*Heightening Comparativists' Concern for Model Choice: Voting Behavior in Great Britain and the Netherlands**

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Theory: As the research methodology more closely approximates the causal process being analyzed, the inferences and predictions derived from that methodology will better represent actual behavior. Statistical models were specified on the basis of accepted theories of voting behavior and political cleavages in the Netherlands and Great Britain.
Hypotheses: We hypothesize that multinomial models provide a more accurate characterization of voting behavior in countries with more than two political parties competing for votes.
Method: Binomial logit, multinomial logit, and nested multinomial logit models of voting behavior are estimated on Dutch and British National Election Study data.
Results: Compared to binomial methods, we find that multinomial models of voting behavior produce results that are more congruent with accepted theories of Dutch and British politics.

There is a disunion between theoretical propositions and empirical analyses in the literature on Western European electoral behavior. The theoretical literature describes a complex voting decision over multiple choices. According to this literature, an individual's vote choice is influenced by social cleavages, ideological divisions, strong (sometimes institutionalized) party-group ties, non-dimensional issues, and pre-election coalition behavior among the parties. These factors suggest a multifaceted decision-making process in a multidimensional election space that incorporates strategic considerations and varies across demographic groups. In contrast, the empirical research characterizes voting as a less complex decision over a restricted set of choices. Many comparative empirical researchers artificially (and often arbitrarily) structure the electoral decision by grouping the parties

*An earlier version of this paper was presented at the 1994 annual meeting of the Midwest Political Science Association, Chicago, IL, April 1994. The authors are grateful to R. Michael Alvarez, Neal Beck, Charles Franklin, Simon Jackman, and Jonathan Nagler for helpful comments on this earlier version. As usual, any remaining errors are the fault of the authors alone. The Limdep sessions used to conduct this analysis are available through anonymous ftp at anarchy.tamu.edu in directory /pub/whitten.

American Journal of Political Science, Vol. 40, No. 1, February 1996, Pp. 231–260

along a single continuum, by assuming that the primary choice is between the government and the opposition, or by representing the vote choice as a set of pairwise party comparisons.

This disunion is not a consequence of divergent theoretical conceptions of voting behavior in Western Europe. Instead, it reflects a relative lack of concern for model choice. When generating empirical evidence to support their theoretical claims, comparative researchers often stress the inconvenience and complexity of less restrictive statistical models and downplay the methodological problems associated with simpler but more restrictive models. In turn, empirical studies of multiparty electoral behavior often use correlation coefficients, linear regression, and binomial logit/probit, even when statistical theory indicates that these techniques are inappropriate for modeling the underlying causal process.

In order to unify theory and empirical research in the comparative study of multiparty electoral behavior, it is necessary to heighten researchers' concern for model choice. The present paper contributes to this effort in several ways. First, we discuss the complexities of voting in multiparty elections and the reasons why multinomial nonlinear regression is the most appropriate statistical approach in this context. Second, we analyze voting behavior in the Netherlands and Great Britain using multinomial logit (MNL). We compare our MNL results with those generated from binomial logit (BNL) analyses of voting for the government party. This comparison demonstrates some substantive implications from modeling voting as a binomial rather than a multinomial choice. Finally, we use our MNL results to determine which factors were more influential in the movement of voters across parties. A serious shortcoming of past empirical research is that it is unable to concisely and adequately address the inter-party dynamics of electoral support.

Model Choice in a Multiparty Electoral Context

Ideally, a statistical model will approximate the underlying causal process as closely as possible. In specifying a statistical model that accurately represents a voter's decision calculus in multiparty elections, the data analyst must address several methodological and theoretical obstacles. First, the vote choice is bounded since the probability of voting for a party cannot be greater than one or less than zero. This suggests that the explanatory variables have nonlinear effects on voting behavior. For instance, we expect the impact of union membership to decline in magnitude as an individual's probability of voting for a particular party approaches one or zero.

Second, the voter is faced with multiple choices. When there are only two parties, the electoral space can be represented as a single dimension

since the probability of voting for one party is directly related to the probability of voting for the other party. In the dichotomous case, the vote choice can be analyzed using either BNL or binomial probit. When there are more than two parties, however, the electoral space is more complex and potentially multidimensional. The statistical model adopted by the data analyst should capture the multifaceted process of choosing among multiple parties at once. The more closely the model approximates the complexity of a multiparty vote choice, the more accurately the parameter estimates will represent the underlying causal relationships.

Third, as well as being bounded, the multiparty vote choice offers no generally accepted means of calibrating the parties along an electoral continuum. In other words, the relationship of the parties to each other is not generally acknowledged and likely varies across voters and elections. Statistical models that impose restrictions on the location of the parties in the electoral space may produce misleading parameter estimates. More specifically, ordinary least squares (OLS) models that align the parties along a single linear dimension, or binomial logit/probit models that group the parties into a dichotomous choice between the government and the opposition, unnecessarily restrict the orientation of the parties to each other.[1] If the coding of the dependent variable in these models is driven by the left-right economic continuum, then we suspect that such models will generate misleading estimates of electoral effects that are not consistent with this continuum (i.e., issues and factors that are non-ideological or non-dimensional in nature). For instance, we expect less restrictive models to more precisely estimate the impact of group-party ties, religious cleavages, and regional voting in the Netherlands and Great Britain.

Finally, the statistical model should allow the data analyst to make inferences about the electoral dynamics of a multiparty system. In other words, the empirical results should help us to assess what issues are more influential in determining the balance of electoral support between particular parties and among parties within the government and opposition. A less restrictive model, such as MNL, will incorporate the factors that influence voters' probabilities of choosing among the parties within each coalition and thereby reveal the complexities of the multiparty voting decision. In contrast, a BNL model that imposes a dichotomous electoral choice implicitly ignores intracoalitional dynamics in electoral support.[2] For instance,

[1]Another tactic used by empirical researchers is to remove voters from their statistical analyses. For instance, some studies of Dutch voting behavior ignore supporters of the small religious right and socialist splinter parties, while some studies of British voting behavior drop Liberal and Alliance voters (e.g., Dutter 1985; McAllister and Studlar 1992).

[2]In several recent British studies (McAllister and Studlar 1992; Heath et al. 1991), researchers have attempted to approximate the inter-party dynamics of multiparty voting by

British scholars interested in the movement of traditional Labour and Conservative voters to the Alliance are unable to extrapolate inter-party dynamics in electoral support from their binomial models and instead use cross-tabulations to infer differences in support across demographic and issue groups (e.g., Heath et al. 1991; Rose and McAllister 1990).

Given these methodological and theoretical obstacles, traditional econometric techniques, such as OLS and binomial logit/probit, are inappropriate for modeling a vote choice over more than two parties. Most of the empirical research, however, on voting behavior in the Netherlands and Great Britain has employed OLS or binomial logit/probit, generally ignoring the potential methodological shortcomings of these models (Dutter 1985; Van Der Eijk and Niemöller 1987; Kelley and McAllister 1985; Studlar, McAllister, and Ascui 1990; McAllister and Studlar 1992; Palmer 1995). For instance, scholars who use OLS methods to analyze voting behavior in Great Britain often assume that the Liberal party (Alliance) lies exactly halfway between the Conservative and Labour parties on the electoral continuum (McAllister and Mughan 1987; Mishler, Hoskin, and Fitzgerald 1989). While many scholars and voters agree that the Liberal party (Alliance) lies somewhere between the Conservative and Labour parties, its exact relationship to those parties varies with voters' perceptions and changes in the electoral context. The relationship of the parties to each other in the electoral space should be estimated by the statistical model, rather than assumed *a priori*.[3]

Given the state of statistical analysis in the studies of British and Dutch voting behvior, comparative research is needed that heightens concern for model choice and alters the perception that simpler, more restrictive econometric techniques, such as BNL, are adequate for generating empirical evidence. We believe there are two general approaches for accomplishing these goals. First, empirical research must demonstrate that less restrictive econometric techniques produce more reliable estimates of the hypothe-

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estimating a series of binomial comparisons between each party and the other parties. To our knowledge, however, no British scholar actually theorizes that voters conduct a sequence of three separate comparisons involving the Conservatives, Labour and Alliance, and then choose the party that compares most favorably to the others. It is generally believed that voters consider the relative merits of the parties simultaneously, which is how the vote choice is treated in the MNL model.

[3]Few observers of British politics would dispute that since World War II the Liberal party (Alliance) has been located, in terms of traditional left-right economic ideology, between the Labour and Conservative parties. This empirical regularity, however, does not imply that the Liberals (Alliance) are equidistant between the other two parties in terms of all issue domains and group loyalties. Rather than unnecessarily imposing this restrictive assumption on voting behavior, the MNL framework treats the proposition of equidistance as a testable hypothesis.

sized relationships. Crucial in this effort is convincing comparativists that the more reliable estimates are products of a more accurate representation of the underlying causal process rather than artifacts of the more sophisticated econometric techniques. Second, empirical research must demonstrate that the evidence generated by inappropriate statistical methods contradicts generally acknowledged theories in the comparative politics literature. In other words, comparative researchers must be convinced that there are theoretical consequences associated with poor model choice.

In this paper, we contend that a more appropriate way to statistically model multiparty voting is to use MNL or multinomial probit (MNP). Both MNL and MNP estimate $J - 1$ sets of M parameters, where $J > 2$ is the number of categories in the dependent variable and M is the number of independent variables. As in the BNL model, the coefficients for the baseline category are set to zero in order to standardize the parameter estimates. In turn, each parameter estimate is the predicted marginal impact of an independent variable on the log of the probability (log-odds) ratio of the jth category to the baseline category.[4] Given the computational difficulties of estimating MNP models, we recommend the use of MNL models. The procedures for estimating MNL models are already included in several of the statistical packages commonly used by social scientists.[5] A more rigorous discussion of the MNL model is presented in the Appendix.

Since MNL and MNP extend the binomial logit and probit models to cases involving more than two choices, we believe that they more accurately represent the underlying decision process of the voter in multiparty systems and are significant improvements over estimation with OLS or bi-

[4]More specifically, if an MNL coefficient is positive, then an increase in the independent variable results in an increase in the *relative* probability of the jth category to the baseline category. This is also true for the BNL model except that an increase in the relative probability implies an increase in the overall probability since there are only two categories. In the MNL model, however, this does not necessarily hold since the overall probability of the jth category may simply decrease by less than the overall probability of the baseline category. The marginal impact of an independent variable on the overall probability of the jth category is a function of the probabilities and parameter estimates for the non-baseline categories, as defined below:

$$\frac{\partial P_{ij}}{\partial x_i} = P_{ij}\left[\beta_j - \sum_{k \neq j} P_{ik}\beta_{ik}\right].$$

[5]The estimation of MNL models does not require significant retooling for political science researchers. We estimated the MNL models for this paper using canned routines in SAS and LIMDEP. From the perspective of interpretation, the MNL model is a relatively straightforward extension of the BNL model, particularly in terms of calculating predicted probabilities.

nomial logit/probit. To illustrate some of the advantages of using MNL, we run separate statistical analyses of voting behavior in the 1986 Dutch election and the 1987 British election using BNL and MNL. Comparisons of the parameter estimates produced by each procedure and the substantive inferences derived from those estimates demonstrate the superiority of MNL over BNL as a means of modeling multiparty vote choice.

The rest of the paper is organized as follows. In the next section, we summarize scholarly accounts of the 1986 Dutch election and the 1987 British election. In the third section, we present our BNL and MNL models of voting in each election. Particular attention is given to differences in the substantive interpretations drawn from the two statistical models. Finally, we conclude with some generalizations about different multiparty voting environments and the circumstances in which the substantive inadequacies of BNL will be most serious.

1986 Dutch and 1987 British Parliamentary Elections

The Dutch parliamentary elections of 1986 can be characterized as much more subdued than the 1987 British election. The British election has been widely described as an intense contest over fundamental economic issues in a divided society. In contrast, one observer described the period leading up to the Dutch parliamentary elections of 1986, as "a rather uneventful campaign" (Van Der Eijk, Irwin, and Niemöller 1986). One major difference from previous elections in the Netherlands was the governing parties' pre-election commitment to continue their coalition government if they retained their parliamentary majority.

Although the major parties tried to deemphasize controversial issues in the 1986 campaign (Van Der Eijk, Irwin, and Niemöller 1986), voting behavior was still dominated by the well-established social, economic, and ideological differences among segments of Dutch society. In addition to socioeconomic group-party ties, there are strong, politically relevant, religious cleavages in the Netherlands. Dutch voters are also influenced by retrospective evaluations of government policy outcomes and by issues and characteristics relating to both the class and religious dimensions (Middendorp and Kolhuis Tanke 1990). In sum, even a rather "normal" Dutch election such as 1986 provides a relatively complex multiparty voting environment.

Great Britain has long been acknowledged as one of the most class-based societies in the industrial democratic world. From 1945 to 1979 there was a general consensus in favor of redistributive policies that slightly loosened the strong class system of the country (for a detailed account of this period see Beer 1982; Franklin 1985). The Thatcher era, from 1979 to 1990,

was a period in which many of the post-war era class-leveling policies were reversed. This was a time in which class and economic-geographic divisions reemerged in British politics (Kavanagh 1990; Edgell and Duke 1991; Palmer 1995), so that, economically, there were clear winners and losers.

In the 1987 British parliamentary elections, voters in all 611 mainland constituencies were offered the choice of candidates from the three major political parties, the Conservatives, Labour, and the Alliance of the Liberals and Social Democrats. According to popular accounts of the 1987 campaign, the major parties debated the record of the Thatcher government, reinforced their socioeconomic linkages to groups in society, and competed for swing voters. One of the issues that was relevant to all three of these elements of the 1987 campaign was unemployment (Butler and Kavanagh 1988; Whitten 1994). In 1979, the official rate of unemployment in Britain was 4.9%. During the Thatcher era, unemployment peaked at 11.7% in 1985 and 1986 and then declined to 10.6% in 1987 (Balchin 1990). This fluctuation in the unemployment rate has been largely attributed to the Thatcher governments' movement away from the inflationary policy commitment to full or near full employment that had been characteristic of British governments, both Conservative and Labour, since 1945 (e.g., Hall 1986). The impact of unemployment in the 1980s was not distributed uniformly across British regions. Generally, the highest levels of unemployment were found in the northern regions while rates in the south were much lower.[6]

MNL Estimation of Voting in Multiparty Elections

In order to illustrate some of the advantages of using MNL rather than BNL, we use each procedure to estimate models of voting behavior in the 1986 Dutch and 1987 British parliamentary elections. In each case, the BNL model estimates voting for the government parties: the Christian Democrats and the Liberals in the Netherlands, and the Conservative Party in Great Britain. As stated earlier, the BNL models do not distinguish between the parties within the government or the opposition (e.g., Labour and the Alliance as opposition parties in Britain) in terms of their probabilities of electoral support. The explanatory variables included in our statistical models parallel those used in empirical research of voting behavior for each nation.

[6]Unemployment has historically been higher in the northern regions of Britain. This trend, however, was dampened by the redistributive and employment policies of the post-war pre-Thatcher era.

Results for the Netherlands 1986

In the 1986 parliamentary elections, nine different political parties received seats based on their share of the votes cast by the Dutch electorate. Of these parties, only four received more than 2% of the total votes cast. For our purposes, it was unwieldy to run MNL analyses with all Dutch parties as separate categories of the dependent variable. For this reason, we constructed a dependent variable containing six categories. Four of these categories correspond to votes for the four parties with the greatest vote totals: the Christian Democrats, Labor, the Liberals, and D66. The remaining two categories are groups of smaller parties on the left and right. The first group (labeled Small Left) is composed of the Communist Party, the Pacifist Socialist Party, and the Radical Party. The second group (labeled Orthodox Religious Right) is composed of the Reformed Political Party, the Reformed Political Union, and the Reformed Political Federation. These groupings are based on similar classifications in a scholarly account of the 1986 elections (Van Der Eijk, Irwin, and Niemöller 1986). The remaining votes cast for other parties represent less than 2% of the Dutch electorate in 1986. The respondents who reported voting for these parties were removed from our analysis.

Table 1 presents a BNL model of voting for the government, the Christian Democrats or the Liberals, in 1986. For the BNL model the four opposition parties are grouped together into a baseline category. Even though the BNL model accurately predicts voting for the government or opposition, it does not allow one to make inferences about the inter-party dynamics of electoral support. The parties that are lumped together in the two categories of the dependent variable differ from one another in terms of issue positions, ideologies, and religious stances.[7] This artificial grouping of the par-

[7]Dutch politics is characterized by two salient cleavages: a religious-secular division and a traditional left-right economic dimension. In order to account for these cleavages, we included attitudinal and self-placement variables as well as demographic characteristics. In addition to the self-explanatory demographic variables, we included the respondent's household income (coded 1 for the lowest category), education level (coded 1 for the lowest level), attitude toward abortion (coded from 1 for "forbid abortion" to 7 for "woman decides"), attitude toward the use of nuclear power (coded from 1 for "more nuclear plants" to 7 for "no nuclear plants"), and left-right self placement (coded 1 for far left). We also included a composite measure of the respondent's evaluation of government economic policy. *Government Economic Evaluation* is based on recoded responses to three questions (v29, v30, v31) asking respondents whether government policy had a negative, neutral, or positive effect on the economy, employment, and their personal finances. *Government Economic Evaluation* ranges from 1, for a respondent who evaluated government policy negatively in all three areas, to 7, for a respondent who evaluated government policy positively in all three areas. Table A1 presents some descriptive statistics for the independent variables in Tables 1 and 2.

Table 1. Logit Model of Government Vote, 1986

	Parameter Estimate	Standard Error
Constant	−5.18***	0.75
Working Class	−0.45**	0.23
Upper Working Class	−0.14	0.28
Upper/Upper-Middle Class	0.07	0.26
Left-Right Self Placement	0.572***	0.051
Government Economic Evaluation	0.508***	0.067
Abortion	0.068*	0.049
Nuclear Power	−0.153***	0.046
Income Redistribution	−0.152***	0.049
Union Member	−0.31*	0.22
Unemployed	0.45*	0.30
Household Income	0.102***	0.033
Education	−0.040	0.041
Age	0.0006	0.0054
Married	0.02	0.19
Catholic*Church Attendance	0.465***	0.073
Protestant*Church Attendance	0.011	0.073
LR test statistic [16]	785.2	
Correctly predicted (%)	83.8	
Reduction in error (%)	67.6	
N	1230	

Note: The dependent variable is coded 1 if the respondent voted for either the Christian Democrats or the Liberals in the Netherlands. The LR test statistic is chi-squared with a 1% critical value of 32.0. The naive model that everyone votes opposition correctly predicts 50.1% of the cases.

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$ (one-tailed t-tests)

ties confounds the estimates of causal relationships between voting behavior and the explanatory variables. For instance, based on the BNL results alone, one might conclude that abortion attitudes were inconsequential in the 1986 Dutch election. From the multinomial results presented in Table 2, however, it is clear that people's positions on abortion were powerful predictors of their vote.

Table 2 presents an MNL model of voting in the Netherlands. The first five columns represent a complete set of MNL parameter estimates. As discussed earlier, each parameter estimate is the predicted marginal effect of an explanatory variable on the log-odds ratio between one of the five parties and Labor—the baseline category. The predicted probabilities of voting for the six parties can be derived from the parameter estimates in

Table 2. Multinomial Logit Model of Dutch Vote, 1986

	ln[CDA/PvDA]	ln[VVD/PvDA]	ln[D66/PvDA]	ln[SLeft/PvDA]	ln[ORR/PvDA]	ln[CDA/VVD]
Constant	−6.45***	−10.87***	−6.40***	−0.37	−10.57***	4.41***
Working Class	−0.42*	−1.36***	−0.06	−0.36	−0.16	0.94**
Upper Working Class	−0.41	−0.39	−0.37	0.35	−0.38	−0.02
Upper/Upper-Middle Class	0.06	0.51*	0.40	−0.27	0.46	−0.45**
Left-Right Self Placement	0.874***	1.088***	0.320***	−0.479***	1.554***	−0.214***
Government Economic Evaluation	0.678***	0.976***	0.483***	0.071	0.563***	−0.298***
Abortion	−0.046	0.158**	0.292***	0.102	−0.760***	−0.204***
Nuclear Power	−0.234***	−0.266***	−0.195***	−0.037	−0.361***	0.032
Income Redistribution	−0.169***	−0.328***	−0.169***	−0.111	−0.077	0.159***
Union Member	−0.17	−0.38	0.17	0.16	0.59	0.21
Unemployed	0.05	0.60	−0.08	−0.22	−2.75**	−0.54
Household Income	0.118***	0.143***	0.088**	0.001	0.079	−0.025
Education	−0.049	0.155***	0.178***	0.198***	0.168*	−0.204***
Age	−0.0015	−0.0039	0.0010	−0.0244**	−0.0141	0.0024
Married	−0.05	0.31	0.36	−0.89***	−0.68	−0.37*
Catholic*Church Attendance	0.564***	−0.034	0.045	−0.231	−1.341*	0.598***
Protestant*Church Attendance	0.476***	−0.177	0.063	0.103	0.522***	0.653***
LR test statistic [80]				1594.3		
Correctly predicted (%)				68.2		
Reduction in error (%)				50.5		
N				1230		

Note: The dependent variable is party vote with six categories. The PvDA coefficients have been set to zero, so the first five columns represent a complete set of MNL coefficients. Coefficients for additional pairwise party comparisons, such as those in column six, are simple linear transformations of these coefficients (see note 9). The LR test statistic is chi-squared with a 1% critical value of 112.3. The naive model that everyone votes Labor (PvDA) correctly predicts 35.8% of the cases.

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$ (one-tailed t-tests)

these five columns (see Appendix).[8] One can assess the impact of a variable on party voting by comparing its parameter estimates across columns. A variable's effect on party voting is statistically significant if *any* of its parameter estimates are statistically significant.

Since the parameter estimates are defined with respect to a baseline category, it is possible to calculate five additional sets of parameter estimates for the Dutch case by changing the baseline category. These additional sets, however, are largely redundant since they are linear transformations of the parameter estimates in the first five columns in Table 2. For instance, the sixth column of parameter estimates can be calculated by subtracting the parameter estimates in column two from those in column one. Despite this fact, presenting the parameter estimates for a selected number of additional log-odds ratios can highlight the dynamic nature of the explanatory variables' effects.[9]

From a cursory inspection of the parameter estimates in Table 2, it is relatively obvious that the electoral effects of the explanatory variables differ among the parties both within the government and the opposition. By differentiating between Christian Democratic and Liberal votes, as well as among votes for Labor, D66, Small Left, and Orthodox Religious Right parties, the MNL model allows us to make inferences about the specific sources of support for each party as well as what variables are critical in the choice between any two parties competing against each other in 1986. For instance, compare the parameter estimates for *Left-Right Self Placement* in the BNL and MNL models (see Tables 1 and 2). Both models demonstrate that ideology has a strong impact on voting behavior in the Netherlands, but only the MNL model reveals the intricate nature of that relationship. From the standpoint of predicting government voting, the BNL model provides a relatively good estimate of the effect of *Left-Right Self Placement* on the likelihood of a baseline respondent voting for the govern-

[8]Despite its relative sophistication, the MNL model is actually more parsimonious than a series of binomial party comparisons. First, the MNL model estimates fewer ($J - 1$ rather than J) sets of parameters. Second, the MNL model generates consistent predicted probabilities. In contrast, BNL coefficients from a series of party comparisons usually produce inconsistent predicted probabilities since the predictions vary with the subset of coefficients used to calculate them.

[9]More generally, the parameter estimates for $\ln[P_{ij}/P_{ik}]$ can be calculated by subtracting the parameter estimates for $\ln[P_{ik}/P_{im}]$ from those for $\ln[P_{ij}/P_{im}]$. While there are $J*(J - 1)$ possible vectors of parameter estimates, only half of those vectors are unique since the β_j from $\ln[P_{ij}/P_{ik}]$ equals $-\beta_k$, where β_k is from $\ln[P_{ik}/P_{ij}]$. The calculation of the corresponding standard errors is not a straightforward transformation since it involves changing the probability weights of the independent variables in the Hessian matrix (Greene 1993, 667). For this reason, it may be necessary to estimate parameters for additional log-odds ratios in order to assure that a variable does not have a statistically significant effect.

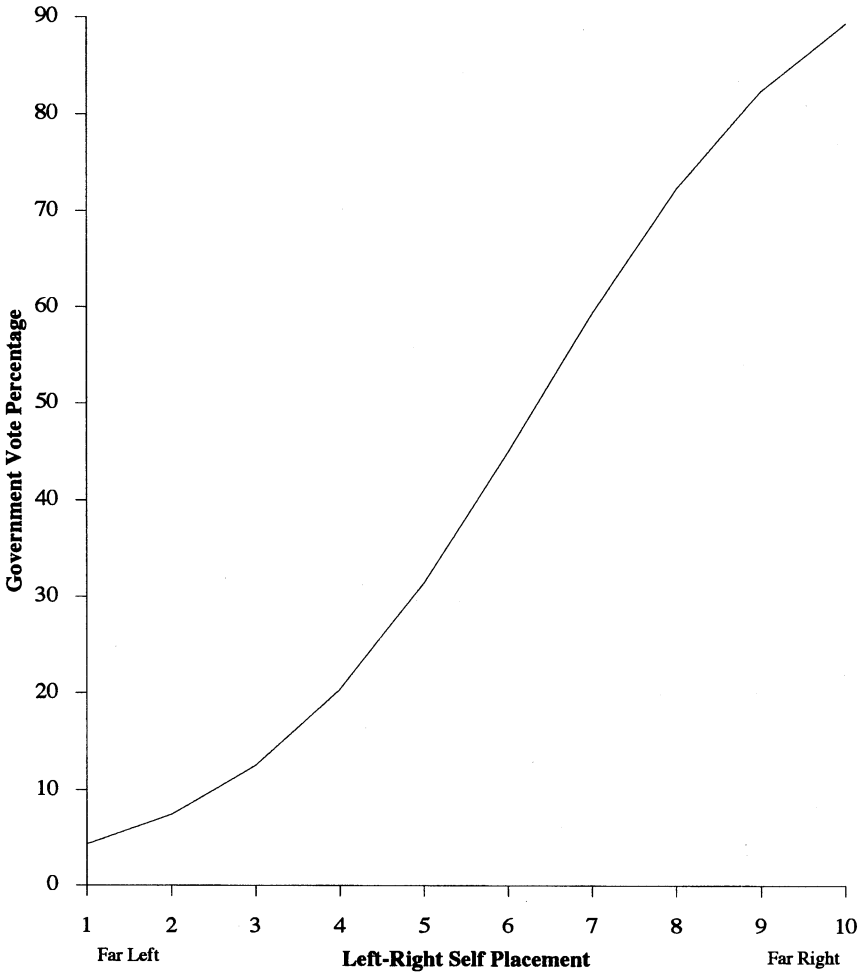
ment, as illustrated by Figure 1.[10] The BNL model, however, does not show that ideology had a greater impact on the choice between some of the government and opposition parties (e.g., Labor vs. Christian Democrats) than on the choice between others (e.g., D66 vs. Christian Democrats). In addition, the BNL model does not indicate that ideology also affects the choice between parties within each grouping (e.g., Liberals vs. Christian Democrats, or D66 vs. Labor).

We can also use the MNL parameter estimates for *Left-Right Self Placement* to make inferences about party support across the left-right spectrum. Figure 2 graphs party vote percentages for a baseline individual contingent on *Left-Right Self Placement.* In Figure 2 the likelihood of our baseline respondent voting for any particular party is represented by the vertical distance between the lines that bound that party's region of the graph contingent on the individual's position for *Left-Right Self Placement.* As a party's vote percentage increases, its region in the graph will expand (i.e., the vertical distance between its boundary lines will increase). On the basis of Figure 2, a hypothetical individual whose ideological position moves from the far left to the moderate left will be more likely to vote for D66 and less likely to vote for one of the Small Left parties. If this individual moves further toward the center, then his or her likelihood of voting for the Christian Democrats will increase at the expense of Labor. Movement from the center to the moderate right will continue to increase his or her likelihood of voting for the Christian Democrats and the Liberals, while decreasing the individual's likelihood of supporting Labor and D66. Finally, if he or she moves from the moderate right to the far right, the individual's probability of voting for one of the Orthodox Religious Right parties will increase at the expense of the Christian Democrats. From Figure 2, it is evident that MNL models allow researchers to make inferences about the inter-party dynamics of each independent variable.

The MNL parameter estimates also clarify the relationship between attitudes on abortion and voting behavior. According to the BNL model in Table 1, there was no statistically significant relationship between *Abortion* and government voting in 1986. The MNL parameter estimates in Table 2, however, indicate that *Abortion* did have a significant impact on vote

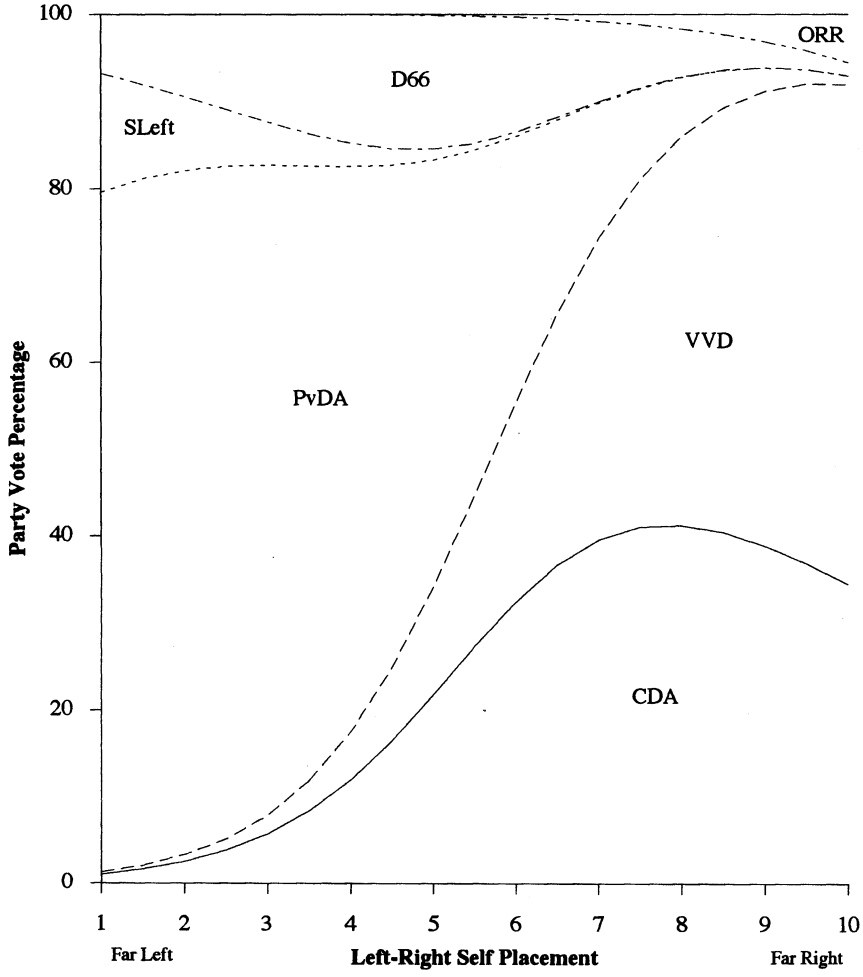
[10]Both BNL and MNL models estimate non-linear relationships between independent variables and categories of the dependent variable. Therefore, in order to illustrate the predicted marginal effect of a variable on party voting, we refer to a baseline Dutch respondent. This respondent is defined as follows: married, 45 years old, and has sample mean values for *Education* (4.7), *Household Income* (5.9), *Left-Right Self Placement* (5.5), *Government Economic Evaluation* (4.3), *Abortion* (4.8), *Nuclear Power* (4.5), and *Income Redistribution* (4.3). In Figures 1 and 2, the estimated effect of ideology on voting is illustrated with respect to this baseline Dutch respondent.

Figure 1. BNL Estimated Effect of Ideological Self Placement on Government Vote (Netherlands, 1986)



choice. Using these estimates, we find that pro-choice attitudes actually decreased the likelihood of voting for the government parties. Not surprisingly, the electoral support for the religious parties (Christian Democrats and Orthodox Religious Right) is stronger among respondents who oppose abortion, while electoral support for the Liberals and D66 is stronger among those who favor a woman's right to choose. Thus, the abortion issue con-

Figure 2. MNL Estimated Effect of Ideological Self Placement on Party Vote (Netherlands, 1986)



tributed to the balance of electoral strength within the opposition and the government.

The MNL model also identifies some interesting relationships between party voting and economic evaluations of the government, education, and religion. With respect to economic evaluations of the government, there are some important differences between the BNL and MNL parameter estimates in Tables 1 and 2. While both models indicate that positive assess-

ments increase the likelihood of voting for one of the government parties, the MNL model reveals that the Liberals receive more of these electoral benefits than the Christian Democrats. This finding suggests that the Liberals, as a proponent of liberal economic policies, are perceived as being more responsible for the performance of the government's economic policies. The MNL model also reveals that, among the opposition parties, Labor benefits the most from negative economic evaluations of the government. This finding is consistent with the perception that Labor, as the largest opposition party and a strong proponent of redistributive policies, is the most viable alternative to the present government.

With respect to the relationship between party voting and education, the MNL model reveals that the probability of voting for the Liberals, D66, the Small Left, or the Orthodox Religious Right parties increases with the respondent's education level, *ceteris paribus.* In contrast, the likelihood of voting for one of the larger and more mainstream parties (Christian Democrats and Labor) decreases with the respondent's education level. For the small opposition parties, this finding is consistent with the claim that these parties receive electoral support from the more educated individuals who share their extreme issue positions. For D66, this finding suggests that more educated individuals are attracted by its history as a protest party and its more recent record of policy independence and ideological centrality. For the government coalition, this finding suggests that more educated voters are attracted by the Liberals' more secular stances on religious and social issues while less educated voters are attracted by the Christian Democrats' moral conservatism.

Turning again to a comparison of the parameter estimates in Tables 1 and 2, the MNL model reveals that the relationship between Protestant religious faith and government voting is poorly estimated by the BNL model. The MNL model indicates that the strength of a Protestant's faith (i.e., frequency of church attendance) has divergent effects on voting for the Christian Democrats and the Liberals. Increases in *Protestant*Church Attendance* benefit the Christian Democrats at the expense of the Liberals, as well as at the expense of Labor, D66, and the Small Left parties. In contrast, the BNL model implies that there is no significant relationship, since it does not differentiate between a vote for the Christian Democrats and the Liberals. These conflicting estimates reflect the fact that the religious dimension does not parallel the dominant left-right economic dimension in the Netherlands. The government coalition between the Christian Democrats and the Liberals is based on shared economic interests, not on shared moral conservatism. As in the specific case of abortion attitudes, the Christian Democrats and the Liberals differ in their positions on religious and moral issues. Consequently, only the MNL model can account

for the intracoalitional dynamics of the relationship between Protestant religious faith and party voting.[11]

Finally, a clear advantage of MNL over BNL is the ability to derive predicted choice probabilities and draw inferences about the voter's preference ordering over the parties. Table 3 compares voters' actual vote to their predicted first, second and third party preferences. The comparison of actual vote to predicted first choice provides a more detailed illustration of the MNL model's explanatory power. Not surprisingly, the model is better at explaining votes for the Labor, Christian Democratic and Liberal parties than for the smaller parties. Table 3 provides us with a characterization of Dutch voters' party preference orderings. On the basis of this, we can infer that orthodox religious right voters are actually closer to the government than the opposition in terms of party preference. We also find that the D66 is a prominent third choice of Labor, Christian Democratic and Liberal voters. This is consistent with the claim that the D66 attracts voters who are disenchanted with the major parties.

Results for Great Britain 1987

Table 4 presents a BNL model of voting for the Conservative Party.[12] The results in Table 4 are generally consistent with those of past research. In terms of demographic characteristics, the Conservative Party received the strongest support from older and wealthier respondents, whites, home owners, those with more years of formal education, and members of the Church of England.[13] In contrast, union members, staff association members, residents of Wales, respondents whose fathers were manual workers, and the unemployed were more likely to vote for one of the opposition parties.

In order to measure the impact of respondents' political opinions, we constructed three indices based on responses to sets of related questions. All three of these variables performed strongly, in terms of both statistical and substantive significance, and were positively related to support for Conservative Party candidates. The most powerful of these variables, *Government*

[11]Consistent with this claim, the MNL model also reveals the divergent effects of Catholicism and Protestantism on the probability of voting for one of the Orthodox Religious Right parties.

[12]The Labour Party and the Alliance are the opposition. A total of 45 respondents who reported voting for the Scottish National Party (29), Plaid Cmyru (10), and the Green Party (6) were removed from our analysis because they represented such a small portion of the sample and their party choices were not available to all British voters.

[13]All of the demographic variables are dummy variables, except *Age* and *Household Income* which is coded 1 for the lowest income category. The demographic dummy variables are self-explanatory, except education level which is coded with respect to the year that the respondent left formal schooling. Table A2 presents some descriptive statistics for the independent variables in Tables 4 and 5.

Table 3. Predicted Preference Ordering of Dutch Voters, 1986

	Actual Vote					
	Labor	CDA	Liberal	D66	SLeft	ORR
Predicted First Choice						
Labor	**87.7**	12.4	3.8	**44.8**	**91.8**	2.5
Christian Democrats (CDA)	10.7	**72.5**	31.3	23.0	4.1	**47.5**
Liberal	0.5	11.9	**63.5**	20.7	0	10.0
D66	0.7	1.0	0	11.5	2.0	0
Small Left	0.5	0	0.5	0	2.0	0
Orthodox Religious Right (ORR)	0	2.2	0.9	0	0	40.0
Predicted Second Choice						
Labor	9.5	18.9	4.3	16.1	8.2	10.0
Christian Democrats (CDA)	22.5	24.1	**60.2**	31.0	6.1	**52.5**
Liberal	1.6	**43.7**	27.0	13.8	2.0	5.0
D66	23.6	3.5	6.2	**33.3**	12.2	0
Small Left	**42.3**	0.5	0	5.7	**71.4**	0
Orthodox Religious Right (ORR)	0.5	9.4	2.4	0	0	32.5
Predicted Third Choice						
Labor	1.4	16.4	10.9	18.4	0	7.5
Christian Democrats (CDA)	13.0	2.0	6.6	18.4	10.2	0
Liberal	6.6	19.9	4.7	14.9	2.0	**70.0**
D66	**63.4**	**47.4**	**67.3**	**39.1**	**79.6**	2.5
Small Left	14.8	2.0	0	9.2	8.2	0
Orthodox Religious Right (ORR)	0.9	12.4	10.4	0	0	20.0
N	440	403	211	87	49	40

Note: Table entries are percentages of party voters with particular predicted party preferences. Predicted probabilities were derived from the first five columns of MNL parameter estimates in Table 2.

Evaluation, combines responses to questions about how well the Conservative Party handled seven different policy areas between 1983 and 1987.[14]

[14]*Government Evaluation* is based on recoded responses to seven questions (v113a through v113g) asking respondents to evaluate the Conservative government's handling of prices, unemployment, taxes, health and social services, crime, education, and defense. This index was standardized so that its values range from −1, for a respondent who evaluates the Conservative government negatively on every policy area, to +1, for a respondent who evaluates the Conservative government positively on every policy area.

Table 4. Logit Model of Conservative Vote, 1987

	Parameter Estimate	Standard Error
Constant	−2.56***	0.72
Authoritarian Values	0.88***	0.23
Social Welfare Issues	2.38***	0.21
Government Evaluation	4.19***	0.21
Manual Worker	0.92*	0.65
Father Manual Worker	−0.26**	0.12
Union Member	−0.55***	0.16
Former Union Member	−0.03	0.14
Staff Association Member	−0.62**	0.33
Former Staff Association	0.23	0.33
Public Sector Employee	−0.12	0.14
Unemployed	−1.06**	0.61
Unemployed*Manual	1.05*	0.73
Regional Unemployment	0.041	0.045
Regional Unemployed*Manual	−0.107**	0.058
Owner Occupier	0.48***	0.15
Household Income	0.081***	0.026
Education 15 yrs	0.67***	0.19
Education 16 yrs	0.24	0.21
Education >16 yrs	0.56***	0.22
Age	0.0109**	0.0048
White	0.76**	0.40
Married	−0.14	0.14
Church of England	0.25**	0.13
Roman Catholic	0.02	0.21
North of England	0.31	0.27
Scotland	−0.42*	0.27
Wales	−0.72***	0.31
LR test statistic [27]	1917.8	
Correctly predicted (%)	85.1	
Reduction in error (%)	73.5	
N	2818	

Note: The dependent variable is coded 1 if the respondent voted for the Conservative Party in Great Britain. The LR test statistic is chi-squared with a 1% critical value of 47.0. The naive model that everyone votes Conservative correctly predicts 43.9% of the cases.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$ (one-tailed t-tests).

Positive evaluations of the Conservative government's handling of these policy areas increased the probability that respondents would vote Conservative. We also constructed indices that tapped respondents' attitudes towards redistributive policies, *Social Welfare Issues,* and law and order, *Authoritarian Values.*[15] Respondents who reported issue opinions more in line with those traditionally associated with the Conservative Party were more likely to vote Conservative.

Table 5 presents an MNL model of voting in Great Britain. The dependent variable has three categories: Labour, Alliance, and Conservative. A cursory comparison of the parameter estimates in Tables 4 and 5 reveals that the MNL model provides a more detailed understanding of voting behavior in Great Britain. By differentiating between votes for Labour and the Alliance, the MNL model allows one to draw inferences about the sources of opposition support.

The results in Table 5 demonstrate that a change in the likelihood of Conservative voting does not necessarily affect Labour and the Alliance equally. The three indices that we constructed, *Government Evaluation, Authoritarian Values,* and *Social Welfare Issues,* are all powerful predictors of Conservative support. What becomes apparent from Table 5, that was not discernible in Table 4, is that the impact of each of these variables is strongest between the Conservatives and Labour, followed by the Conservatives and the Alliance, followed by the Alliance and Labour. This indicates that, for both retrospective evaluations and policy positions, the majority of movement is between the Conservatives and Labour.

In the BNL model presented in Table 4 we found strong relationships between Conservative voting and variables associated with socioeconomic status. We cannot infer from those results, however, whether or not such variables have greater impacts on voting for the Labour Party or the Alliance. The MNL model clarifies this relationship. As a respondent's socioeconomic status becomes more working class oriented, his or her likelihood of voting for Labour increases. This increase in Labour's vote percentage is at the expense of the Conservatives and not the Alliance. Although there

[15] *Social Welfare Issues* is based on recoded responses to questions v121a, v121c, v121d, v121e, v121f, v121h, and v121i. *Authoritarian Values* is based on recoded responses to questions v121k, v121l, v121n, v121o, v121p, and v121q. Both indices were standardized so that their values range from −1, for a respondent taking the most extreme non-Conservative position in their answer to each question, to +1, for a respondent taking the most extreme Conservative position in their answer to each question. In the construction of *Social Welfare Issues, Authoritarian Values,* and *Government Evaluation,* respondents who refused to answer or replied that they did not know, were coded as taking a neutral position on that particular question. Replicating our analysis with such individuals omitted reduces our sample size slightly but has no substantial impact on parameter estimates.

Table 5. Multinomial Logit Model of British Vote, 1987

	ln[CON/LAB]	ln[ALL/LAB]	ln[CON/ALL]
Constant	−0.78	0.88	−1.66**
Authoritarian Values	1.30***	0.59***	0.71***
Social Welfare Issues	3.25***	1.26***	1.99***
Government Evaluation	5.41***	1.74***	3.67***
Manual Worker	−0.06	−0.68	0.61
Father Manual Worker	−0.62***	−0.48***	−0.13
Union Member	−0.66***	−0.17	−0.49***
Former Union Member	−0.06	−0.05	−0.01
Staff Association Member	−0.20	0.51*	−0.71**
Former Staff Association	0.49	0.32	0.17
Public Sector Employee	−0.29**	−0.26**	−0.04
Unemployed	−0.89*	0.19	−1.08**
Unemployed*Manual	0.85	−0.42	1.27**
Regional Unemployment	−0.154***	−0.254***	0.100**
Regional Unemployed*Manual	−0.055	0.006	−0.061
Owner Occupier	0.85***	0.60***	0.24*
Household Income	0.111***	0.041*	0.070***
Education 15 yrs	0.74***	0.07	0.67***
Education 16 yrs	0.29	0.04	0.25
Education >16 yrs	1.02***	0.60***	0.42**
Age	0.0177***	0.0094**	0.0083**
White	2.00***	2.13***	−0.13
Married	−0.03	0.14	−0.17
Church of England	0.11	−0.21*	0.32***
Roman Catholic	−0.33*	−0.57***	0.25
North of England	0.50*	0.26	0.25
Scotland	−0.01	0.61***	−0.62**
Wales	−0.90***	−0.27	−0.63**
LR test statistic [54]		2440.3	
Correctly predicted (%)		72.9	
Reduction in error (%)		51.6	
N		2818	

Note: The dependent variable is party vote with three categories. The LR test statistic is chi-squared with a 1% critical value of 81.1. The naive model correctly predicts 43.9% of the cases.

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$ (one-tailed *t*-tests).

are certain demographic variables that are significant in their impact on the odds ratio between the Alliance and the other parties, these effects largely cancel each other out.

Comparing the estimated impact of *Regional Unemployment* in the two models provides a further example of the advantages of MNL over BNL in the analysis of British voting. In the BNL model, the parameter estimates for

the impact of regional unemployment indicate that this variable only affected the votes of manual workers. In the MNL model, however, *Regional Unemployment* has a powerful influence on all voters. Increases in *Regional Unemployment* benefit the Labour Party at the expense of both the Alliance and the Conservatives. Higher *Regional Unemployment* also benefits the Conservatives at the expense of the Alliance. Consequently, an analysis using BNL, such as that presented in Table 4, fails to indicate much of a relationship for *Regional Unemployment* because its effect on Conservative voting is negative with respect to one party of the opposition, Labour, and positive with respect to the other party of the opposition, the Alliance.

BNL will be most inappropriate in describing the effects of independent variables that do not move individuals monotonically across the British ideological spectrum—from Labour to the Alliance to the Conservatives, or in the reverse order. This is demonstrated by *Regional Unemployment* which moved respondents from the Alliance to both the Conservatives and Labour, and from Labour towards the Conservatives. Another example of this is the effect of being Catholic on vote choice in 1987. Based on the BNL model presented in Table 4, it would appear that being a Catholic has no effect on voting. The multinomial model, however, reveals that Catholics are more likely to vote for the Labour Party but not the Alliance. This finding may reflect the Alliance's vocal support of social freedom and a woman's right to have an abortion and is impossible to detect using BNL.

The MNL model also helps to clarify the nature of regional voting in Britain. Past research has debated the extent of regional voting in recent elections (Johnston, Pattie, and Allsopp 1988; Heath et al. 1991; McAllister and Studlar 1992). Responding to other scholars' evidence of regional voting, McAllister and Studlar (1992) conclude that the only significant evidence of regional voting in recent elections is for Wales. McAllister and Studlar remove Liberal and Alliance voters from their statistical analysis. In the BNL model presented in Table 4, our findings are similar to those of McAllister and Studlar, with Wales being the only one of the three regional variables to achieve statistical significance. In the MNL model presented in Table 5, however, we find statistically significant effects for both Wales and Scotland. Residents of Scotland were more likely to vote for the Alliance at the expense of both Labour and the Conservatives, while residents of Wales were more likely to vote for Labour and the Alliance at the expense of the Conservatives. It is not surprising that McAllister and Studler do not find a significant effect for Scotland in 1987 since they use BNL and exclude Alliance voters from their analysis.

Finally, the MNL model enables us to calculate predicted choice probabilities and thereby infer the preference orderings of British voters. Table 6 compares respondents' actual votes to their predicted first and second

Table 6. Predicted Preference Ordering of British Voters, 1987

	Actual Vote		
	Labour	Alliance	Conservative
Predicted First Choice			
Labour	**78.3**	30.0	5.5
Alliance	14.5	**40.1**	7.0
Conservative	7.1	29.9	**87.5**
Predicted Second Choice			
Labour	11.3	25.0	3.7
Alliance	**82.3**	**57.6**	**91.2**
Conservative	6.3	17.4	5.1
N	882	700	1236

Note: Table entries are percentages of party voters with particular predicted party preferences. Predicted probabilities were derived from the first two columns of MNL parameter estimates in Table 5.

party preferences. The comparison of actual vote to predicted first choice demonstrates that the MNL model is better at explaining Labour and Conservative votes than Alliance votes. Table 6 also suggests that Labour may have a slight advantage over the Conservatives in attracting Alliance voters since a larger percentage of Alliance voters are predicted to prefer Labour to the Conservatives.[16]

Discussion

From the statistical analyses presented in this paper, it is clear that moving from a simpler model specification to a more complicated multinomial setup produces significant substantive improvements in empirical results for voting behavior in multiparty systems. There are two major lines along which multinomial models make such improvements. First, the effects of certain independent variables that were muted or confused by more restrictive models are now predicted to have effects that are more consistent with theoretical propositions. Second, we are no longer restricted to estimating the effects of independent variables on the dichotomous vote choice between the parties in the opposition and the government.

When a researcher groups parties of the government into one category and parties of the opposition into another, the severity of the consequences depends on two major factors: the characteristics of the parties being grouped together and the number of salient political dimensions in the country being

[16]In a future study, we intend to compare British voters' predicted preference orderings to their stated party preferences as part of an analysis of tactical voting.

analyzed. In the case of Great Britain, there are three major parties and one commonly accepted political dimension. The government party in 1987 was at one extreme of the accepted political dimension. Because of this, BNL estimates for any independent variable that moves an individual monotonically across the salient political dimension will not be problematic. BNL estimates, however, will provide an inaccurate picture of the underlying causal processes for independent variables that do not move individuals monotonically across this single dimension. We found this to be the case for *Regional Unemployment,* Catholics and residents of Scotland and Wales.

The problems of using binomial models in a multinomial setting become more severe as the number of parties and salient political dimensions increases, especially when either the government or opposition contains parties that are diverse on one or more of the salient political dimensions. This is the case with the Netherlands, which is more typical of the world's democracies in terms of its electoral laws and the number of salient political dimensions.[17] The application of less complicated but more restrictive models to Dutch voting behavior generates a number of problematic results. We demonstrate that a less restrictive multinomial model of Dutch voting behavior produces results that are much more consistent with theoretical accounts of voting behavior in the Netherlands.

When deciding which methodology to use to test a theoretical proposition, an empirical researcher will usually have a variety of available options. One of the tradeoffs inherent in this choice is between expediency and appropriateness of the available techniques. We believe that students of Western European voting behavior have too often favored expediency over appropriateness in making their choice of methodology. We hope that the analyses presented in this paper convince such analysts that the costs incurred from the increased complexity of multinomial models are more than worth the payoffs of more substantively sensible and inferentially rich empirical results.

Manuscript submitted 30 September 1994.
Final manuscript received 8 March 1995.

[17]Lijphart (1990) reports that for 32 democracies, between 1945 and 1985, the average number of effective parties was 3.85. If we remove the six countries in Lijphart's analysis that have single member, plurality districts, such as Great Britain, the average number of effective parties is 4.06. The majority of the established democracies using proportional representation have two or more salient political dimensions, typically a religious or ethnic cleavage as well as a left-right ideological dimension. When one considers further that most emerging democracies have adopted some form of proportional representation and are predominately characterized as politically multidimensional, it becomes increasingly clear that the choice between binomial and multinomial models has important implications for future research.

APPENDIX

The multinomial and conditional logit models are the most common methods used by econometricians to estimate unordered, multiple choice dependent variables. The conditional and multinomial logit models differ in how they explain choices over multiple alternatives. The conditional logit model has choice-specific independent variables, while those in the multinomial logit model are individual-specific.

Our empirical analysis adopts the MNL specification because we believe it is a more appropriate model of voting behavior in Western Europe. This belief is based on two observations. First, voting decisions are primarily determined by individual characteristics and preferences, particularly in Western Europe where party-group ties and social cleavages have greater impacts on election outcomes and parties play a much larger role than candidates. Second, even when candidate or party characteristics are salient to the electorate, their influence on the vote choice is often contingent on voters' perceptions, and thus the choice characteristics are still effectively individual-specific.

The multinomial logit model can be motivated by a random utility model (Maddala 1983, 59–61; Greene 1993, 664–7). For the ith individual faced with $J + 1$ choices, suppose that the utility of choice j is

$$U_{ij} = \beta_j X_i + \varepsilon_{ij},$$

where X_i is a matrix of individual-specific independent variables and the J disturbances are independent and identically distributed with a Weibull distribution,

$$F(\varepsilon_{ij}) = \exp(e^{-\varepsilon_j}).$$

Let Y_i be a random variable denoting the choice made by the ith individual. If the ith individual chooses j, we assume that U_{ij} is the maximum among the $J + 1$ utilities, such that

$$\Pr(Y_i = j) = \Pr(U_{ij} > U_{ik}) \quad \text{for all choices } k \neq j.$$

The choice probabilities for the ith individual are

$$\Pr(Y_i = j) = \frac{e^{\beta_j' x_i}}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}} \quad \text{for } j = 1, 2, \ldots, J,$$

$$\Pr(Y_i = 0) = \frac{1}{1 + \sum_{k=1}^{J} e^{\beta_k' x_i}}.$$

These expressions imply that the odds ratio of the probabilities of choosing alternative j to alternative k is

$$\frac{P_{ij}}{P_{ik}} = \frac{e^{\beta_j' x_i}}{e^{\beta_k' x_i}} \quad \text{for } j \neq k;\ j, k = 1, 2, \ldots, J,$$

and that we can compute J log-odds ratios,

$$\ln\left[\frac{P_{ij}}{P_{i0}}\right] = \beta_j' x_i.$$

Note the similarity to the binomial logit model. The outcome $Y_i = 0$ serves as a baseline for comparing the other alternatives. Also note that the odds ratio for any two alternatives is independent of the probabilities of choosing the other alternatives. This property is the independence of irrelevant alternatives (IIA assumption) and follows from the independence of the disturbances in the original random utility model. The IIA assumption makes the multinomial logit model a relatively straightforward extension of the binomial logit model.

From the perspective of estimation and interpretation, it is useful that the odds ratio, P_j/P_k, is independent of the other choices. From a behavioral standpoint, however, the IIA assumption may be problematic. Since the odds ratio of any two choices is the same irrespective of the total number of choices considered, expansion or contraction of the choice set does not alter it. A widely documented violation of the IIA assumption is the "red bus, blue bus" problem in which the set of transportation choices is expanded by adding a choice that is viewed by individuals as similar to (rather than independent of) one of the other choices (Maddala 1983, 62; Greene 1993, 671). In this situation, we expect individuals' utilities over red and blue bus transportation to be strongly correlated, and in turn, the joint probability of bus transportation to be less than that estimated by MNL under the assumption that the choices are independent.

More generally, we can conceptualize the IIA assumption as requiring that the odds ratio for any two choices is independent of exogenous changes in the probabilities of other choices. In this context, adding an alternative to the choice set represents an exogenous increase in that alternative's probability from zero. This exogenous increase will cause the probabilities of the other alternatives to decrease proportionally so that the odds ratios among them are all constant. This conception of the IIA assumption implies that an exogenous increase in the probability of one alternative will not result in disproportionate decreases in the probabilities of the other alternatives (i.e., changes in the odds ratios).

How often will the IIA assumption be violated in the context of multiparty elections in Western Europe? Major expansion or contraction of the party system is relatively rare in the Western European democracies, so the classic example of an IIA violation seems inappropriate in the present context. Outside of the present context, the IIA assumption may limit our ability to draw inferences from the MNL model about the electoral effects of party entry or exit, but does not cast doubt on the reliability of the parameter estimates for assessing the determinants of voting behavior in any particular election. Even in the case of party entry or exit, though, a change in the party system will probably result in changes in the voters' decision

calculus, the strength of group-party ties, and public perceptions of the parties' issue positions. Consequently, inferences drawn from an empirical analysis of an election that occurred prior to party entry or exit would be questionable regardless of the estimation procedure used.

For our present purposes, a more serious implication of the IIA assumption is that the probabilities of two alternatives cannot be independent of each other. This violates the IIA assumption since it requires that an exogenous change in the probability of an alternative produces proportional changes in the probabilities of other alternatives, so that their odds ratios are constant. For instance, if issues existed that affected voters' probabilities of supporting a subset of parties (e.g., those in the government), but were inconsequential in determining voters' probabilities of supporting other parties, then the IIA assumption would not hold. We expect this type of IIA violation to be more common in multiparty systems that are segmented by social cleavages. In a segmented society, the social cleavages alter the electoral decision by creating nested choices over subsets of the parties. In electoral systems with large numbers of parties, voters may behave in a similar fashion by using ideological distinctions to simplify their electoral decision. In both of these cases, the IIA assumption may be violated because voting is structured so that it involves inherently sequential choices over subsets of alternatives.

Multinomial probit and nested multinomial logit are two alternatives to MNL that do not make the IIA assumption. Because of the need to evaluate multiple integrals of the normal distribution, the MNP model has been used sparingly in the analysis of unordered multiple choices. For more than four alternatives, computations of the MNP estimates and their standard errors are generally viewed as impractical (Maddala 1983, 63). Even for three or four alternatives, less sophisticated and moderately-equipped researchers would probably view the estimation of MNP models as a daunting task that is unlikely to significantly improve their empirical analyses.

The nested multinomial logit model is a special case of the generalized extreme value (GEV) model. Nested MNL relaxes the IIA assumption by allowing for correlation among the utility disturbances for alternatives in the same nest or subset. These subsets of similar alternatives are defined by the researcher when specifying the model's likelihood function. For subsets that are not degenerate (i.e., containing more than one alternative), nested MNL estimates a similarity coefficient. This similarity coefficient accounts for correlation among the alternatives' utilities that is not captured by the independent variables. In the MNL model, the similarity coefficient is assumed to be one, so the MNL model is a special case of the nested MNL model.

The nested MNL model has received considerable attention among economists (e.g., see Maddala 1983; Cameron 1984; Hensher 1986; Brownstone and Small 1989). To the authors' knowledge, however, this literature focuses almost exclusively on the case of choice-specific variables and does not consider a model that includes only individual-specific variables. We believe that there are important theoretical and applied differences in the nested MNL model depending on whether

Table A1. Independent Variables in the Dutch Analysis

Categorical Variables	Mean	S.D.	Min.	Max.
Left-Right Self Placement	5.5	2.4	1	10
Government Economic Evaluation	4.3	1.6	1	7
Abortion	4.8	2.0	1	7
Nuclear Power	4.5	2.1	1	7
Income Redistribution	4.3	2.0	1	7
Household Income	5.9	3.1	1	12
Education	4.7	2.7	1	10
Age	44.6	17.3	17	89
Catholic*Church Attendance	0.80	1.33	0	4
Protestant*Church Attendance	0.58	1.26	0	4
Dichotomous Variables		% with Characteristic		
Self Identified Class Image:				
Upper and Upper-Middle Class		18.0		
Upper Working Class		10.7		
Working Class		23.1		
Union Member		19.8		
Unemployed		10.0		
Married		62.0		
Roman Catholic		31.5		
Protestant		21.6		

individual-specific or choice-specific variables are used. A proper discussion of these differences, however, is beyond the scope of the present paper.

In order to confirm the robustness of our results, we estimated two nested MNL models using a full information maximum likelihood procedure. Both of the nested MNL models distinguish between the opposition and government. In the Dutch case, two similarity coefficients were estimated, allowing for correlation among the utility disturbances of the opposition parties and among those of the government parties. In the British case, only one similarity coefficient was estimated since the government is a degenerate nest. Unfortunately, there are no canned routines in Limdep or SAS for estimating a nested MNL model with individual-specific variables. Therefore, we used the *Minimize* command in Limdep that requires the researcher to specify the likelihood function that is minimized in the estimation of the parameters.

In the Dutch case, the nested MNL results are practically identical to the MNL results from both a substantive and statistical perspective.[18] In fact, both of the

[18]For reasons of parsimony, we do not present the nested MNL results here. They are included, however, in a supplemental appendix that is available from the authors upon request. The supplemental appendix also includes a theoretical exposition of the nested MNL model, an explanation of how the nested MNL parameter estimates were derived in Limdep, and a more thorough comparison of the MNL and nested MNL results.

Table A2. Independent Variables in the British Analysis

Categorical Variables	Mean	S.D.	Min.	Max.
Authoritarian Values	0.37	0.33	−1	1
Social Welfare Issues	−0.06	0.39	−1	1
Government Evaluation	−0.13	0.43	−1	1
Household Income	5.5	3.0	1	12
Regional Unemployment	11.0	2.1	7.5	14.8
Regional Unemp*Manual	4.9	5.7	0	14.0
Age	46.3	17.3	17	94
Dichotomous Variables		% with Characteristic		
Manual Worker		44.0		
Father Manual Worker		57.9		
Public Sector Employee		28.4		
Owner Occupier		72.0		
Union Member		23.9		
Former Union Member		29.5		
Staff Association Member		2.9		
Former Staff Association		3.5		
Unemployed		5.1		
Unemployed*Manual		3.5		
Education 15 yrs		24.1		
Education 16 yrs		24.0		
Education >16 yrs		28.6		
White		97.4		
Married		68.0		
Church of England		42.9		
Roman Catholic		10.1		
North of England		6.8		
Scotland		8.3		
Wales		5.5		

similarity coefficients are not statistically different from one at any accepted significance level, so we *cannot* reject the null hypothesis that the MNL model holds. This implies that the IIA assumption is not problematic in the Dutch case. In the British case, though, there are some subtle differences between the MNL and nested MNL results. In general, the MNL model overstates the strength of the explanatory variables' impacts on the log-odds ratios for the Alliance and Labour. This is most apparent for variables that account for differences in Labour and Alliance voters, such as *Regional Unemployment* and religion. Yet, the overall changes in the parameter estimates do not alter the substantive inferences of the MNL model.

Given the computational difficulties of estimating nested MNL models, at the present time, we recommend the use of MNL for analyzing multi-choice decisions with individual-specific independent variables. In this context, we believe that MNL is relatively accurate for approximating the nested MNL case, especially

when variables are included in the model that distinguish among individuals who choose similar alternatives.

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