

# Reassessing the Link between Voter Heterogeneity and Political Accountability: A Latent Class Regression Model of Economic Voting

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## ABSTRACT

While recent research has underscored the conditioning effect of individual characteristics on economic voting behavior, most empirical studies have failed to explicitly incorporate observed heterogeneity into statistical analyses linking citizens' economic evaluations to electoral choices. In order to overcome these drawbacks, we propose a latent class regression model to jointly analyze the determinants and influence of economic voting in Presidential and Congressional elections. Our modeling approach allows us to better describe the effects of individual covariates on economic voting and to test hypotheses on the existence of heterogeneous types of voters, providing an empirical basis for assessing the relative validity of alternative explanations proposed in the literature. Using survey data from the 2004 U.S. Presidential, Senate and House elections, we find that voters with college education and those more interested in political campaigns based their vote on factors other than their economic perceptions. In contrast, less educated and interested respondents assigned considerable weight to economic assessments, with sociotropic judgments strongly influencing their vote in the Presidential election and personal financial considerations affecting their vote in House elections. We conclude that the main distinction in the 2004 election was not between 'sociotropic' and 'pocketbook' voters, but rather between 'economic' and 'non-economic' voters.

The crucial link between citizen knowledge and democratic accountability has been long recognized in the political science literature (Inglehart, 1977). In order to be able to hold government accountable, citizens must be able to use information in constructing attributions of governmental responsibility (Main, Przeworski and Stokes, 1999; Gomez and Wilson, 2006). The relationship between information, cognition and attribution of governmental responsibility has been extensively analyzed in the empirical and theoretical literature, particularly in the context of economic voting (Lewis-Beck and Paldam, 2000).

The fact that citizens hold elected officials accountable for fluctuations in the economy has long been established in the political science literature (Kramer, 1971; Tufte, 1975; Kinder and Kiewiet, 1979, 1981; Fiorina, 1981; Hibbs, Rivers and Vasilatos, 1982; Norpoth, 1985). Empirical evidence from the U.S., by far the most extensively studied democracy in the economics and elections subfield, tends to support the hypothesis that economic considerations have a significant influence

on citizens' political decision-making, both in presidential and congressional races (Kramer, 1971; Tufte, 1975, 1978; Fiorina, 1981; Gomez and Wilson, 2001, 2003; Godbout and Belanger, 2007). Comparative analyses reach similar conclusions regarding the importance of economic conditions on electoral outcomes in several other polities around the world (Lewis-Beck, 1983, 1988; Sanders, 2000; Duch and Stevenson, 2005, 2006). Nonetheless, the relative impact of economic judgments on electoral choice has been shown to vary markedly across countries, elections, races and, more recently, across individual voters (Powell and Whitten, 1993; Anderson, 1995, 2000; Duch, 2001; Duch and Stevenson, 2005, 2006; Gomez and Wilson, 2001, 2003, 2006).

The literature on the economic determinants of electoral behavior and outcomes is far too vast to even begin to fully cite here.<sup>1</sup> While the large body of research accumulated in the last 40 years has offered alternative interpretations and emphasized different aspects of the economic-vote link, the main argument justifying the link between economic conditions, electoral choice and democratic accountability can be summarized in the classical reward-punishment hypothesis: citizens hold governments responsible for economic performances and reward or punish incumbents at the ballots based on their retrospective economic evaluations (Nannestad and Paldam, 1994; Lewis-Beck and Stegmaier, 2000; Duch and Stevenson, 2005; Anderson, 2007). However, the precise mechanism connecting voters' opinions about the economy to their electoral choice is still subject to considerable debate.

For the most part, the pioneering work in the field (Goodhart and Bhansali, 1970; Kramer, 1971, 1983; Stigler, 1973; Tufte, 1975; Kinder and Kiewiet, 1979, 1981) tended to assume homogeneous citizens that attributed economic responsibilities in the same manner, focusing on whether the electorate as a whole engaged in economic voting and ignoring potential differences in the way in which voters linked their economic evaluations to their electoral choice (Gomez and Wilson, 2001, 2003). Economic voting, though, is essentially an individual-level phenomenon (Yoon, 2000; Duch and Stevenson, 2005), and later work gradually focused on the influence of individuals' economic evaluations - as opposed to aggregate, objective economic indicators - on their vote choice (Lewis-Beck and Stegmaier, 2000). In this direction, scholars have drawn attention to the fact that differences in voters' personal characteristics can substantially affect the connection between their economic perceptions and their probability of supporting the incumbent candidate or party. In particular, researchers have noted that citizens' ability to attribute changes in economic conditions to the actions of political leaders is largely dependent on their knowledge and understanding of the political world, and thus variables like education, political information, media consumption and political sophistication can drastically affect economic voting at the individual level (Weatherford, 1983; Abramowitz, Lanoue and Ramesh, 1988; Mutz, 1992; Duch, 2001; Gomez and Wilson, 2001, 2003, 2006; Godbout and Belanger, 2007). As suggested by prior research in related areas (Bartels, 1996; Duch et al., 2000), these systematic differences in the association between economic assessments and vote choice do not necessarily cancel out at the aggregate level, potentially affecting the electorate's collective choices and distorting substantive conclusions drawn from aggregate-level analyses.

Few empirical studies, however, have sought to account for heterogeneity in the "micro-politics" of economic voting. The vast majority of individual-level analyses simply rely on standard generalized linear models to estimate the effect of economic judgments on the dependent variable of interest - e.g., incumbent approval or vote choice - after adjusting for relevant control variables (Lewis-Beck and Stegmaier, 2000; Nannestad and Paldam, 2004; Anderson, 2007), thus assuming

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<sup>1</sup>A review of the most relevant work can be found in Monroe (1984), Kiewiet and Rivers (1985), Lewis-Beck (1988), Norpoth (1996), Lewis-Beck and Stegmaier (2000) and Anderson (2007), among others.

that the same model for economic voting holds for all individuals in the sample. More recently, some scholars have tried to incorporate subjective variation into models of economic voting model by either adding interaction terms between economic perceptions and individual characteristics thought to mediate the economy-vote link (e.g., Duch, 2001; Wilson, 2003, 2006) or by exogenously splitting the sample according to the distribution of covariates representing these moderating influences and estimating the impact of economic assessment on vote choice in each of the sub-samples (Gomez and Wilson, 2001). While these works have the merit of relaxing the assumption that voters respond to economic conditions in identical fashion, they still exhibit some conceptual and methodological weaknesses that undermine their ability to capture and explain individual variation in economic voting patterns. From a theoretical perspective, they focus exclusively on the mediating effect of particular individual characteristics on economic voting, rather than jointly examining the influence of alternative variables underscored in the literature and simultaneously testing for their differential effects on voters' ability to link economic outcomes to electoral choice. More generally, these studies have failed to explicitly account for the possibility that different groups of citizens exhibit clearly distinctive economic voting behaviors, with some voters casting their ballots based on specific economic cues while still others not engaging in economic voting at all.<sup>2</sup> From a methodological stance, separate sample estimation can be quite inefficient and make it difficult to test for significant effects across sub-samples (Kam and Franzese, 2007), while fully dummy-interactive models may require the addition of a large number of parameters to thoroughly assess the effect of several moderating variables, running the risk of considerably underpowered statistical tests and obscuring interpretation of the model coefficients (Cohen, Cohen, West and Aiken, 2003; Van Horn et al., 2009). Also, in both empirical approaches, individual differences beyond those captured by the moderating variables is neglected - or, more accurately, relegated to the error terms - rather than allowed to affect the parameter estimates, which may not only be undesirable from a substantive standpoint (Alvarez and Nagler, 1998), but can also lead to less precise estimation and prediction (Shigemasa and Sugiyama, 1994; Wedel and Desarbo, 2002; Greene and Hensher, 2003). More importantly, both methods require researchers to *a priori* identify and select the relevant moderators, failing to account for other potential sources of heterogeneity and restricting the development of a more comprehensive representation of individual-level variations in economic voting, in so far as they have limited ability to explore general hypothesis involving complex moderation effects (Hagenaars and McCutcheon, 2002; Van Horn et al., 2009).

In order to overcome these shortcomings, we use a latent class regression model (Wedel and Desarbo, 1994; McLachlan and Peel, 2000; Wedel and Desarbo, 2002; Huang and Bandeen-Roche, 2004) to examine the mediating role of individual characteristics on economic voting in the 2004 U.S. presidential election. Our empirical strategy enables us to examine the relative influence of alternative socio-demographic variables on the extent to which voters cast their ballot based on economic considerations and the particular economic heuristics they use, identifying and characterizing groups of voters who differ in the impact that economic evaluations have on their vote choice without the need to exogenously segment the sample based on a priori chosen covariates or to include multiple interaction terms in the model specification. By revealing systematic differences in the way in which voters relate their assessments about economic outcomes to their electoral choice using an easily interpretable and parsimonious model, our analysis can contribute to explain inconclusive and often contradictory results regarding the scope and relative importance different "types" of economic voting behavior, as well as inconsistent findings between aggregate-

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<sup>2</sup>While Gomez and Wilson (2003) acknowledge this possibility, their empirical strategy does not allow to model or identify these different groups of voters.

and individual-level analyses (Lewis-Beck, 1988; Nannestad and Paldam, 1994; Gomez and Wilson, 2001; Anderson, 2007).<sup>3</sup>

In addition, the latent class regression model implemented in this paper lets us study how individual characteristics interact with economic perceptions in attributing blame or credit for economic outcomes among competing political actors. A growing number of articles have highlighted the influence of the institutional and electoral context on the relationship between economic perceptions and government support, indicating that the division of political control between agents and institutions may affect voters' assignment of responsibility for economic outcomes between different political actors (Powell and Whitten, 1993; Anderson, 1995, 2000; Powell, 2000; Godbout and Belanger, 2007). In particular, Gomez and Wilson (2003) argue that the process of causal attribution varies considerably between presidential and congressional elections, although previous research has shown that national and local electoral preferences are tightly linked via the reward-punishment hypothesis (Kramer, 1971; Tufte, 1975, 1978; Brown and Woods, 1991). The focus of this line of research, however, has been mainly comparative in nature, with conclusions generally drawn from independent analyses of economic voting in different races or electoral contexts, extrapolating results from various models, periods and data sources, and usually ignoring individual-level variability (Anderson, 2007). In contrast, our modeling strategy allows us to examine how citizens relate their economic judgments to their vote choice in simultaneous presidential, senate and house elections, providing valuable insights into individuals' differential use of economic information in their voting decisions across several levels of political decision-making and control.

The rest of the paper is organized as follows. The next section reviews the literature on the effect of voter heterogeneity on economic voting behavior. Section 3 presents the data and the latent class regression model used to examine individual economic voting in simultaneous Presidential, House and Senate elections between 1980 and 2008. Section 4 discusses the main empirical findings from the analysis, and Section 5 concludes.

## 1. INDIVIDUAL HETEROGENEITY, ECONOMIC EVALUATIONS AND VOTE CHOICE

Scholarly research has indisputably established that economic considerations strongly affect citizens' electoral behavior (Kramer, 1971; Tufte, 1975; Hibbs, Rivers and Vasilatos, 1982). Empirical evidence conclusively supports the hypothesis that voters who perceive an improvement in economic conditions are more likely to support incumbents during an election for a variety of offices, both at the state and national levels (Kramer, 1971; Fiorina, 1983; Gomez and Wilson, 2001, 2003). There is much less consensus, however, about the precise nature of the connection between the vote choice and the economy or, more specifically, on the relationship between voters' characteristics, their assessment of economic information in their electoral choice.

One possible explanation for economic voting, formalized in the the 'sociotropic hypothesis' (Kinder and Kiewiet, 1979, 1981), is that voters consider macroeconomic conditions, i.e., the economic well being of the nation as a whole, when voting for or against incumbents. In contrast, other

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<sup>3</sup>Recent studies (Hetherington, 1996; Duch, Palmer and Anderson, 2000; Erikson, 2004) have found that voters' opinions about the national economy are themselves significantly related to individual characteristics. Although we do not delve into this issue here, the interdependence of economic perceptions and electoral preferences has not been thoroughly examined by scholars working in the economics and elections subfield, and points to interesting opportunities for future research. However, even if voters have biased judgments of economic reality, little is known about the conditions under which these judgments have a significant impact on electoral behavior. As noted by Anderson (2007), identifying and distinguishing these conditions is relevant for a better understanding of the relationship between economic voting and democratic accountability.

scholars (e.g., Campbell et al., 1960; Kramer, 1971, 1983) have argued that people vote according to changes in their own personal economic and financial circumstances; that is, they vote according to their own ‘pocketbook’. Sociotropic judgments have been generally shown to be better cross-sectional predictors of voting behavior than pocketbook evaluations (Godbout and Belanger, 2007), although Nannestad and Paldam (1997) find strong influences of pocketbook considerations - even to the exclusion of sociotropic effects - and still other studies (e.g., Monroe and Erickson, 1986) find weak evidence of any form of economic voting. Nonetheless, few studies examine why and to what extent voters rely on one kind of economic perception rather on the other when casting their vote, and how these differences among voters might affect electoral outcomes. In fact, the influence of individual characteristics on economic voting behavior in general has not been thoroughly analyzed.

In order to form economic judgments and relate this information to electoral choices by attributing credit or blame for economic performance to relevant political actors, a certain amount of information and cognitive skills is necessary. Hence, recent research examining the influence of individual characteristics on economic voting behavior have focused on the role of political information or sophistication, broadly defined as the quantity and organization of a person’s political awareness, information and cognition (Luskin, 1987; Sniderman, Brody and Tetlock, 1991), in explaining heterogeneous economic voting behavior. For instance, Duch (2001) argues that information conditions voters’ ability to cast an economic vote: higher levels of information tend to decrease the ambiguity regarding the link between government policy and economic performance, and hence more informed citizens would be more likely to attribute political responsibilities for economic outcomes and engage in economic voting. In the same direction, individuals’ consumption of media information and exposure to political campaigns would affect attributions of economic responsibility, as well as the likelihood of pocketbook versus sociotropic evaluations (Weatherford, 1983; Mutz, 1992; Hetherington, 1996; Godbout and Belanger, 2007). In particular, this conception of economic voting as a process of information acquisition suggests that less informed or politically engaged citizens would be inclined to rely on personal financial circumstances when making judgments about government economic performance, since this information is easier to gather and process. In contrast, more sophisticated voters would be able to use other relevant information - such as indicators of the state of the national economy - in formulating their policy expectations (Lupia, 1994; Delli Carpini and Keeter; Goren, 1997; Krause, 1997). From a different perspective, Gomez and Wilson (2001) propose a theory of economic voting that underscores the role of political sophistication in attributing causal responsibility for economic developments, rather than on information acquisition. Focusing on the distinction between pocketbook and sociotropic evaluations, these authors argue that the associative link between personal finances and macroeconomic policy is too ‘distal’ for less sophisticated voters, whereas the relationship between the state of the national economy and the government is considerably easier to establish. In contrast, politically sophisticated individuals are more likely to understand how changes in government’s economic policies may affect their personal finances, while at the same time being able that several political or economic factors beyond the government’s control may affect macroeconomic outcomes. Hence, in their opinion, sociotropic evaluations will be more prevalent among low sophisticates, while more sophisticated voters will place relatively less weight on national economic evaluations and more on pocketbook circumstances. A similar argument is made by Abramowitz, Lanoue and Ramesh (1988) regarding the effects of voters’ education levels.

In addition, differences in citizens’ level of political information, sophistication and experience can also affect how voters attribute credit or blame for economic development across different political actors and institutional layers. While the connection between national economic conditions

and vote choice might be easy to establish in Presidential elections, the task of assigning responsibility for economic developments in Congressional elections is more complex (Mayhew, 1974). As noted by Jacobson (1997), Congressional elections are national contest in which local contexts matter and hence, when attributing responsibilities for economic outcomes, voters might focus on all the incumbents, or on the candidates of the party that controls Congress, on all candidates of the President’s party (Gomez and Wilson, 2003). Here too, differences in voters’ levels of political awareness, information and sophistication is likely to affect whether and how voters link their economic perceptions to their electoral choice. For instance, since less sophisticated voters will tend to focus attributions of responsibility for the economic performance on the single most obvious actor in the relevant sphere (Gomez and Wilson, 2001, 2003), economic voting should be more prevalent among these voters in Presidential than in Congressional elections. In contrast, sophisticated and informed citizens should be able to recognize that the executive branch does not have complete control for the state of the national economy (Godbout and Belanger, 2007) and might be more likely to attribute at least part of the responsibility for economic outcomes to other political actors such as members of Congress (Gomez and Wilson, 2001).

While these studies disagree on the specific mechanisms linking individual assessments of economic conditions and vote choice, they underscore the need to account for the conditioning role of individual heterogeneity and contextual factors when analyzing economic voting behavior. Nonetheless, as mentioned in the Introduction, the vast majority of empirical analyses fail to explicitly account for the fact that citizens’ economic voting behavior might be strongly conditioned by their individual characteristics (Gomez and Wilson, 2003). The few applied studies that actually tried to account for the existence of groups of voters with different economic voting patterns (Gomez and Wilson, 2001) focus only on the distinction between sociotropic and pocketbook evaluations, considering only one possible source of heterogeneity (political sophistication) and imposing exogenous criteria based on the levels of the covariate of interest (level of political sophistication) in order to classify voters into the pre-defined groups. More importantly, most of the recent studies focusing on the influence of individual characteristics on economic voting behavior have highlighted the role of voter heterogeneity in distinguishing between ‘sociotropic’ and ‘pocketbook’ *versus* pocketbook voters (Gomez and Wilson, 2001, 2003, 2006; Godbout and Belanger, 2007). Very few studies, if any, have attempted to model and account for the effect of individual characteristics in the more basic distinction between ‘economic’ and ‘non-economic’. In addition, while previous empirical research studied economic voting behavior across different electoral contexts and types of races, comparisons have proceeded almost exclusively by contrasting results from different periods, elections or statistical models. In our knowledge, no study has analyzed the determinants of economic voting in simultaneous Presidential and Congress elections, jointly analyzing the process by which voters use economic information and attribute credit or blame for economic developments across different political actors and electoral races. In order to overcome these difficulties, we propose a latent class regression model to analyze economic voting behavior in Presidential, House and Senate elections in the U.S.

## 2. A LATENT CLASS REGRESSION MODEL OF ECONOMIC VOTING

Latent class analysis is an empirically based statistical approach for explaining heterogeneity in response patterns in terms of underlying latent classes. Originally introduced by Lazarsfeld (1950) as a way of formulating latent attitudinal variables from dichotomous survey items, latent class models were later generalized to deal with broader classes of observable variables (Magidson and

Vermunt, 2004). Recent developments also incorporated covariates as predictors of class membership and allowed the conditional distribution of the observed responses to depend on additional regressors (Dayton and Macready, 1988; Bandeen-Roche et al. 1997; Huang and Bandeen-Roche, 2004; Reboussin, Ip and Wolfson, 2008). Latent class regression models extend traditional latent class models by allowing for the simultaneous probabilistic classification of observations into underlying segments and estimation of (generalized) regression models within each of these segments (Wedel and DeSarbo, 2002).<sup>4</sup>

The main idea underlying latent class regression models is that the observations in a sample arise from a limited number of underlying classes or groups of individuals that differ in their behavior or attitudes and in the impact of relevant predictors on the response variables measuring these characteristics (Wedel and DeSarbo, 2002; Magidson and Vermunt, 2004; Van Horn et al., 2009). Individual group affiliations are not known but estimated based on the observed response patterns, where the association between responses is assumed to be explained by their relationship to a latent categorical variable with as many categories as groups or clusters. The observed dependent variables are usually - though not necessarily - assumed to be mutually independent within classes and to have different marginal distributions among them, and the parameters of the regression models are allowed to differ between the classes. While latent class regression models are similar to random effects models in the sense that they can be used to explain both observed and unobserved heterogeneity in the data, they do not make strong assumptions about the distribution of the random coefficients and are usually much less computationally intensive than parametric models (Greene and Hensher, 2003; Magidson and Vermunt, 2004). Also, heterogeneity in latent class regression models can be more intuitively and meaningfully interpreted in terms of a number of mutually exclusive groups of like-minded individuals (Vermunt and Van Dijk, 2001; Agresti, 2002; Wedel and Desarbo, 2002).

In our application, we resort to latent class regression models to identify and characterize groups of voters that are homogeneous in terms of the responsiveness of their electoral preferences to economic assessments in presidential, senate and house elections. Drawing on previous research on heterogeneous economic voting reviewed in Section 1, our model specification allows us to distinguish between different “types” of economic voters and to estimate the relative prevalence of economic voting across races in presidential election-years between 1980 and 2008. Although latent class and finite mixture models have recently found a growing number of uses in political science (Linzer, 2006; Blaydes and Linzer 2008; Jackman, 2008; Treier and Jackman, 2008), they have been generally used as a clustering technique or as a statistical measurement model, rather as a regression model, as is the case in this paper.

## 2.1. *Data*

In our analysis of the determinants of economic voting, we use survey data from the 2004 ANES study, covering the last presidential election held in the country. Using an election year in which both Presidential and Congressional elections are held allows us to jointly analyze the influence of economic voting across different races, contributing to better understand how voters attribute credit or blame for the economic performance among the relevant political actors and institutional levels.

The outcome vector comprises a series of indicator variables coded as 1 if the respondents voted

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<sup>4</sup>A detailed description of latent class and finite mixture models is beyond the scope of the paper. An excellent overview can be found in McLachlan and Peel (2000).

for the incumbent candidate or party in each of the races considered. In the case of Presidential election, this coding reflects the fact that economic voting is essentially a referendum on government performance, and hence a vote for any challenger amounts to a vote against the incumbent (Downs, 1957; Fiorina, 1981; Gomez and Wilson, 2001). In the case of House and Senate elections, the coding of the corresponding indicator is less straightforward since, as mentioned above, it is unclear whether the target of economic voting are all incumbents (regardless of party), all candidates of the party controlling Congress, or all candidates of the President’s party. We agree with Gomez and Wilson (2003) in the sense that economic voting in Congressional elections should basically reflect a partisan orientation, and thus we use the vote for the President’s party to define the response variable in Congressional. Nonetheless, we also fit models using the other two potential credit/blame attributions, with little effect on the main substantive results.

Our focus lies in determining the effect of several individual characteristics of interest on economic voting. We include both measures of both pocketbook and sociotropic judgments in the analysis. *Sociotropic evaluation* is defined based on respondents answer to the survey question: ‘Would you say that over the past year the nation’s economy has gotten better, stayed about the same, or gotten worse?’. The variable is coded on a 5-point scale running from 1 (much worse) to 5 (much better). *Pocketbook evaluation* is measured using the question: ‘Would you say that you (and your family) are better off or worse off financially than you were a year ago?’. Given the purposes of our study, self-reports of economic conditions are preferable to objective aggregate economic indicators (Kramer, 1971, 1983), and previous research has shown that these self-reports are very reliable and they correlate with economic data on real disposable personal income as well as with personal events such as loss of a job or falling behind on bills (Rosenstone, Hansen and Kinder, 1986; Gomez and Wilson, 2003).

Along the lines of the different theoretical explanations reviewed in Section 1, we consider the mediating effect of education, political interest, information and sophistication on the linkage between economic evaluations and vote choice, examining whether these individual characteristics discriminate between groups of voters with relatively homogeneous economic voting patterns. We include an indicator for *College education*, and measure *Interest in political campaigns* based on the NES survey items tapping this issue.<sup>5</sup> To operationalize *Political sophistication*, we follow Godbout and Belanger (2007) and construct an additive scale from a series of six factual questions asked in the NES surveys for the period under analysis aimed at capturing voters’ knowledge and information about politics. Four of these items ask respondents to identify the political office held by key political figures: the Speaker of the House of Representatives, the Vice-President, the Supreme Court’s Chief Justice and former British Primer Minister Tony Blair. The other two questions ask respondents to identify which party controlled the House and the Senate before the election.

Finally, we include a series of sociodemographic and attitudinal variables affecting the conditional probability of voting for incumbents. These include *Party identification*, coded on a 7-point scale ranging from 0 (‘strong democrat’) to 6 (‘strong republican’), and dummy variables for *African American*, *Male* and *South*. We also include indicators for *Open seat* for each of the two Congressional elections. Although the results reported in Section 3 are based on a complete-case analysis using list-wise deletion, the estimation methodology can be extended to account for missing and partially observed data, both under MAR/NMAR assumptions (Little and Rubin, 1987; Fay, 1986; Schafer, 1997; Vermunt, 1997).

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<sup>5</sup>The number of the survey items used to define these two variables are V043254, V045001, respectively.

## 2.2. The Statistical Model

Let  $y_i = (y_{i,1}, y_{i,2}, y_{i,3})$ , denote the set of vote choices of respondent  $i$ ,  $i = 1, \dots, n$ , in election  $k$ ,  $k = 1, 2, 3$ , where  $y_{i,k} = 1$  if the respondent  $i$  supports a Republican candidate in race  $k$  and 0 if she supports any other candidate. Without loss of generality,  $k = 1$  corresponds to the Presidential election,  $k = 2$  to the Senate election, and  $k = 3$  to the House election. Our model postulates an underlying categorical latent variable  $\eta_i \in 1, 2$  denoting respondent  $i$ 's unobserved class. The choice of two underlying class of voters is determined both by theoretical considerations from the literature on economic voting as well as for identifiability reasons, since mixtures of logistic distributions are not identifiable unless the number of components is limited with respect to the number of observations per person (Grun 2002; Grun and Leisch, 2008).

Given  $\eta_i$ , the votes of respondent  $i$  in the different races are assumed to be mutually independent. Thus, letting  $\pi_j = \Pr(\eta_i = j)$ , the distribution of  $y_i$  can be expressed as:

$$\Pr(y_i|\pi, p) = \sum_{j=1}^2 \pi_j \prod_{k=1}^3 p_{j,k}^{y_{i,k}} (1 - p_{j,k})^{(1-y_{i,k})} \quad (1)$$

where  $p_{j,k} = (y_{i,k} = 1|\eta_i = j)$  is the probability that respondent  $i$ , who belongs to latent class  $j$ , votes for the incumbent candidate in election  $k$ .

In order to allow the classification of survey respondents into heterogeneous groups to depend on relevant individual characteristics while adjusting for variables that determine vote choice other than the underlying group membership, we specify both the probabilities of the latent class membership and the distribution of the observed vote choices as functions of individual covariates of interest. We denote by  $(x_i, v_i, z_i)$  be vectors of covariates for respondent  $i$ , where  $x_i = (1, x_{i,1}, \dots, x_{i,p})^T$  are individual characteristics hypothesized to be associated with latent class membership  $\eta_i$ , and  $v_i = (v_{i,k,1}, \dots, v_{i,k,l})^T$  and  $z_i = (1, z_{i,k,1}, \dots, z_{i,k,m})^T$  are two sets of individual characteristics assumed to affect vote choice in election  $k = 1, 2, 3$ . The difference between the covariates included in  $v_i$  and  $z_i$  is that, while we assume that the conditional effect of the former on the observed response  $y_{i,k}$  is the same for members of both latent classes, we allow the effect of the latter to depend on  $\eta_i$ . Hence, the model is similar to a mixed-effects model (Pinheiro and Bates, 2000), although the distribution of the coefficient of the  $z_i$  is unknown and has to be estimated. In our application, we model the conditional probability of class membership as a function of *College education*, *Interest in political campaigns* and *Political sophistication*, as indicated in Section 2.1. The covariates in  $v_i$  are *African American*, *Male*, *South* and *Party ID*, with *Open seat* included in  $v_{i,2}$  and  $v_{i,3}$ . Finally,  $z_i$  includes our two measures of economic perception, *Sociotropic evaluation* and *Pocketbook evaluation*.

Equation 1 can be therefore rewritten as

$$\Pr(y_i|\pi, p, x_i, v_i, z_i) = \sum_{j=1}^2 \pi_j (x_i^T \beta) \prod_{k=1}^3 [p_{j,k}(\alpha_{j,k} + v_{i,k}^T \delta_k + z_{i,k}^T \gamma_{j,k})]^{y_{i,k}} [1 - p_{j,k}(\alpha_{j,k} + v_{i,k}^T \delta_k + z_{i,k}^T \gamma_{j,k})]^{(1-y_{i,k})} \quad (2)$$

with  $\pi_j (x_i^T \beta)$  and  $p_{j,k}(\alpha_{j,k} + v_{i,k}^T \delta_k + z_{i,k}^T \gamma_{j,k})$  defined as in the generalized linear framework (Mc-

Cullagh and Nelder, 1989). In particular, adopting logit link functions, we can write

$$\log\left(\frac{\pi_1(x_i^T\beta)}{\pi_2(x_i^T\beta)}\right) = \log\left(\frac{\pi(x_i^T\beta)}{1 - \pi(x_i^T\beta)}\right) = \beta_0 + \beta_1 x_{i,1} + \cdots + \beta_p x_{i,p} \quad (3)$$

and

$$\log\left(\frac{p_{j,k}(\alpha_{j,k} + v_{i,k}^T \delta_k + z_{i,k}^T \gamma_{j,k})}{1 - p_{j,k}(\alpha_{j,k} + v_{i,k}^T \delta_k + z_{i,k}^T \gamma_{j,k})}\right) = \alpha_{j,k} + \delta_{k,1} v_{i,k,1} + \cdots + \delta_{k,l} v_{i,k,l} + \gamma_{j,k,1} z_{i,k,1} + \cdots + \gamma_{j,k,m} z_{i,k,m} \quad (4)$$

Note that we allow for election-specific covariates in the conditional probability model in 2, and we also specify class and election-varying intercepts  $\alpha_{j,k}$ ,  $j = 1, 2, \dots, 3$ ,  $k = 1, \dots, 3$ , in order to capture potential overdispersion due to, for instance, important omitted covariates. It is assumed that class membership probabilities are associated only with the covariates in  $x_i$ , and that, conditioning on class membership, responses are only dependent on  $v_i$  and  $z_i$ . In addition, as mentioned above, respondent  $i$ 's votes in the different races are independent given  $\eta_i$ ,  $v_i$ ,  $z_i$ . That is,

$$\Pr(\eta_i = j | x_i, v_i, z_i) = \Pr(\eta_i = j | x_i) \quad (5)$$

$$\Pr(y_i | \eta_i, x_i, v_i, z_i) = \Pr(y_i | \eta_i, v_i, z_i) \quad (6)$$

and

$$\Pr(y_i | \eta_i, v_i, z_i) = \prod_{k=1}^3 \Pr(y_{i,k} | \eta_i, v_{i,k}, z_{i,k}) \quad (7)$$

The parameter vector  $\psi = (\beta, \alpha, \delta, \gamma)$  can either be estimated within a frequentist framework, within the Bayesian framework using MCMC samplers, or with moment estimators (Grun and Leisch, 2007; McLachlan and Peel, 2000). The most popular method for estimating latent class models with fixed number of components is frequentist maximum likelihood with the Expectation-Maximization (EM) algorithm (Dempster, Laird and Rubin, 1977; McLachlan and Krishnan, 1997).<sup>6</sup> Since class membership  $\eta_i$  is unobservable, the latent class regression model in 2 becomes an incomplete or missing-data problem. Hence, the EM algorithm uses an iterative data augmentation scheme in which the missing class membership indicators  $\eta_{i,j}$ ,  $i = 1, \dots, N$ ;  $j = 1, 2$  are imputed based on the estimated posterior probabilities given the most recent estimates of the parameters in  $\phi$  using , and the ‘complete-data’ likelihood is then maximized. Specifically, in the

<sup>6</sup>In general, the number of latent classes has to be fixed a priori or is simultaneously estimated with  $\psi$  (Huang, 2005). In our case, as mentioned above, identification constraints prevent us from fitting a model with more than two latent classes.

E-step, given the current parameter estimates  $\phi^r$  in the  $r$ -th iteration, the missing data indicators  $\eta_{i,j}$ ,  $i = 1, \dots, N$ ;  $j = 1, 2$  are replaced by

$$\omega_{i,j}(\phi^r) = E(\eta_{i,j} | y_i, \phi^{(r)}, x_i, z_i) = \frac{\pi_j(x_i^T \beta^{(r)}) \prod_{k=1}^3 [p_{j,k}(\alpha_{j,k}^{(r)} + v_{i,k}^T \delta_k^{(r)} + z_{i,k}^T \gamma_{j,k}^{(r)})]^{y_{i,k}} [1 - p_{j,k}(\alpha_{j,k}^{(r)} + v_{i,k}^T \delta_k^{(r)} + z_{i,k}^T \gamma_{j,k}^{(r)})]^{(1-y_{i,k})}}{\sum_j \pi_j(x_i^T \beta^{(r)}) \prod_{k=1}^3 [p_{j,k}(\alpha_{j,k}^{(r)} + v_{i,k}^T \delta_k^{(r)} + z_{i,k}^T \gamma_{j,k}^{(r)})]^{y_{i,k}} [1 - p_{j,k}(\alpha_{j,k}^{(r)} + v_{i,k}^T \delta_k^{(r)} + z_{i,k}^T \gamma_{j,k}^{(r)})]^{(1-y_{i,k})}}$$

and the new parameter estimates  $\phi^{r+1}$  are obtained in the M-step by maximizing

$$Q(\beta^{(r+1)} | \phi^{(r)}) = \sum_{i=1}^N \sum_{j=1}^2 \omega_{i,j}^{(r)} \log(\pi_j(x_i^T \beta^{(r+1)}))$$

and

$$Q(\psi^{(r+1)} | \phi^{(r)}) = \sum_{i=1}^N \sum_{j=1}^2 \sum_{k=1}^3 \omega_{i,j}^{(r)} \left( y_{i,k} \log(p_{j,k}(\alpha_{j,k}^{(r+1)} + v_{i,k}^T \delta_k^{(r+1)} + z_{i,k}^T \gamma_{j,k}^{(r+1)})) \right. \\ \left. + (1 - y_{i,k}) \log(1 - p_{j,k}(\alpha_{j,k}^{(r+1)} + v_{i,k}^T \delta_k^{(r+1)} + z_{i,k}^T \gamma_{j,k}^{(r+1)})) \right)$$

where  $\psi = (\alpha, \delta, \gamma)$ . We run the EM 10 times with different initializations, choosing the solution that maximizes the log likelihood (Grun and Leisch, 2007). Additional details of the EM algorithm for estimating the regression latent class model can be found in Muthen and Shedden (1999, Appendix) and Bandeen-Roche (2004, Appendix B).

It is important to mention that the model in Equations 2 - 7 is not necessarily identified (Huang and Bandeen-Roche, 2004; Grun and Leisch, 2008). In contrast, under mild regularity conditions (Huang and Bandeen-Roche, 2004, p. 8-11), the sufficient conditions for the identifiability of the model are met if we adopt the restriction  $\gamma_{j,k} = \gamma_k$ ,  $j = 1, 2$ , i.e., if we do not allow the coefficients of  $v_{i,k}$  to vary across latent classes. This would pose no problem if the sole aim of our analysis was to assess the relative influence of economic voting across different elections. Nonetheless, as mentioned above, we are also interested in determining whether the effect of economic judgments on vote choice vary for different types or groups of voters. In order to overcome this difficulty, we adopt two different empirical approaches to check the local identifiability of the estimated model. First, following Muthen and Shedden (1999), we start by estimating our model imposing the assumption that  $\gamma_{j,k} = \gamma_k$ ,  $j = 1, 2$  in order to ensure identifiability, and then check whether relaxing this restriction - which amounts to adding extra parameters - changes the observed-data log-likelihood. We perform this check via a LR-test for the unrestricted and restricted models. In addition, we use parametric bootstrap method based on Grun and Leisch (2004) to assess the stability of the estimated coefficients for the unrestricted model. These two checks revealed no substantive identifiability problems for the unrestricted model.<sup>7</sup>

<sup>7</sup>Additional details on the application of these procedures in order to check local identifiability are available from

### 3. EMPIRICAL FINDINGS

Figure 1 presents the parameter estimates and confidence intervals for the model of vote choice in the Presidential, House and Senate elections. The signs of the sociodemographic and attitudinal variables affecting the conditional probability of voting for George W. Bush in the presidential election and for the Republican party in the Congressional elections are in line with the theoretical expectations: african americans are less likely to vote for Republicans in the three elections considered, while southern voters and Republican identifiers are much more likely to support the Republican candidates. The effect of *Open seat* is not statistically significant in either of the two Congressional races at the usual confidence levels. Given the purposes of our analysis, however, the most interesting findings concern the coefficients of the two indicators of economic perceptions across races as a function of class membership.

Looking first at class membership, the evidence reported in the figure shows that for respondents assigned to  $\eta = 1$ , neither of the two indicators of economic judgments are statistically significant at the usual confidence levels in any of the three electoral races considered. Thus, there is no evidence of economic voting among these respondents. In contrast, for voters assigned to  $\eta = 2$ , economic perceptions did have a significant and positive effect on the probability of supporting Republican candidates in the Presidential and House elections. Among these voters, sociotropic considerations had a strong positive effect on the probability of casting a ballot for George W. Bush in the 2004 Presidential election: *ceteris paribus*, voters who believed that the economy had gotten much better during the previous year were on average 4.5 percentage points more likely to vote for the incumbent President than those who believed that the economy had gotten much worse, and this difference is significant at the 0.01 level. While *Pocketbook evaluations* area also positively correlated with vote choice in the Presidential election for these respondents, its effect is not statistically significant even at the 0.1 level, as was the case for voters in  $\eta = 1$ . In contrast, in the House elections, economic voting among respondents assigned to  $\eta = 2$  was driven by personal financial considerations: respondents in  $\eta = 2$  who felt that their own economic situation had gotten much better in the previous year were on average 9.8 percentage points more likely to vote for Republican candidates than those who believed that their personal finance had become much worse. Again, this difference is significant at the 0.05 level. Neither *Sociotropic evaluations* nor *Pocketbook evaluations* had a significant effect on vote choice in the Senate race, even for the class of ‘economic voters’.

The results in Figure 1 highlight the fact that respondents assigned to the two different subpopulations considered in our latent class regression model exhibit substantially different patterns regarding their economic voting behavior. While respondents assigned to  $\eta = 1$ , comprising 34% of respondents in the sample, based their vote on factors other than economic perceptions, national and personal economic considerations clearly affected remaining 66% of respondents belonging to  $\eta = 2$ . These differences between ‘economic’ and ‘non-economic voters’ translate into very different probabilities of support for the incumbent President and for members of the President’s party running for Congress, even after controlling for strong partisan biases. This is clear from Figure 2, which plots the sample vote-shares for Republican candidates in each of the three races analyzed and compares them to the average probabilities of support for the two types of voters. 50.2% of the respondents in the sample voted for George W. Bush in the 2004 Presidential election, while 44.8% and 46.3% voted for Republican candidates in the Senate and House elections, respectively. The corresponding average probabilities of support among respondents assigned to  $\eta = 1$  where

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the authors upon request.

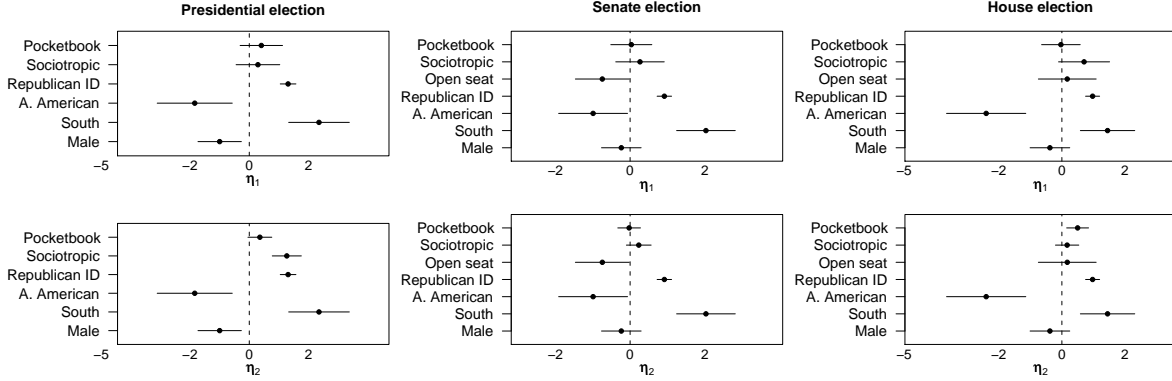


Figure 1: *Coefficients of the conditional model of vote choice in Presidential, Senate and House elections. The center dots correspond to the point estimates of the parameters and the solid lines the 90% confidence interval.*

39.8%, 22.2% and 24.2%. In contrast, the expected vote-shares of Republican candidates among respondents classified as belonging to  $\eta = 2$  were all above 50%.

Table 1 explores the sources of heterogeneity between the two subpopulations of voters, reporting the association estimation between latent class membership and the variables measuring voters’ education, interest in politics and sophistication. The odds ratios presented in the table are obtained by exponential transformations of the regression coefficients in Equation 3. The results show that, in the 2004 election, voters with college education and those interested in political campaigns were much less likely to belong to the group of ‘economic voters’, i.e., their vote choice was not significantly affected by their economic perceptions. In contrast, for less educated citizens and for those less interested in politics, economic judgments strongly influenced their vote in the Presidential and House elections. Among these voters, favorable national and personal economic conditions translated in a higher probability of support for the incumbent President and for members of the President’s party. A likelihood ratio test comparing our modeling approach with a standard latent class model that did not specify the probabilities of class membership as function of individual characteristics favored our latent class regression model (p-value=0.02), indicating that education and interest in politics contribute to explain the different economic voting patterns between the two types of voters found in the sample.

Table 1: Latent prevalence regression for the relationship between vote choice and education, interest and sophistication

Covariates	Odds ratios (Class 2 versus Class 1)	90% Confidence Interval
<i>Interes in campaigns</i>	0.39	0.13 - 0.95
<i>College education</i>	0.36	0.18 - 0.73
<i>Sophistication</i>	1.15	0.88 - 1.51

Together, the evidence presented in Figure 1 and Table 1 indicates that less informed and educated voters clearly took national economic outcomes into account in the Presidential election.

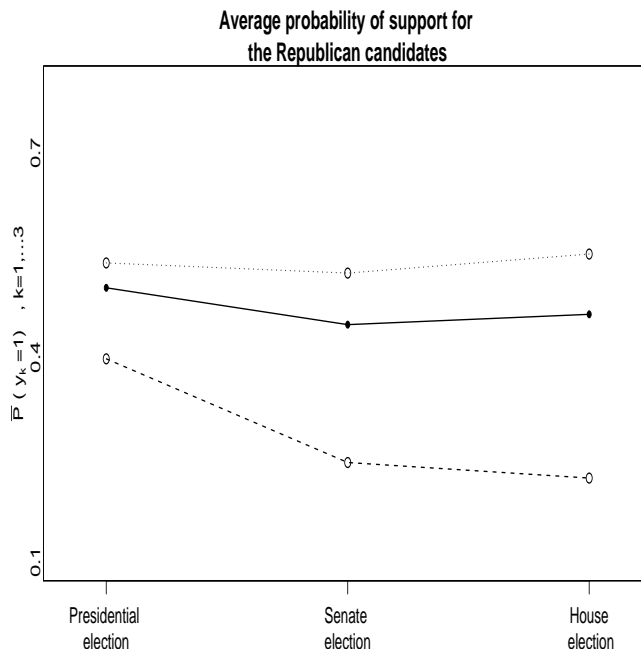


Figure 2: Average probability of support for Republican candidates across races. The solid line plots the sample vote-shares of Republican candidates in the three elections analyzed. The dashed and dotted lines plot the corresponding average probabilities of support for  $\eta = 1$  and  $\eta = 2$ , respectively

Although *Political sophistication* had no significant effect on the probability of class membership, these results are in the spirit of Gomez and Wilson’s (2001,2003) ‘Theory of Heterogeneous Attribution’, in the sense that less sophisticated voters are more likely to attribute credit or blame for national economic developments to the single most obvious actor, the chief of the executive. Our finding that that *Sociotropic evaluations* had no effect on the vote of less informed and educated voters in either of the two Congressional races is also in line with Gomez and Wilson (2001, 2003), suggesting that this group of voters failed to recognize that other political actors besides the President, such as members of Congress, may also affect national economic developments. However, in contrast to their arguments, we do find that less informed and educated voters took their personal finances into account in the House election and, more importantly, that economic perceptions had actually no effect on the vote of more sophisticated in any of the three elections under analysis. In this sense, our results suggest that the most important difference between sophisticated and unsophisticated voters in the 2004 election did not lie on whether they relied on national or personal economic assessments when casting their vote, but rather on whether their economic perceptions had a significant effect on vote choice or not. That is, while the focus of most recent research on economic voting (Gomez and Wilson, 2001, 2003, 2006; Godbout and Belanger, 2007) has been on the distinction between ‘sociotropic’ versus ‘pocketbook’ voters, we find that the main divide in the 2004 U.S. election was between ‘economic’ and ‘non-economic’ voters.

#### 4. CONCLUDING REMARKS

In this study, we examined the impact of individual covariates on economic voting in simultaneous Presidential, Senate and House elections using a latent class regression model. This modeling approach allows us account for associations among citizens' vote choice across races, testing hypotheses on the existence of different patterns of economic voting behavior and determining whether different theories and associated explanatory variables actually discriminate between heterogeneous groups of voters. Using survey data from the 2004 U.S. election, we found that voters' education and information levels had a significant effect on their economic voting behavior. Respondents with college education and those more interested in politics based their vote in the Presidential and Congress, House and Senate elections on factors other than economic perceptions. In contrast, economic assessments had a significant effect on the vote of less educated and interest voters, with sociotropic evaluations strongly affecting the probability of supporting the incumbent President and personal financial judgments influencing vote choice in House elections. Unlike recent empirical analyses of economic voting in the U.S., we find that the main distinction in the 2004 election was not between 'sociotropic' and 'pocketbook voters', but rather between 'economic' and 'non-economic' voters.

Since this work is preliminary, there are many possible extensions for further research. An immediate extension would be to include a larger number of election years in the analysis, examining the patterns and determinants of economic voting behavior across time. Another possible extensions is using a hierarchical extension of the latent class regression model implemented in this paper, accounting for nested data structures - i.e., allowing for clustering of voters within elections/districts - along the lines of Vermunt and Magidson (2005) and Vermun (2008). Also, benefiting from the ANES panel studies, it is possible to asses the influence of electoral campaigns and economic information on voters' economic voting behavior (Godbout and Belanger, 2007) using latent class regression models for longitudinal data and including both constant and time-varying individual characteristics in the model (Vermunt, Langeheine and Bockenholt, 1999; Vermunt, Tran and Magidson, 2008). In addition, it is possible to relax some of the assumption of the model and compare the results with those presented in this paper. For instance, the assumption that voter's choice across races is independent given her class membership can be substituted and a model assuming that vote in the Presidential race affects vote choice in the Congressional elections could be implemented (Vermunt, 1997). Finally, while estimation in this paper was based on the EM algorithm, Bayesian estimation of latent class models using Markov chain Monte Carlo methods has been recently gaining ground due mainly to improvements in computing power (Hojtink, 1998; Garrett and Zeger, 2000; Lenk and De Sarbo, 2000). Although the EM-algorithm usually leads to reasonable parameter estimates, it often fails to provide useful measures of uncertainty and can be subject to convergence problems (Braun and Leibs, 2008). On the other hand, Bayesian estimation of latent class models is particularly susceptible to identifiability problems due to the 'label-switching' problem (Celeux et al., 1997; Stephens, 2000). Hence, the two estimation approaches exhibit advantages and drawbacks that have to be carefully examined in particular applications. While some comparisons of Bayesian vs. maximum likelihood estimation of latent class regression models have been performed and reported (e.g., Vermunt, 2005), these contrasts have been restricted to particular classes of models. Exploring and contrasting the two estimation approaches when applied to examine economic voting using a much broader class of latent class regression models is particularly relevant from a methodological perspective.

## 5. REFERENCES

- Abramowitz, Alan I., David J. Lanoue, and Subha Ramesh. 1988. Economic Conditions, Causal Attributions, and Political Evaluations in the 1984 Presidential Election. *Journal of Politics* 50, 848-863.
- Agresti, A. 2002. *Categorical data analysis*. New York: JohnWiley Sons.
- Bandeen-Roche, K., Miglioretti, D. L., Zeger, S. L. and Rathouz, P. J. 1997. "Latent variable regression for multiple discrete outcomes." *Journal of the American Statistical Association*, 92, 1375-1386.
- Chung, Hwan, Flaherty, Brian P., and Joseph L. Schaffner. 2006. "Latent class logistic regression: application to marijuana use and attitudes among high school seniors." *J. R. Statist. Soc., Series A*, 169, Part 4, pp. 723-743.
- Conover, Pamela, and Stanley Feldman and Kathleen Knight. 1986. Judging Inflation and Unemployment: The Origins and Retrospective Evaluations. *Journal of Politics* 48, 565-588.
- Delli Carpini, Michael, and Scott Keeter. 1996. *What Americans know about politics and why it matters*. New Haven: Yale University Press.
- Duch, Raymond M. 2001. A Developmental Model of Heterogeneous Economic Voting in New Democracies. *American Journal of Political Science* 95, 895-910.
- Feldman, Stanley. 1982. Economic Self-Interest and Political Behavior. *American Journal of Political Science* 26, 446-466.
- Fiorina, Morris P. 1981. "Retrospective Voting in American National Elections". New Heaven: Yale University Press.
- Finkel, S.E. 1993. "Re-examining the 'Minimal-Effects' Model in Recent Presidential Campaigns." *Journal of Politics*, 55, 1-21.
- Flaherty, B. P. 2002. "Assessing the reliability of categorical substance use measures with latent class analysis." *Drug Alc. Depend.*, 68, S7-S20.
- Formann, A. K. 1992. "Linear logistic latent class analysis for polytomous data." *Journal of the American Statistical Association*, 87, 476-486.
- Fruhwirth-Schattner, Sylvia. 2006. *Finite Mixture and Markov Switching Models*. New York: Springer.
- Godbout, Jean-Francois, and Eric Belanger. 2007. Economic Voting and Political Sophistication in the United States: A Reassessment. *Political Research Quarterly* 60(3), 541-554.
- Gomez, Brad T., Wilson, J. Matthew. 2001. Political Sophistication and Economic Voting in the American Electorate: A Theory of Heterogeneous Attribution. *American Journal of Political Science* 45, 899-914.
- Gomez, Brad T., Wilson, J. Matthew. 2003. Causal Attribution and Economic Voting in American Congressional Elections. *Congressional Research Quarterly* 56, 271-282.

- Gomez, Brad T., Wilson, J. Matthew. 2006. Cognitive Heterogeneity and Economic Voting: A Comparative Analysis of Four Democratic Electorates. *American Journal of Political Science* 50(1), 127-145.
- Godbout, Jean-Francois, and Eric Belanger. 2007. Economic Voting and Political Sophistication in the United States: A Reassessment. *Political Research Quarterly* 60(3), 541-554.
- Goodman, L.A. 1974. "The analysis of systems of qualitative variables when some of the variables are unobservable: Part I - A modified latent structure approach." *American Journal of Sociology*, 79, 1179-1259.
- Grun, Bettina, and Friedrich Leisch. 2004. Bootstrapping finite mixture models. *Proceedings of the COMPSTAT 2004 Symposium*. Berlin: Physica-Verlag/Springer.
- Grun, Bettina, and Friedrich Leisch. 2007. Finite Mixtures of Generalized Linear Regression Models. Technical Report Number 013,2007. Department of Statistics, University of Munich.
- Grun, Bettina, and Friedrich Leisch. 2008. Identifiability of Finite Mixtures of Multinomial Logit Models with Varying and Fixed Effects. Technical Report Number 024,2008. Department of Statistics, University of Munich.
- Hagenaars, J.A. 1990. *Categorical longitudinal data - loglinear analysis of panel, trend and cohort data*. Newbury Park: Sage.
- Hibbs, Douglas A., and R. Douglas Rivers, and Nicholas Vasilatos. 1982. On the Demand for Economic Outcomes: Macroeconomic Performance and Mass Political Support in the United States, Great Britain and Germany. *Journal of Politics* 44, 426-461.
- Huang, Guan-Hua. Selecting the Number of Classes Under Latent Class Regression: A Factor Analytical Analogue. *Psychometrika* 70(2), 325-345.
- Inglehart, Ronald. 1977. "The Silent Revolution". Princeton: Princeton University Press.
- Kinder, Donald R., and D. Roderick Kiewiet. 1979. Economic Discontent and Political Behavior: The Role of Personal Grievances and Collective Economic Judgements in Congressional Voting. *American Journal of Political Science* 23, 495-527.
- Kinder, Donald R., and D. Roderick Kiewiet. 1981. Sociotropic Politics: The American Case. *British Journal of Political Science* 11, 129-161.
- Kinder, Donald R., and Walter R. Mebane. 1983. Politics and Economics in Everyday Life. In Kristen Monroe (ed.), *The Political Process and Economic Change*, pp. 141-180. New York: Agathon.
- Kramer, Gerald H.. 1971. Short-term Fluctuations in U.S. Voting Behavior, 1896-1964. *American Political Science Review* 65, 131-143.
- Krause, George A. 1997. Voters, information heterogeneity and the dynamics of aggregate economic expectations. *American Journal of Political Science* 41, 1170-1200.
- Lewis-Beck, Michael S., and Martin Paldam. 2000. Economic Voting: An Introduction. *Electoral Studies* 19, 113-121.

- Luskin, Robert L. 1987. Measuring Political Sophistication. *American Journal of Political Science* 31, 856-899.
- Magidson, J., Vermunt, J.K. 2001. "Latent class factor and cluster models, bi-plots and related graphical displays." *Sociological Methodology*, 31, 223-264. McCullagh, Peter, and John A. Nelder. 1989. *Generalized Linear Models*. New York: Chapman Hall.
- Manin, Bernard, and Przeworski, Adam, and Stokes, Susan C. 1999. "Elections and Representatives". In Adam Przeworski, Susan C. Stokes, and Bernard Manin (eds.) *Democracy, Accountability, and Representation*, pp. 29-54. Cambridge: Cambridge University Press.
- McLachlan, G.J., Peel, D. 2000. *Finite Mixture models*. New York: John Wiley Sons.
- Muthn, B. Muthn, L. 2000. "Integrating person-centered and variable-centered analysis: growth mixture modeling with latent trajectory classes." *Clinical and Experimental Research*, 24, 882-891.
- Mutz, Diana C. 1992. Mass Media and the Depoliticization of Personal Experience. *American Journal of Political Science* 36, 483-508.
- Pinheiro, Jose C., and Douglas M. Bates. 2000. *Mixed-Effects Models in S and S-Plus*. New York: Springer.
- Powell, G. Binham Jr., and Guy D. Whitten. 1993. A Cross-National Analysis of Economic Voting: Taking Account of the Political Context. *American Journal of Political Science* 37, 391-414.
- Sniderman, Paul, Richard A. Brody, and Philip E. Tetlock. 1991. *Reasoning and Choice: Explorations in Political Psychology*. Cambridge: Cambridge University Press.
- Tufte, Edward R. 1975. Determinants of the Outcomes of Midterm Congressional Elections. *American Political Science Review* 69, 812-826.
- Vermunt, J.K. 1997. *Log-linear models for event histories*. Advanced Quantitative Techniques in the Social Sciences Series, vol. 8, Thousand Oakes: Sage Publications.
- Vermunt, J.K.: 2008. "Multilevel latent class models." *Sociological Methodology*, 33, 50-67.
- Vermunt, J.K., Tran, Bac, and Jay Magidson. 2008. "Latent Class Models in Longitudinal Research". In S. Menard (ed.), *Handbook of Longitudinal Research: Design, Measurement, and Analysis*, 373-385.
- Vermunt, J.K., Van Dijk. L. 2001. "A nonparametric random-coefficients approach: the latent class regression model". *Multilevel Modelling Newsletter*, 13,6-13
- Weatherford, M. Stephen. 1983. Economic Voting and the 'Symbolic Politics' Argument: A Reinterpretation and Synthesis. *American Political Science Review* 77, 158-174.