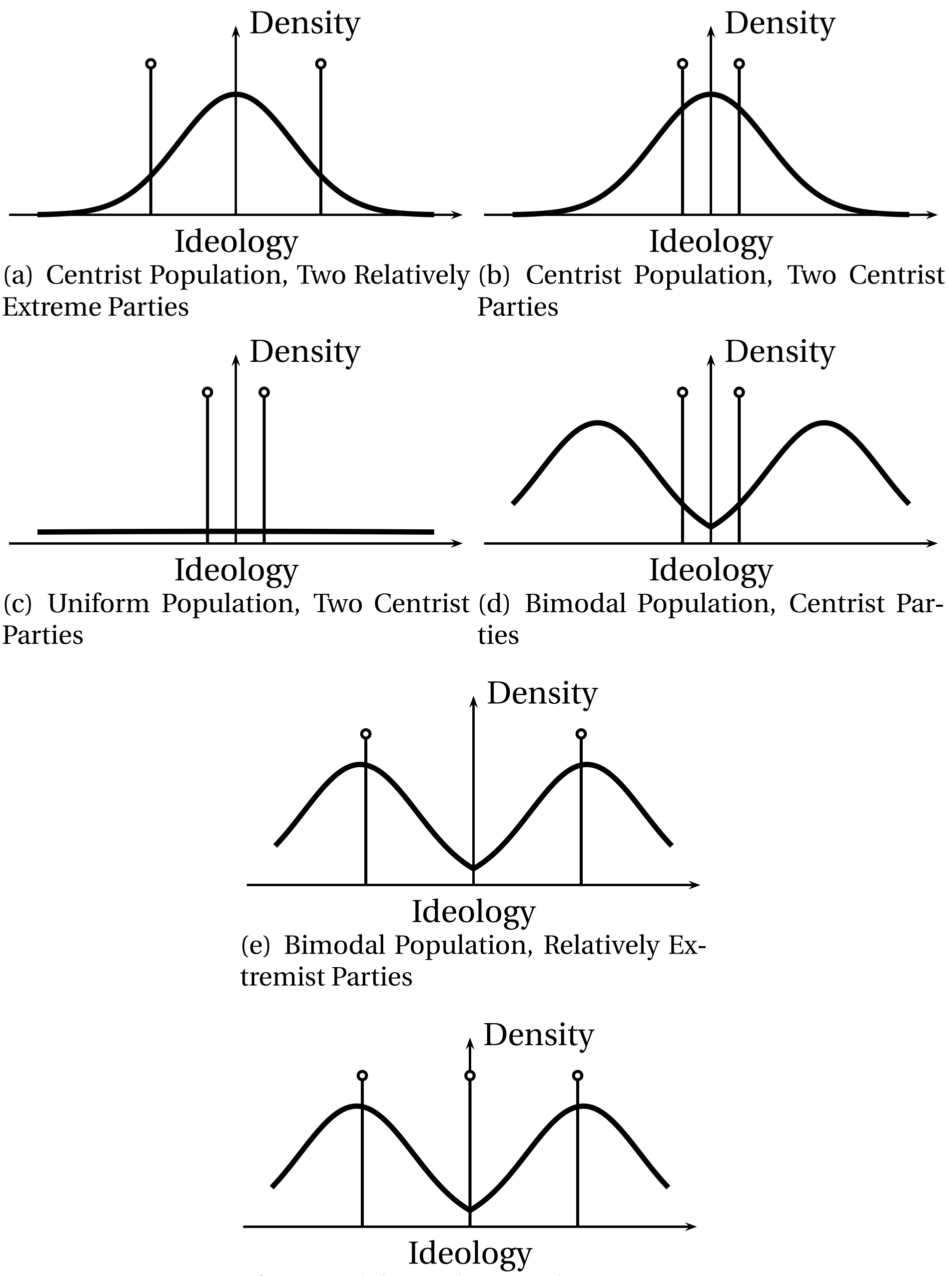
$$F(i) = \frac{1}{1+e^{-(i-j)}} \tag{13}$$

Hence, 11 can be rewritten as:

$$H_a = \sum_j (\gamma_j (F(a) - F(a-1)))^2 \tag{14}$$

It is now clear that if competition is not equal all along the ideological

Figure 3: Different combinations of party location and population preference distributions



(a) Centrist Population, Two Relatively Extreme Parties

(b) Centrist Population, Two Centrist Parties

(c) Uniform Population, Two Centrist Parties

(d) Bimodal Population, Centrist Parties

(e) Bimodal Population, Relatively Extremist Parties

(f) Bimodal Population, Three Parties

spectrum, then the degree of competition will be understated. This follows immediately from Jensen's inequality, which states that if f is a convex function defined on an interval F then for $x_1, x_2, \ldots, x_n \in F$:

$$f(\sum_{i=1}^{N} x_i) \leq \sum_{i=1}^{N} f(x_i) \tag{15}$$

Let $\phi(a) = \gamma_j(F(a) - F(a-1))$ then:

$$\sum_j f(\sum_a \phi(a)) \geq \sum_a \sum_j f(\phi(a)) \tag{16}$$

$$\sum_j f(\sum_a \phi(a)) \geq \sum_j \sum_a f(\phi(a)) \tag{17}$$

Since, here $f(x) = x^2$. This implies that:

$$\sum_j [\sum_a \phi(a)]^2 \geq \sum_j \sum_a \phi(a)^2 \tag{18}$$

$$\sum_j [\sum_a \gamma_j(F(a) - F(a-1))]^2 \geq \sum_j \gamma_j \sum_a (F(a) - F(a-1))^2 \tag{19}$$

A corollary of this is that the reported Effective Number of Parties, will be overly large. Note, that only in the case of perfectly equal competition at all parts of the ideological spectrum, i.e. if $x_1 = x_2 = \cdots = x_n$ and as described in in Figure 4(e) do Equations 15 and 17 hold with equality. This result suggests that the sum of the subinterval Herfindahl indices is a logical generalisation of the standard Herfindahl index.

$$H = \sum_a \sum_j [\gamma_j(F(a) - F(a-1))]^2 \tag{20}$$

H is the measure of political competition that will be employed. Whilst, there are other ways in which to aggregate competition across the subintervals, summation has the advantage here that if preferences are uniform then the new measure corresponds to the Herfindahl Index. Equivalently, H^{-1} will be the

Laakso and Taagepera (1979) Effective Number of Parties measure. Moreover, H^{-1} is also intuitively appealing, as it is simply the aggregate of the number of effective parties for each of the A subsets of voters. Thus, if a new party enters which is only likely to appeal to very extreme voters then the impact of this, depends on the number of extreme voters. That is, in a district with few or no extreme-right voters, the entry of a hard-right party is likely to have little impact on the effective choice faced by almost every voter, and thus little impact on competition, and is therefore measured as such by H.

3. Data

This section describes the data used to operationalise 20 and for the regression analyses. The data used are not new, information on district level electoral outcomes are taken from the CD accompanying Caramani (2004). Data on party manifestos are taken from the CD accompanying Budge et al. (1997) and Klingemann, Volkens, Bara, Budge and McDonald (2006). Data on individual preferences, income, and other demographic characteristics are taken from the Eurobarometer survey (Schmitt and Scholz (2005-12-06)). However, their combination is. One reason for this is that the combination of these datasets could not be easily automated due to different and changing district boundaries, and a lack of coincidence between between the different geographic systems used. This necessitated a manual approach. The details of how these data were combined are long-winded, reflecting the approach taken, and are described in the Web Appendix.[3] The resultant dataset is reasonably large and details results for 224 national elections in 15 European democracies, for the period 1945-'98.[4] Data available are for if not the Universe, the vast majority of candidates. There are a total of around $69,000$ candidates standing in 3000 electoral districts. That

[3]The scripts used are available upon request.

[4]The countries, with number of elections in parentheses, are; Austria(8), Belgium(17), Denmark(22), Finland(15), France(14), Germany(14), Ireland(15), Italy(14), Luxembourg(27), the Netherlands(16), Norway(14), Portugal(9), Spain(7), Sweden(17), and the UK(15).

is, what might seem a surprisingly large average of 23 candidates per district, per election.

Ideally, data would be available on the preferences of each voter in every district, at every election, along with detailed data on candidate and voter characteristics. The case is made in what follows, that despite significant limitations the data on preferences available are very different than those of such an ideal dataset, they still represent a meaningful improvement despite these imperfections.

The data on voter preferences are taken from the Eurobarometer data. A key limitation of these data, is that whilst they exhibit the necessary geographic coverage, in general it is not possible to disaggregate them at the district level. In particular, the highest feasible level of disaggregation gives a median of 23 districts per survey area.[5] Moreover, they are only available for the period 1979-‘95. This limitation has implications for both the implementation of the measure of electoral competitiveness developed in section 2. and for the interpretation of the results. However, to disregard the data entirely would be to ignore valuable information. One alternative, would be to try to infer the district level preference distributions by exploiting, for example, differential overlap in districts and the Eurobarometer survey regions. Our preferred option here is simpler. We assume that the quantiles of the Eurobarometer district distribution are consistent, and unbiased, estimators of the electoral district distribution. If I^*_α is the α^{th} quantile of the unobserved electoral-district level preference distribution, and I_α the α^{th} quantile of of the Eurobarometer-district level distribution, then this assumption can be made more explicit using a two-

[5] The Eurobarometer data use a geographic coding scheme, similar, but not equivalent to the NUTS2 scheme used by Eurostat.

way error component model:

$$I_\alpha = I^*_\alpha + \lambda_\alpha \tag{21}$$

$$\lambda_\alpha \sim \zeta_\alpha + \eta_\alpha \tag{22}$$

$$\lambda_\alpha \sim N(0, \sigma) + N(\mu, \phi) \tag{23}$$

Where ζ_α is sampling error and η is the error associated with variation across electoral districts within a given Eurobarometer district. Then we just require that the sampling error is not associated with the cross district variation, $cov(\zeta, \eta) = 0$, and that the average of the cross-district variations is 0, $E[\mu] = 0$. The latter is trivially true, but the former maybe more problematic. The extent to which this isn't true will lead to errors in the construction of 20. One potential consequence would could be for this to translate into extreme values of 20 and hence outlying observations. However, the empirical strategy discussed in Section 4. should allay many of these concerns, through the use of fixed-effects, and quantile regression.

A similar problem concerns the manifesto data. As data are not available on the individual politicians manifesto positions, it has to be assumed that there are not systematic variations in the electoral platform of individual politicians from that specified by their party's national manifesto. This assumption is made more reasonable by the necessity of coherent policy platforms across districts in most European systems, and a focus on the national level policy debates. This is not to deny the importance of local issues or individual candidates stated preferences, but again to assume that there is no consistent pattern in these, following a similar argument to that made about voters' preferences H is calculated given these two assumptions.

Let, $q(a)$ be the a^{th} quantile of the survey data, then 20 can be calculated as:

$$H = \sum_a \sum_j [\gamma_j(F(q(a)) - F(q(a-1)))]^2 \tag{24}$$

The other variables used may be categorised by whether they are available at the electoral district, the eurobarometer district, or national level. Summary statistics and a Correlation Matrix are reported in Table 1, and Table 2 respectively.

At the district level, other than the competition measure, the variables of interest available are the number of candidates, the vote share of each party, and the total turnout level. For those observations for which the Eurobarometer data are available then a rich set of additional regressors are available. These include data on income per capita, demographics, as well as political and social beliefs. Following, the results of the literature reviewed by Geys (2006) the importance of these measures is also investigated.

4. Empirical Analysis

The econometric approach taken is designed to address two key features of the available data. Firstly, that few variables are available at the Electoral district level leading to potential concerns about unobserved heterogeneity. Secondly, that the data have an inherently multilevel structure.

The first concern is addressed,as far as possible, using standard panel data techniques. We also use longitudinal quantile regression techniques as introduced by Koenker (2004) and extended by Harding and Lamarche (2009), Lamarche (2010), Galvao Jr. (2011) to consistently estimate the distribution of the effect on turnout of increased electoral competition. Quantile regression is an l_1 estimator in that it minimises the absolute deviations rather than their squares, one particular advantage of this type of approach is that it is less sensitive to outlying observations.

To address the second concern a multilevel approach is used to analyse the other determinants of district level turnout. Data on these other factors, such as education levels or income per capita, are also taken from the Eurobarometer survey and the Eurostat database and are mostly only available at the regional level. Hence, a multilevel approach in which this particular data structure can be explicitly handled allows consideration of a broader range of possible determinants of turnout.

4.1. Least-Squares Estimates

Our starting point is a standard error-component model:

$$Y_{it} = \alpha + \beta X_{it} + \epsilon_{it} \tag{25}$$

$$\epsilon it = \lambda_i + \mu_t + u_{it} \tag{26}$$

$$u_{it} \sim N(0, \sigma_u) \tag{27}$$

Table 3 summarises the results of estimating 25 for a variety of specifications. The absolute number of political parties is included alongside the competition measure, as it is important to ensure that the estimated effect reflects additional competition rather than simply the consequences of extra parties regardless of their size or location on the political spectrum. A second important issue is how best to model idiosyncratic factors affecting turnout at a given election. Figure 1 suggests that a single linear time-trend is unlikely to be adequate, and that allowing for different national trends may also not be sufficient. Indeed, it is reasonable to argue that trends may vary by region if not district and one issue is to find the right balance between a sufficiently rich time trend that will eliminate as much unobserved heterogeneity as possible and preserving degrees of freedom. Table 3 reports results for a variety of specifications and different time trends.

Columns 1 and 2 contain results of random-effects and fixed-effects estimates respectively. The estimated coefficients are similar, and both suggest that a one standard-deviation increase in political competition leads to just under 0.4 of a standard deviation increase in turnout, or around 5 percentage points. The results of a Hausman test suggest that despite the similarity in the coefficients that the fixed-effects specification should be preferred. The importance of allowing for variation across elections is highlighted by the smaller coefficients obtained using specifications reported in Columns 3 and 4. Yet, clearly there maybe significant idiosyncratic local features at every election. But, a balance has to be struck between avoiding over parametrisation of the model whilst maximising the explanatory power of the model. Columns 5 and 6 report results that represent an attempt to achieve this balance with the respective inclusion of either regional level stochastic time-trends or a combination of stochastic national time trends and linear regional trends. The estimated coefficients are now again just below 0.4. The most heavily parametrised specification with district level linear trends is reported in Column 7 and political competition has an estimated coefficient of around 0.34 suggesting a one standard deviation increase in competition leads to an increase of around 4 percentage points. This last specification is probably overly demanding of the available data, but the broad consistency in the estimated coefficients across all seven specifications is persuasive.

Table 4 contains results for individual countries. The results exclude Austria, Finland, and Sweden for which insufficient observations were available. The estimated coefficient of *scomp* is positive everywhere but Belgium although its magnitude varies markedly by country. It is however not significant at conventional levels for either Belgium or Portugal, and only barely so for Spain. One explanation for this is that this might be connected to sample size, as the subsample available for each country is below average. Overall, the results suggest that the large impact of competition, as measured, on Turnout is a consistent across countries despite the rich variety different electoral systems employed.

4.2. Quantile Regression Estimates

Whereas Least-Squares estimates focus on minimising the sum of squared deviations from the mean, Quantile regression estimators focus on minimising the sum of absolute deviations from an arbitrary percentile, commonly the median. The presentation of this approach will be necessarily brief here and readers are directed to Koenker and Hallock (2001) for an excellent introduction, whilst Koenker (2005) provides a more thorough treatment. Following Koenker and Hallock (2001), recall that Least Squares estimators are the solution to problems of the following form:

$$E(Y|X) = min_{\beta} \sum_{i}^{N} (y_i - \mu(x_i, \beta))^2$$

Where $\mu(x, \beta)$ is a some parametric function.[6] If $Q_{Y|X}(\tau)$, the conditional value of the τ^{th} percentile of Y given X is the quantile equivalent of E(Y—X) then the quantile estimators solve:

$$Q_{Y|X}(\tau) = min_{\beta} \sum_{i}^{N} (y_i - \varepsilon(x_i, \beta))$$

Where $\varepsilon(x_i, \beta)$ is similarly some parametric function. If $\varepsilon(x_i, \beta) = X'\beta_{\tau}$ and the quantile of interest is the median ($\tau = 0.5$) then:

$$Q_{Y|X}(\tau) = min_{\beta} \sum_{i}^{N} (y_i - x_i'\beta))$$

The quantile regression estimates focus on the same specification described in Equation 25. Rather than focus on the median or some other specific quantiles the entire distribution of effects is estimated simultaneously. Koenker (2004) defines the fixed effect quantile regression model as:

$$Q_{y_{ij}}(\tau|x_{ij}) = \alpha_i + x_{ij}'\beta(\tau) \quad j = 1, \ldots, m_i, \quad i = 1, \ldots, n \tag{28}$$

[6] OLS corresponds to $\mu(x_i, \beta) = x_i^{'}\beta$.

Crucially, α_i is assumed to not vary by quantile, much reducing the number of parameters to be estimated. This is especially important here as for some countries, we have data for relatively few elections and estimating quantile specific fixed effects would likely be too demanding of the data. Still following Koenker (2004), the model in Equation 28 implies solving:

$$min(\alpha, \beta) \sum_{k=1}^{q} \sum_{j=1}^{n} \sum_{i=1}^{m_i} w_k \rho_{\tau_k}(y_{ij} \alpha_i x'_{ij} \beta(\tau_k)) \tag{29}$$

Where, w_k describes the relative influence of each quantile on the estimates of α_i. The specification of the w_k's is a choice for the investigator but we follow Koenker (2004) in assigning weights of $w_k = (0.25, 0.5, 0.25)$ to the 3 quartiles.[7] $\rho_\tau(s) = u(\tau I(s < 0))$ is the loss function proposed by Koenker and Bassett (1978) and minimising $\rho_\tau(s)$ for any given quantile, τ, gives the τ^{th} quantile of the random variable s.

The resulting estimates of β from solving Equation 29 for the same specification as in Table 3 Column 4 (that with the lowest mean effect of competition) are reported in Figure 4. Three key features are immediately obvious. Firstly, that the estimated effect is uniformly lower than that found using least squares. Secondly, that the estimates are uniformly at the median and below. But, that the estimated effect is positive for every quantile of the distribution. This suggests that while competition raises turnout the effect is right-skewed. Results for other specifications are available upon request, but again the results are broadly consistent across specifications.

Taking together the quantile results, the country-specific results, and the different specifications considered in Table 2, suggests that there is convincing evidence for a relationship between turnout and the degree of political competition. The main qualification on the result, is that the effect seems far from uniform. Why this, will be an interesting avenue for future research.

[7] Below, the model is estimated for a broader range of quantiles but the tri-mean weighting is retained, this allows other quantiles no influence on the fixed effect estimates.

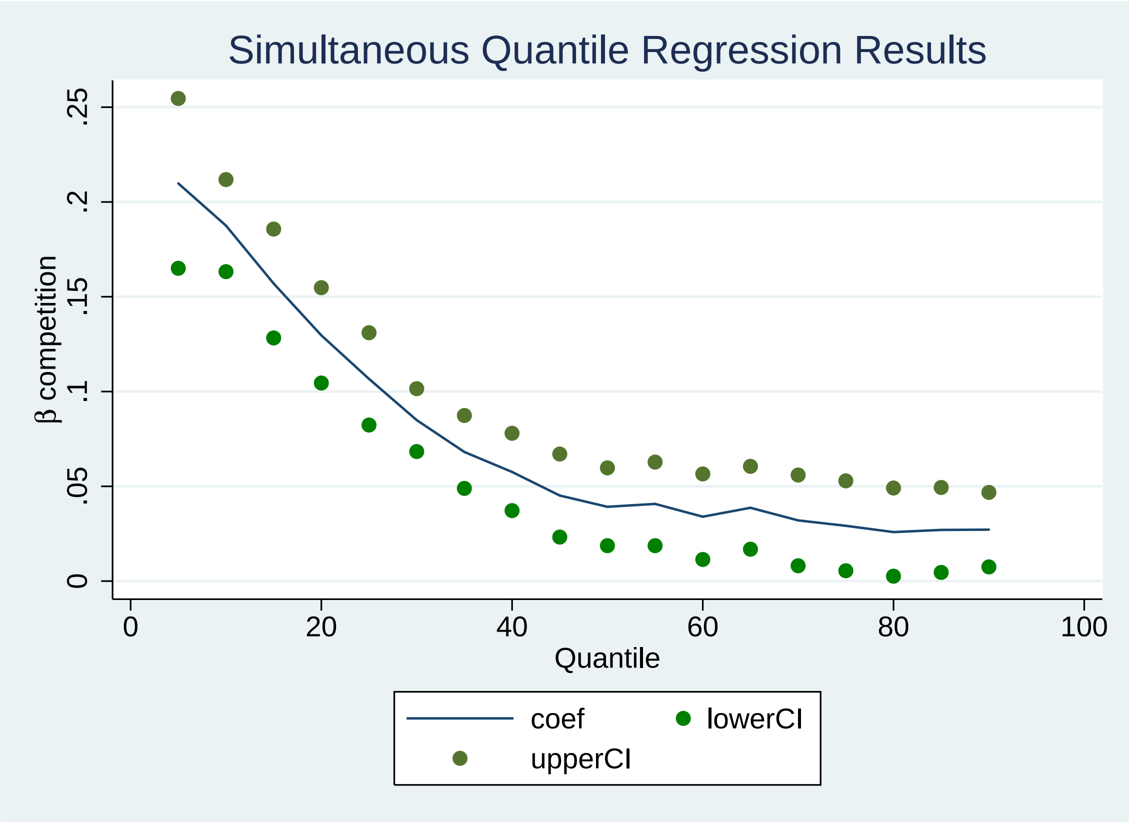


Figure 4: Simultaneous Quantile Regression Estimates of the Effect of Competition on Turnout

4.3. Multi-level Estimates

As discussed previously, one problem is that many variables of interest are not measured at the district level. The remedy employed here is to employ a simple two-step methodology that decomposes the vector of fixed effects into an explained component and remaining unit specific heterogeneity. This approach should not be confused with the increasingly popular FEVD estimator of Plumper and Troeger (2007). [8]. Instead, the approach is rather simpler. We observe data on a set of variables Z at a higher level of aggregation than we do

[8]Although the recovery of slowly time-varying variables would be useful in this context, this estimator requires a strong orthogonality assumption which is unlikely to be reasonable here. For further details see Beck (2011) and the associated symposium.

the dependent variable or the independent variables X. We thus estimate the following regression specification using OLS:

$$Y = \alpha_1 D_1 + \beta X + \rho_1 T_2 + \epsilon_1 \quad (30)$$

$$\hat{\alpha_1} = \alpha_2 D_2 + \gamma Z + \rho_2 T_2 + \epsilon_2 \quad (31)$$

Where D_1 is a vector of district fixed-effects, D_2 is a vector of country fixed effects, T_1 and T_2 are stochastic time trends, and $\epsilon_1 \sim N(0, \sigma_1)$ and $\epsilon_2 \sim N(0, \sigma_2)$, $Cov(\epsilon_1, \epsilon_2) = 0$, are error terms. The control variables used are demographic variables from the Eurobarometer survey, however we collapse these data such that the unit of observation is the regional mean. The results of this approach are reported in Table 5. The full set of controls are unavailable for all districts and so columns 1-8 report results for a variety of different specifications. However, the overall message is clear - the only variable that is significant in all specifications (or indeed in all but one specification) is income per capita. That the estimated coefficients are all negative implies that turnout is, ceteris paribus, lower in richer areas. This result is consistent with a story in which higher income voters face a greater opportunity cost of voting and as such choose not to. This, again is compatible with an expressive model (as well as classical Downsian approaches) as there is no particular reason to presume that the expressive utility derived from voting is correlated with income, and as such those facing higher costs should vote less.

5. Conclusion

This paper has developed a new measure of political competition that emphasises the importance of taking into account district level heterogeneity in the distribution of individual voters' preferences and politicians manifestos. By combining data from several different sources including the district level historical election data of Caramani (2004), and data from the Comparative Manifesto Project and Eurobarometer, this measure was calculated for a large number of European elections at the district level. The empirical analysis employed both conventional panel-data techniques as well as a Quantile and a Multilevel approach to provide consistent evidence that political competition has a statistically significant and quantitatively large impact on turnout levels.

Table 1: Summary Statistics

	(1)			
	mean	sd	min	max
turnout	0.743	0.113	0.082	0.997
scomp	0.213	1.113	-0.947	6.599
nparties	5.083	2.091	2.000	11.000
pev	186832.808	252107.790	22785.000	3700000.000
agemean	45.171	1.885	33.167	51.680
soclassmean	2.194	0.407	1.473	3.176
incomemean	7.341	0.959	3.068	9.378
childrenmean	0.583	0.185	0.000	1.297
educmean	4.185	0.694	2.544	7.450
feelclomean	351.863	58.980	159.429	600.000

Table 2: Correlation Matrix

	turnout	scomp	nparties	pev	$\overline{age}$	$\overline{soclass}$	$\overline{income}$	$\overline{children}$	$\overline{education}$	$\overline{feelclose}$
turnout	1									
scomp	0.0398	1								
nparties	0.248	-0.849	1							
pev	-0.106	-0.353	0.337	1						
agemean	0.338	0.162	0.00346	-0.183	1					
soclassmean	0.170	-0.645	0.714	0.417	-0.0999	1				
incomemean	0.254	0.192	-0.0772	-0.226	0.170	-0.0887	1			
childrenmean	-0.396	0.342	-0.483	-0.0952	-0.355	-0.357	-0.0305	1		
educmean	-0.0544	-0.428	0.434	0.288	-0.371	0.570	-0.0162	-0.106	1	
feelclomean	-0.0997	0.142	-0.160	-0.208	-0.153	-0.0860	0.236	0.162	0.0272	1

Table 3: Survey-based Measure Results

	The Dependent Variable is Turnout						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
scomp	0.389***	0.392***	0.192***	0.213***	0.352***	0.258***	0.378***
	(0.029)	(0.034)	(0.035)	(0.042)	(0.073)	(0.051)	(0.085)
nparties	0.209***	0.102***	0.284***	0.267***	0.237***	0.228***	0.282***
	(0.011)	(0.012)	(0.014)	(0.025)	(0.034)	(0.030)	(0.026)
Estimator	Random-Effects	Fixed-Effects	Fixed-Effects	Fixed-Effects	Fixed-Effects	Fixed-Effects	Fixed-Effects
Time Trend	None	None	Stochastic	Stochastic	Stochastic	Stochastic & linear	District Linear
				(Country-Specific)	(Region-Specific)	(National) (regional)	
N	4826	4826	4826	4826	4826	4826	4826

Clustered robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Results by Country

	The Dependent Variable is Turnout									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
scomp	-0.211	1.232***	1.584***	2.853***	0.120***	0.262***	0.272***	0.326	0.085*	0.297***
	(0.128)	(0.289)	(0.169)	(0.159)	(0.027)	(0.093)	(0.074)	(0.231)	(0.045)	(0.039)
nparties	0.406***	0.299***	0.431***	0.371***	0.233***	0.268**	0.062	0.433***	0.249***	1.923***
	(0.079)	(0.023)	(0.051)	(0.031)	(0.049)	(0.109)	(0.055)	(0.063)	(0.057)	(0.231)
Country	Belgium	Denmark	France	Germany	Ireland	Italy	Netherlands	Portugal	Spain	UK
N	167	136	671	1169	300	454	130	48	197	1468

Clustered errors in parentheses. Fixed effect estimates also included a stochastic time-trend

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Multilevel Estimates of the Socio-Economic Determinants of Turnout levels

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\overline{Age}$	0.000		-0.001	-0.002	0.003	-0.006	0.002	0.001
	(0.019)		(0.019)	(0.018)	(0.019)	(0.017)	(0.016)	(0.018)
$\overline{Income}$		-0.047***	-0.047***	-0.033*	-0.086**	-0.056*	-0.069***	-0.078**
		(0.010)	(0.010)	(0.016)	(0.030)	(0.029)	(0.012)	(0.028)
$\overline{Education}$				-0.052	-0.082	-0.059	-0.061	-0.161
				(0.036)	(0.109)	(0.073)	(0.035)	(0.099)
$\overline{SocialClass}$					0.124			0.148
					(0.173)			(0.126)
$\overline{Children}$						-0.087		0.078
						(0.169)		(0.171)
$\overline{ClosetoaParty}$							-0.101	-0.318**
							(0.159)	(0.110)
N	2617	2617	2617	2617	972	1534	1954	939
R^2	0.028	0.030	0.030	0.031	0.043	0.035	0.034	0.040

Clustered errors in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

References

Banzhaf, John F., "One Man, 3.312 Votes: A Mathematical Analysis of the Electoral College , 16 (1968), 30432.," *Villanova Law Review*, 1968, *16*, 304–32.

Beck, Nathaniel, "Of Fixed-Effects and Time-Invariant Variables," *Political Analysis*, 2011, *19*, 119–122.

Budge, Ian, Hans-Dieter Klingemann, Andrea Volkens, Judith Bara, and Eric Tanenbaum, *Mapping Policy Preferences. Estimates for Parties, Electors, and Governments 1945-1998,*, Oxford University Press., 1997.

Caramani, Daniele, *Elections in Western Europe since 1815: Electoral Results by Constituencies*, London-New York: Palgrave, 2004.

Dawes, Christopher T., Peter John Loewen, and James H. Fowler, "Social Preferences and Political Participation," *Journal of Politics*, 2012, *Forthcoming.*

Dhillon, Amrita and Susana Peralta, "Economic Theories Of Voter Turnout," *Economic Journal*, June 2002, *112* (480), F332–F352.

Edlin, Aaron, Andrew Gelman, and Kaplan Noah, "Voting as a Rational Choice: Why and How People Vote to Improve the Well-Being of Others," *Rationality and Society*, 2007, *19* (3), 293–314.

Ferejohn, John and Morris P. Fiorina, "The Paradox of Not Voting: A Decision Theoretic Analysis," *American Political Science Review*, 1974, *68*, 525–536.

Gelman, Andrew, Jonathan N. Katz, and Bafumi Joseph, "Standard Voting Power Indexes Do Not Work: An Emprical Analysis," *British Journal of Political Science*, 2004, *34*, 657–674.

_ , _ , and Francis Tuerlinck, "The Mathematics and Statistics of Voting Power," *Statistical Science*, 2002, *17* (4), 420–435.

Geys, Benny, "Explaining voter turnout: A review of aggregate-level research," *Electoral Studies*, 2006, *25*, 637–663.

Harding, Matthew and Carlos Lamarche, "A quantile regression approach for estimating panel data models using instrumental variables," *Economics Letters*, 2009, *104* (3), 133 – 135.

Jr., Antonio F. Galvao, "Quantile regression for dynamic panel data with fixed effects," *Journal of Econometrics*, 2011, *164* (1), 142 – 157. Annals Issue on Forecasting.

Klingemann, Hans-Dieter, Andrea Volkens, Judith Bara, Ian Budge, and Michael McDonald, *Mapping Policy Preferences II. Estimates for Parties, Electors, and Governments in Eastern Europe, the European Union and the OECD, 1990-2003*, Oxford University Press., 2006.

Koenker, Roger, "Quantile regression for longitudinal data," *Journal of Multivariate Analysis*, 2004, *91* (1), 74 – 89. Special Issue on Semiparametric and Nonparametric Mixed Models.

_ , *Quantile Regression* number 9780521608275. In 'Econometric Society Monographs.', Cambridge University Press, 2005.

_ **and Gilbert Bassett**, "Regression Quantiles," *Econometrica*, January 1978, *46* (1), 33–50.

_ **and Kevin F. Hallock**, "Quantile Regression," *Journal of Economic Perspectives*, Fall 2001, *15* (4), 143–156.

Laakso, M. and Rein Taagepera, "Effective Number of Parties: A Measure with Application to West Europe," *Comparative Political Studies*, 1979, *12*, 3–27.

Lamarche, Carlos, "Robust penalized quantile regression estimation for panel data," *Journal of Econometrics*, 2010, *157* (2), 396 – 408.

Lijphart, Arend, *Patterns of Democracy: Government Forms and Performance in Thirty-sex Countries*, paperback ed., New Haven, London: Yale University Press, 1999.

Mann, Irwin and Lloyd. S. Shapley, "The A Priori Voting Strength of the Electoral College," in Martin Shubik, ed., *Game Theory and Related Approaches to Social Behavior*, Wiley, New York, 1964, pp. 151–163.

McFadden, Daniel, "Conditional Logit Analysis of Qualitative Choice Behavior," in Paul Zarembka, ed., *Frontiers in Econometrics*, Academic Press, 1974, pp. 105–142.

Persson, T., G. Roland, and G. Tabellini, "Comparative politics and public finance," *Journal of Political Economy*, 2000, *108* (6), 1121–1161. 50.

Plumper, Thomas and Vera E. Troeger, "Efficient estimation of time-invariant and rarely changing variables in finite sample panel analyses with unit effects.," *Political Analysis*, 2007, *15*, 124–39.

Poole, Keith T. and Howard Rosenthal, *Ideology and Congress*, 1st ed., Edison, NJ: Transaction Publishers, 2006.

Schmitt, Hermann and Evi Scholz, "The Mannheim Eurobarometer Trend File, 1970-2002," 2005-12-06.

Schuessler, Alexander A, *A Logic of Expressive Choice*, Princeton University Press, 2000.