Coordination, Moderation and Institutional Balancing in American House Elections at Midterm

by

Walter R. Mebane, Jr.†

and

Jasjeet S. Sekhon‡

January 18, 2000

An earlier version of this paper was presented at the 1999 Annual Meeting of the American Political Science Association, September 2–5, Atlanta Hilton and Marriott Marquis. Data were made available in part by the Cornell Institute for Social and Economic Research and the Inter-University Consortium for Political and Social Research. Thanks to Jonathan Cowden for letting tron help macht and lapo with the computing. All errors are solely the responsibility of the authors.

† Associate Professor, Department of Government, Cornell University. Email: wrm1@macht.arts.cornell.edu.

‡ Assistant Professor, Government Department, Harvard University. Email: jsekhon@fas.harvard.edu.

Abstract

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Individuals have been coordinating their turnout decisions and vote choices for the House of Representatives in recent midterm elections, with each eligible voter (each elector) using a strategy that features policy moderation. Coordination is defined as a noncooperative rational expectations equilibrium among electors, in which each elector has both common knowledge and private information about the election outcome. Stochastic choice models estimated using individual-level data from NES surveys of years 1978–1998 support both coordination and a model in which electors act non-strategically. Both models generate midterm cycles in which the President's party usually loses vote share at midterm. The 1998 exception was due to Republican party positions being too conservative for most electors. Midterm electors have expected the House to dominate the President in determining post-election policy. But parameter estimates for the non-strategic model mostly do not describe moderating behavior; the model seems to be artificially mimicking the coordinating model.

Do Americans coordinate their electoral choices in midterm congressional elections? Consider the population of everyone who is eligible to vote—henceforth, the population of *electors*. If an elector knows that policy outcomes are compromises between the positions taken by the President and the Congress, believes the two political parties push for distinct policy alternatives and cares about the policy outcomes, then the elector should take the President's party into account when deciding what to do in the election. Each elector should consider how likely it is that the election will increase support for the President's party, or increase support for the opposition party. Coordination occurs when each elector makes the best possible assessment of what the election outcome will be and then uses that assessment to act in the way that is most likely to produce the best possible result for the elector.

Alesina and Rosenthal (1989; 1995; 1996) argue that midterm voters are choosing between House candidates with the intention to bring about a moderate policy outcome, meaning a policy outcome that is an intermediate combination of the parties' positions. Moderation does not necessarily mean coordination. There is coordination if each elector's choice is in a strategic equilibrium with every other elector's choice. Following Mebane (2000), this means three things: each elector's strategy for choosing among candidates or perhaps deciding not to vote is in equilibrium with every other elector's strategy for choosing among candidates or perhaps deciding not to vote; each elector's beliefs about every other elector's preferences and strategy are compatible with the elector's own strategy; and each elector's beliefs are compatible with every other elector's beliefs.

Coordination is not cooperation. We introduce a model in which electors do not cooperate—they do not act based on binding prior agreements—but each elector is able to make an equilibrium strategic choice, in accurate anticipation of the aggregate result of the choices all other electors intend to make, by using information that all electors know. Alesina and Rosenthal's (1989; 1995; 1996) theory of midterm moderation features coordination in the choices voters make between candidates. Each voter's choice depends on an expected election result that everyone knows and that is an equilibrium. Their model does not feature an equilibrium level of voter turnout, however. In our model there is an equilibrium that includes the level of turnout along with the two-party split of votes for House candidates. Our model allows exogenous factors to motivate an elector to vote, so our equilibrium is not necessarily a new solution to the problem of obtaining substantial positive turnout in equilibrium based purely on post-election policy considerations (cf. Hinich, Ledyard and Ordeshook 1972; Enelow and Hinich 1984; Ledyard 1984; Palfrey and Rosenthal 1985). Voters in Alesina and Rosenthal's treatment do not have private information about the election outcome. In our model, different electors have beliefs about the upcoming election results that are very similar but not exactly the same in equilibrium. The similarity is a result of common knowledge they have, while the differences are due to private information each elector has about the elector's preferences.

We use National Election Studies (NES) survey data from midterm election years 1978 through 1998 to estimate a stochastic choice model that matches the theoretical model. In both models, each elector forms preferences about the candidates based on a personally distinct idea about what the parties' policy positions are. The coordination takes the form of a rational expectations equilibrium among electors. The equilibrium concept is the same as in Mebane (2000), whose analysis of presidential and House candidate choices however considers only voters. The empirical results support the idea that in recent years Americans have coordinated their electoral choices for the House of Representatives, with most electors using a strategy that features policy moderation.

We also introduce an empirical model that applies to midterm elections the core idea in the non-strategic theory that Fiorina (1988; 1992, 73–81) introduced to describe institutional balancing by voters in elections during presidential years. Mebane (2000) finds the non-strategic theory to be significantly inferior to his coordinating theory in analysis of NES data from the presidential-year elections of years 1976–1996. We find the non-strategic model to have implications for midterm elector behavior that are very similar to the implications of the coordinating model.

The theory of moderation-with-coordination developed by Alesina and Rosenthal (1989; 1995; 1996) implies that the party that wins a presidential election will usually lose support in Congress at midterm. Each voter chooses a congressional candidate during the presidential-year election to match the voter's expectation regarding the presidential outcome, which is uncertain. For some voters, the congressional votes cast when the presidential outcome is uncertain are not the votes they would have cast had they known which presidential candidate would win. At midterm such voters change their votes, so that the midterm election results differ from the congressional results in the preceding presidential-election year. Usually the changed votes reduce support for candidates of the President's party. Alesina and Rosenthal (1989; 1995, 137–160; Alesina, Londregan and Rosenthal 1993) show patterns in aggregate data that match the kind of midterm cycle that their theory implies. Evidence that individual midterm voters act the way the equilibrium of their theory says they should has been lacking. We examine whether a non-strategic model of individual electors' choices can explain a midterm cycle pattern as well as a coordinating equilibrium model can.

Alesina and Rosenthal's theory is not the only one on offer to explain the frequently observed midterm cycle (Erikson 1988). Some have emphasized the connection between evaluations of the President and midterm election outcomes. Put most simply, as the President's popularity goes, so goes the midterm election (Kernell 1977; Piereson 1975; Born 1990; Cover 1986; Abramowitz 1985).[1] Such explanations are not strictly speaking alternatives to a policy-moderating theory, because evaluations of policy performance may be a large reason for a President to be more or less popular. Another line of argument emphasizes differences in voter turnout between the presidential election and midterm, with a surge of support for the President's party in the presidential election ebbing at midterm (Campbell 1966; Campbell 1985, 1987, 1991; Born 1990; Cover 1986). The relationship between partisan preferences and turnout at midterm is well known to be strong, as we reconfirm in our empirical analysis. We are not currently able to assess how surge-and-decline dynamics may affect midterm cycles in the context of a coordinating equilibrium, because we do not have a comparable analysis of elector's choices in presidential years.

In a manner similar to Mebane (2000), the heart of the formal model of coordination that we develop and test is a fixed-point theorem that defines the common knowledge belief that all electors have about the upcoming election results.[2] The values of two aggregate statistics summarize the election results: (i) the proportion of the two-party vote to be cast nationally for Republican candidates for the House and (ii) the proportion of electors who will vote. Some electors care about those values because the values affect the loss each expects from policies the government will adopt after the election. Each such elector chooses what to do so as to minimize that loss. Therefore the elector's belief about the aggregate values affects the elector's choice. The fixed-point theorem shows that aggregate values exist that have a basic self-consistency property: if every elector chooses based on belief that the aggregate statistics have those values, then the common knowledge aggregate result to be expected from all the electors' choices is the very same pair of aggregate values. If each elector's belief equals the fixed-point values adjusted by amounts that correspond to the elector's choice (which uses the elector's private information), then the belief each elector has about the aggregate result is consistent with the choice the elector knows it will make. Despite knowing that every other elector is also acting on the basis of beliefs that differ slightly from the common knowledge values, no elector knows any other elector's private information and so no elector can do any better than to use the common knowledge values as its aggregate expectation for what everyone else is going to do. Because all electors are situated similarly, it is common knowledge that every elector is forming beliefs in that way. So there is an equilibrium in which every elector has a slightly different expectation regarding the upcoming election results.

The fixed-point result that determines what electors' beliefs are in equilibrium in the theoretical model imposes a constraint on the statistical model to be used to estimate the parameters of the model with survey data. The parameter estimates must be such that the aggregate election summary statistics computed from the survey data satisfy the fixed-point condition. Mebane (2000) first imposed such a constraint on a stochastic choice model of electoral behavior. The empirically determined fixed-point values are the estimates for the aggregate values that are common knowledge in equilibrium in the theoretical model. Because of limitations of survey data, the empirical model treats the fixed-point values as the belief that every elector has regarding the upcoming election outcome. The empirical and theoretical models specify the same stochastic choice model for each elector, but the empirical model does not refine each elector's belief to take the elector's private information into account.

A Model of Coordinating Turnout and Vote Choices at Midterm

In the model the election is a game among everyone who is eligible to vote, that is, among all the electors, assumed to be a large number. Electors all act non-cooperatively. The model focuses on the choice each elector makes whether to vote for one of two candidates for a House seat, or not to vote. There are many House districts, but each elector has the option of voting in only one of them. There are two parties, Democratic and Republican, and each race has one candidate running for each party (in the next section we extend the model to include districts in which one candidate is running unopposed). Both whether the incumbent is running and the incumbent's party vary over districts. Some electors' preferences regarding the candidates and the possibility of not voting depend on the expected outcome of the election and therefore on the choice strategy every other elector is using. Equilibrium occurs when, given everything each elector knows, including the elector's own intended choice and accurate expectations regarding other electors' strategies, no elector expects to gain by using a different strategy.

Some electors have preferences regarding the three choices that depend on comparisons between the elector's ideal point and the policies the elector believes will result from various election outcomes. Those policies are functions of the policy position the elector expects each party will act on after the election. The expected post-election policy position for the party of the President is a combination of two positions that may differ: the position the elector associates with the party on the basis of previous turns in office and previous campaigns, and the position the elector thinks the President has adopted. For each election, the expected position of the President's party is a weighted average of the President's position and the prior party position. The more influence the President has over the party, the greater the weight of the President's position. For the opposing party there is no presidential figure so there is only one position for the elector to consider.

We use ϑ_{Di}, ϑ_{Ri}, ϑ_{PDi} and ϑ_{PRi} to denote values in the interval $[0,1]$ that elector i, $i = 1, \ldots, N$, believes at election time are the prior positions of the Democratic party (ϑ_{Di}) and Republican party (ϑ_{Ri}), and, as relevant, the position of the Democratic President (ϑ_{PDi}) or the Republican President (ϑ_{PRi}). The positions i expects the Democratic party (θ_{Di}) and the Republican party (θ_{Ri}) to act on after the election are, respectively,

$$\theta_{Di} = \begin{cases} \rho\vartheta_{PDi} + (1-\rho)\vartheta_{Di}, & \text{if Democrat is President} \\ \vartheta_{Di}, & \text{if Republican is President} \end{cases} \tag{1}$$

$$\theta_{Ri} = \begin{cases} \vartheta_{Ri}, & \text{if Democrat is President} \\ \rho\vartheta_{PRi} + (1-\rho)\vartheta_{Ri}, & \text{if Republican is President} \end{cases} \tag{2}$$

with $0 \leq \rho \leq 1$. If the President is a Democrat and the Democratic party's position is expected to be very close to the President's position, the weight ρ is near one, but if the party's position is expected to remain close to its previous value, ρ is near zero. The elector's expectation for the position of the Republican party with a Republican President is determined analogously.

The policy expected to result from each possible election outcome depends on four factors: the parties' expected policy positions (as just defined); the policy position expected to be supported in the House; the President's strength relative to the House; and the President's party.[3] We define the expected position of the House as a weighted average of the expected positions of the parties. Each party's weight is equal to the proportion of the vote that elector i expects to be cast nationally for the party's House candidates. The proportion that i expects to be cast for Republicans, denoted $\bar{H}_i$, is a function of the proportion of electors i expects to vote nationally for Republicans ($\bar{R}_i$) and for Democrats ($\bar{D}_i$): $\bar{H}_i = \bar{R}_i/\bar{V}_i$, where $\bar{V}_i = \bar{R}_i + \bar{D}_i$ is the proportion of electors i expects will vote nationally. The expected position of the House is $\bar{H}_i\theta_{Ri} + (1 - \bar{H}_i)\theta_{Di}$.

The post-election policy that elector i expects is a weighted average of the expected position of the House and the expected position of the President's party. The weight of the President, denoted α, $0 \leq \alpha \leq 1$, represents the President's strength in comparison to the House. The expectation for post-election policy depends on the President's party:

$$\tilde{\theta}_i = \begin{cases} \alpha\theta_{Di} + (1-\alpha)[\bar{H}_i\theta_{Ri} + (1-\bar{H}_i)\theta_{Di}], & \text{if Democrat is President} \\ \alpha\theta_{Ri} + (1-\alpha)[\bar{H}_i\theta_{Ri} + (1-\bar{H}_i)\theta_{Di}], & \text{if Republican is President} \end{cases} \tag{3}$$

The value $\alpha = 1$ means that the President is expected to dictate policy, while $\alpha = 0$ means that the House is expected to determine policy with the President being irrelevant.

The functional form of $\tilde{\theta}_i$ is the same as the simplest policymaking formalism considered by Alesina and Rosenthal (1995, 47–48), but there is an important difference in what the current model says about the information that electors have. As does the model of Mebane (2000), the specification of (3) differs from Alesina and Rosenthal's (1995) theory in allowing the expected positions θ_{Di} and θ_{Ri} and the expected election outcome $\bar{H}_i$ to vary over electors. In the theory of Alesina and Rosenthal (1995; 1996), the expected policies and expected election outcomes have the same values for all voters. The variations in the values endow electors with private information in a way that the theory of Alesina and Rosenthal (1995; 1996) essentially does not do.

We use a variable ς_i to indicate whether the preferences of elector i depend on expected policy outcomes: $\varsigma_i = 1$ if so, $\varsigma_i = 0$ if not. The policy-related loss each elector with $\varsigma_i = 1$ expects from the election outcome depends on the absolute discrepancy between the elector's ideal point, denoted $\theta_i \in [0, 1]$, and the policy expected given the election outcome. The loss always increases as the absolute discrepancy $|\theta_i - \tilde{\theta}_i|$ gets larger. We use an exponent $q > 0$ to allow the loss to be a concave ($0 < q < 1$), linear ($q = 1$) or convex ($1 < q < +\infty$) function of $|\theta_i - \tilde{\theta}_i|$. The loss is

$$\lambda_i = \begin{cases} |\theta_i - \tilde{\theta}_i|^q\,, & \text{if } \varsigma_i = 1 \\ 0\,, & \text{if } \varsigma_i = 0\,. \end{cases} \tag{4}$$

Every elector's choice affects the expected election outcome, $\bar{H}_i$, and hence affects $\tilde{\theta}_i$ and therefore for electors with $\varsigma_i = 1$ affects the expected loss λ_i. If $\varsigma_i = 1$, the expected loss therefore has three different values, depending on whether i chooses the Republican ($\lambda_{i,R}$), i chooses the Democrat ($\lambda_{i,D}$) or i does not vote ($\lambda_{i,A}$). For electors with $\varsigma_i = 0$, $\lambda_{i,R} = \lambda_{i,D} = \lambda_{i,A} = 0$.

Considerations other than the expected policy-related losses also affect the value elector i associates with each choice. For instance, the act of voting itself subjects i to rewards or costs that do not occur if i does not vote. Let the continuous random variables $\xi_{i,A}$, $\xi_{i,D}$ and $\xi_{i,R}$ represent gains or losses elector i experiences in addition to the expected policy-related losses if i, respectively, does not vote, votes for the Democrat and votes for the Republican. The total loss for i from the election, taking into account i's choice whether to participate, is then

$$\tilde{\lambda}_i = \begin{cases} \lambda_{i,D} + \xi_{i,D}, & \text{if } i \text{ votes for the Democrat} \\ \lambda_{i,R} + \xi_{i,R}, & \text{if } i \text{ votes for the Republican} \\ \lambda_{i,A} + \xi_{i,A}, & \text{if } i \text{ does not vote}\,. \end{cases} \tag{5}$$

An elector's preference between voting for the Democrat and voting for the Republican depends on which choice produces the least total loss, $\tilde{\lambda}_i$. Using $\bar{V}_{i,V}$ to denote the proportion of electors i expects to vote, including i, let $\bar{H}_{i,R} = \bar{R}_{i,R}/\bar{V}_{i,V}$ denote the proportion of the national vote received by Republican House candidates if i chooses the Republican running in i's district, and let $\bar{H}_{i,D} = \bar{R}_{i,D}/\bar{V}_{i,V}$ denote the proportion received by Republican House candidates if i chooses the Democrat. Because N is large and each i has one vote that is cast (or not) independently of other votes, the effect of a single elector's choice on the expected election outcome is small: $\bar{R}_{i,R} = \bar{R}_{i,D} + 1/N$, so that $\bar{H}_{i,R} - \bar{H}_{i,D} = (N\bar{V}_{i,V})^{-1}$. The small size of $\bar{H}_{i,R} - \bar{H}_{i,D}$ means that the effect on λ_i of i's choosing the Republican rather than the Democrat, $\lambda_{i,R} - \lambda_{i,D}$, is well approximated by $(N\bar{V}_{i,V})^{-1} d\lambda_i/d\bar{H}_i$.[4] If $(N\bar{V}_{i,V})^{-1} d\lambda_i/d\bar{H}_i$ is positive, voting for the Republican rather than the Democrat increases i's expected policy-related loss. Elector i therefore prefers the Republican to the Democrat if $(N\bar{V}_{i,V})^{-1} d\lambda_i/d\bar{H}_i + \xi_{i,R} - \xi_{i,D} < 0$, and the Democrat to the Republican if $(N\bar{V}_{i,V})^{-1} d\lambda_i/d\bar{H}_i + \xi_{i,R} - \xi_{i,D} > 0$.

An elector's preferences between voting for one of the candidates and not voting likewise depend on which produces the least total loss. Using $\bar{V}_{i,A} = \bar{V}_{i,V} - 1/N$ to denote the proportion of electors i expects to vote, excluding i, let $\bar{H}_{i,A} = \bar{R}_{i,A}/\bar{V}_{i,A}$ denote the proportion of the national vote received by Republican House candidates if i does not vote, $\bar{R}_{i,A} = \bar{R}_{i,R} - 1/N$. Then $(N\bar{V}_{i,A})^{-1}(1 - \bar{H}_{i,R}) d\lambda_i/d\bar{H}_i$ and $-(N\bar{V}_{i,A})^{-1}\bar{H}_{i,D} d\lambda_i/d\bar{H}_i$ respectively approximate the effect on λ_i of i's choosing the Republican or the Democrat rather than not voting.[5] So i prefers to vote for the Republican, rather than not to vote, if $(N\bar{V}_{i,A})^{-1}(1-\bar{H}_{i,R}) d\lambda_i/d\bar{H}_i + \xi_{i,R} - \xi_{i,A} < 0$, and i prefers to vote for the Democrat, rather than not to vote, if $-(N\bar{V}_{i,A})^{-1}\bar{H}_{i,D} d\lambda_i/d\bar{H}_i + \xi_{i,D} - \xi_{i,A} < 0$.

We can summarize elector i's preferences among all three choices—voting for the Republican (R), voting for the Democrat (D) and not voting (A)—as a choice rule for i, expressed as a random variable Y_i that takes values on the choice set $K = \{D, R, A\}$. Observe that $d\lambda_i/d\bar{H}_i = w_{Ci}$, where

$$w_{Ci} = \begin{cases} q(\theta_{Di} - \theta_{Ri})(1-\alpha)|\theta_i - \tilde{\theta}_i|^{q-1}\,\mathrm{sgn}(\theta_i - \tilde{\theta}_i)\,, & \text{if } \varsigma_i = 1 \\ 0\,, & \text{if } \varsigma_i = 0\,, \end{cases}$$

with $\mathrm{sgn}(x) = -1$ if $x < 0$, $\mathrm{sgn}(x) = 0$ if $x = 0$, and $\mathrm{sgn}(x) = 1$ if $x > 0$. Defining

$$\kappa_{i,D} = -(N\bar{V}_{i,A})^{-1}\bar{H}_{i,D} w_{Ci} + \xi_{i,D} \tag{6a}$$

$$\kappa_{i,R} = (N\bar{V}_{i,A})^{-1}\left(1 - \bar{H}_{i,R}\right) w_{Ci} + \xi_{i,R} \tag{6b}$$

$$\kappa_{i,A} = \xi_{i,A}\ , \tag{6c}$$

we may write i's choice rule as

$$Y_i = \operatorname*{argmin}_{h \in K} \kappa_{i,h} \ . \tag{7}$$

Equation (7) defines a strategy for each elector. In the game, the moves available to each elector are the three choices. We assume that all electors move simultaneously, each elector plays non-cooperatively, and each elector knows that every other elector is playing the game the same way. Because $\kappa_{i,D}$ and $\kappa_{i,R}$ depend directly on both the proportion of electors who vote ($\bar{V}_i$) and the parties' shares of the vote ($\bar{H}_i$), the best choice for each elector whose preferences depend on the expected post-election policy depends on what every other elector is going to do. The strategy defined by (7) is an equilibrium if it is the rule that minimizes each elector's expected loss when each elector assumes that everyone else is using the same rule.

For an equilibrium to exist, each elector i must assign values to $\bar{H}_i \in \{\bar{H}_{i,D}, \bar{H}_{i,R}, \bar{H}_{i,A}\}$ and $\bar{V}_i \in \{\bar{V}_{i,V}, \bar{V}_{i,A}\}$ in a way that accurately corresponds to the choices every other elector is likely to make. To be able to do that, each i must know enough about the losses other electors expect to incur from the possible election outcomes to allow i to anticipate what the others will do in response to each electoral circumstance that may arise. Knowledge of that response pattern allows each i to determine the mutually consistent values of $\bar{H}_i$ and $\bar{V}_i$. The pair $(\bar{H}_i, \bar{V}_i)$ is mutually consistent if, given everything i knows, i chooses in such a way that—taking i's own choice into account—the proportion of votes i expects to be for Republican candidates is $\bar{H}_i$ and the proportion of electors i expects will vote is $\bar{V}_i$. In equilibrium, all pairs $(\bar{H}_i, \bar{V}_i)$, $i = 1, \ldots, N$, are mutually consistent.

We assume it is common knowledge (Fudenberg and Tirole 1991, 541–546) that every elector i has an expected loss $\tilde{\lambda}_i$ as defined by (5), and further that every i is choosing so as to minimize $\tilde{\lambda}_i$. We assume that the common knowledge includes the values of all parameters, including ρ, α, q and any parameters in $\xi_{i,D}$, $\xi_{i,R}$ or $\xi_{i,A}$. It is then common knowledge that, for some values of the policy position and other variables, (7) is every elector's choice rule.

No elector knows the values of the ideal point, the party and presidential candidate policy positions, or the other variables on the basis of which any other elector is choosing via (7). Each elector does know the probability distribution of those values. Let Z_i be an ordered set that includes all the observable variables in $\tilde{\lambda}_i$. That includes ς_i, the position variables θ_i, ϑ_{Di}, ϑ_{Ri} and ϑ_{PDi} or ϑ_{PRi}, and the component $z_{i,h}$ of each $\xi_{i,h}$, $h \in K$, that may be observed using some generally known technology (e.g., an opinion survey). There are $M \ll N$ mutually exclusive and exhaustive groups of electors, denoted E_k, $k = 1, \ldots, M$. For every elector $i \in E_k$, the election-time value of Z_i is generated, independently across individuals, by a process that takes values in a set $\tilde{Z}$ and has unimodal probability measure f_k, with $\int_{\tilde{Z}} df_k(Z_i) = 1$ and $\int_{\tilde{Z}} Z_i df_k(Z_i)$ finite. Let $\epsilon_{i,h}$ denote the component of $\xi_{i,h}$ not covered by Z_i, $h \in K$. These variables—collectively, the disturbance $\epsilon_i = (\epsilon_{i,D}, \epsilon_{i,R}, \epsilon_{i,A})$—have a joint distribution that is the same for every elector:

$$\Pr(\epsilon_{i,D} < x_D, \epsilon_{i,R} < x_R, \epsilon_{i,A} < x_A) = F_H(x_D, x_R, x_A) \ ,$$

where F_H is a generalized extreme value (GEV) distribution, independent of each f_k.[6] We assume that M, $\tilde{Z}$, f_k, $k = 1, \ldots, M$, the number of electors in each group (M_k), and the fact that ϵ_i is identically and independently distributed as F_H are all common knowledge.

Because many of the costs (or benefits) of voting are the same regardless of which candidate an elector prefers, we assume that $\epsilon_{i,R}$ and $\epsilon_{i,D}$ covary but are independent of $\epsilon_{i,A}$. To specify such a GEV distribution, we start by defining

$$x_{i,D} = -(N\bar{V}_{i,A})^{-1}\bar{H}_{i,D} w_{Ci} + z_{i,D} \tag{8a}$$

$$x_{i,R} = (N\bar{V}_{i,A})^{-1}\left(1 - \bar{H}_{i,R}\right) w_{Ci} + z_{i,R} \tag{8b}$$

$$x_{i,A} = z_{i,A} \ . \tag{8c}$$

Using $v_{i,h} = \exp\{-x_{i,h}\}$, $h \in K$, we define

$$G_i = \left(v_{i,D}^{1/1-\tau} + v_{i,R}^{1/1-\tau}\right)^{1-\tau} + v_{i,A} \ , \qquad 0 \leq \tau < 1 \ . \tag{9}$$

Parameter τ measures the dependence between $\epsilon_{i,R}$ and $\epsilon_{i,D}$. If $\epsilon_{i,R}$ and $\epsilon_{i,D}$ are independent, $\tau = 0$. The GEV distribution function is $F_H(-x_{i,D}, -x_{i,R}, -x_{i,A}) = \exp\{-G_i\}$.

Given Z_i but ϵ_i known only to have the distribution F_H, choice rule (7) implies that the probabilities for elector i to make each choice are

$$\Pr(Y_i = h \mid Z_i) = \frac{v_{i,h}}{G_i} \frac{\partial G_i}{\partial v_{i,h}}, \quad h \in K \tag{10}$$

(McFadden 1978; Resnick and Roy 1990). Define $\mu_{i,h} = \Pr(Y_i = h \mid Z_i)$, $h \in K$.

To characterize the conditions under which mutually consistent pairs $(\bar{H}_i, \bar{V}_i)$ exist when each elector i knows all its own attributes, i.e., knows Z_i and ϵ_i, we first consider what happens when each i knows only which group it belongs to. Because M, M_k, $\tilde{Z}$, f_k and F_H are common knowledge, no elector then has any information that would produce an expectation about the election outcome different from what the common knowledge would imply. No elector has any relevant private information. Therefore, if a set of mutually consistent pairs exists, the expectations $(\bar{H}_i, \bar{V}_i)$ will be the same for all electors (Aumann 1976; Nielsen et al. 1990). Let $(\bar{H}, \bar{V})$ denote the common value that all the pairs have in this case.

Knowing only the group E_k to which an elector i belongs, and therefore knowing only the range $\tilde{Z}$ and probability measure f_k of the variables in Z_i, every elector determines the same probability for i to choose each alternative, by using f_k to integrate over the unknown data:

$$\Pr(Y_i = h \mid i \in E_k) = \int_{\tilde{Z}} \Pr(Y_i = h \mid Z_i) df_k(Z_i), \quad h \in K . \tag{11}$$

Define $\bar{\mu}_{k,h} = \Pr(Y_i = h \mid i \in E_k)$, $h \in K$. Using f_{k_i} to denote the measure for the group to which i belongs, the proportion of electors expected to vote for Republican candidates is

$$\begin{aligned}
\bar{R} &= N^{-1} \underbrace{\int_{\tilde{Z}} \cdots \int_{\tilde{Z}}}_{N \text{ times}} \left(\sum_{i=1}^{N} \mu_{i,R} \right) \prod_{i=1}^{N} df_{k_i}(Z_i), && \text{by common knowledge} \\
&= N^{-1} \sum_{k=1}^{M} \sum_{i \in E_k} \int_{\tilde{Z}} \mu_{i,R} df_k(Z_i), && \text{by independence}
\end{aligned}$$

$$= N^{-1} \sum_{k=1}^{M} M_k \bar{\mu}_{k,R} \; . \tag{12}$$

Similarly, the proportion of electors expected to vote for Democratic candidates is

$$\bar{D} = N^{-1} \sum_{k=1}^{M} M_k \bar{\mu}_{k,D} \tag{13}$$

and the proportion of electors expected to vote nationally is

$$\bar{V} = \bar{R} + \bar{D} \; , \tag{14}$$

so that the expected House outcome is

$$\bar{H} = \bar{R}/\bar{V} \; . \tag{15}$$

We assume that the functional forms of (12), (13), (14) and (15) are common knowledge. It then follows that the set of possible values of $\bar{H}$ and $\bar{V}$ is common knowledge. If only the group membership of each elector is known, the mutual consistency condition requires that the $\bar{H}$ and $\bar{V}$ values must reproduce themselves when they are used to compute the functions $\bar{\mu}_{k,h}$, $h \in K$, and hence (12), (13), (14) and (15). The pair of computed values $(\bar{H}, \bar{V})$ must be a fixed point of the mapping $[0,1]^2 \rightarrow [0,1]^2$ that (12), (13), (14) and (15) define. In Appendix A (Theorem 2) we show that such a pair $(\bar{H}, \bar{V})$ always exists (except on a set of measure zero).

The result when each elector i knows Z_i and ϵ_i may be expressed as a collection of small deviations from a fixed point $(\bar{H}, \bar{V})$. Let $\bar{\mu}_{k_i,h}$, $h \in K$, denote the group-specific probabilities for the group E_k to which i belongs. Let $\tilde{\mu}_{i,h}$ indicate the value of Y_i of (7) when i knows Z_i and ϵ_i but for other electors has only the common knowledge: $\tilde{\mu}_{i,h} = 1$ if $Y_i = h$, $\tilde{\mu}_{i,h} = 0$ if $Y_i \neq h$, $h \in K$. The values of $\tilde{\mu}_{i,h}$, $h \in K$, depend on $\bar{H}_i = \bar{H}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}}$ and $\bar{V}_i = \bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}}$, where $\bar{H}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}}$ and $\bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}}$ are obtained by replacing one instance of $\bar{\mu}_{k_i,R}$ in (12) with $\tilde{\mu}_{i,R}$ and one instance of

$\bar{\mu}_{k_i,D}$ in (13) with $\tilde{\mu}_{i,D}$ and then using (14) and (15):

$$\bar{R}_{i\tilde{\mu}_{i,R}} = \bar{R} + (\tilde{\mu}_{i,R} - \bar{\mu}_{k_i,R})/N \tag{16a}$$

$$\bar{D}_{i\tilde{\mu}_{i,D}} = \bar{D} + (\tilde{\mu}_{i,D} - \bar{\mu}_{k_i,D})/N \tag{16b}$$

$$\bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}} = \bar{R}_{i\tilde{\mu}_{i,R}} + \bar{D}_{i\tilde{\mu}_{i,D}} \tag{16c}$$

$$\bar{H}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}} = \bar{R}_{i\tilde{\mu}_{i,R}}/\bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}} \; . \tag{16d}$$

Notice that, because i knows Z_i and ϵ_i, the choice i makes is not random as far as i is concerned: given $\bar{H}_i$ and $\bar{V}_i$, if $\varsigma_i = 1$, and regardless of $\bar{H}_i$ or $\bar{V}_i$, if $\varsigma_i = 0$, one of the three alternatives in K will certainly be best according to (7).[7] For N large and each group size M_k also large, an equilibrium set of choices Y_i and expectations $(\bar{H}_i, \bar{V}_i)$, $i = 1, \ldots, N$, is given by the following.

Theorem 1 *There is a coordinating elector equilibrium if, with all electors using the same fixed point* $(\bar{H}, \bar{V})$ *computed from common knowledge, each elector* i *has* $(\bar{H}_i, \bar{V}_i) = (\bar{H}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}}, \bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}})$ *and* $Y_i = h$ *for whichever of the three possible pairs of values* $(\bar{H}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}}, \bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}})$ *corresponds to the smallest value of* $\tilde{\lambda}_i$*, where* $(\bar{H}_{i01}, \bar{V}_{i01})$ *goes with* $\lambda_{i,D}$*, with* $\bar{V}_{i,V} = \bar{V}_{i01}$*,* $(\bar{H}_{i10}, \bar{V}_{i10})$ *goes with* $\lambda_{i,R}$*, with* $\bar{V}_{i,V} = \bar{V}_{i10}$*, and* $(\bar{H}_{i00}, \bar{V}_{i00})$ *goes with* $\lambda_{i,A}$*, with* $\bar{V}_{i,A} = \bar{V}_{i00}$.

Proof: Plainly the expectations $(\bar{H}_i, \bar{V}_i) = (\bar{H}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}}, \bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}})$ that minimize $\tilde{\lambda}_i$ match the choice elector i makes according to (7). And while each i knows that every other elector i' also has expectations $\bar{H}_{i'}$ and $\bar{V}_{i'}$ as defined by (16a–d), $\bar{H}$ and $\bar{V}$ are the best estimates of the election outcome—*not* taking into account the choice i will make—available to i in the absence of knowledge of the particular values of $Z_{i'}$ and $\epsilon_{i'}$: based on the common knowledge, the expectation of $N^{-1}\sum_{i=1}^{N}(\bar{V} - \bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}})$ is zero and $N^{-1}\sum_{i=1}^{N}(\bar{H} - \bar{H}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}})$ converges in probability to zero as N increases;[8] there is no information with which to produce estimates that have smaller variance. Since it is common knowledge that all electors are similarly situated (i.e., exchangeable), it is common knowledge that $(\bar{H}, \bar{V})$ is every elector's best estimate of the election outcome, not counting the elector's own choices. *Q.E.D.*

Unopposed Candidates

The model of the preceding section ignores the fact that some candidates run unopposed. To extend the model to cover such cases, we assume that when a candidate is unopposed each elector forms preferences as indicated by the choice rule (7), except conditioning on the pair of choices that are available. If a Democrat is running unopposed, elector i conditions on the choice set $\{D, A\}$. If a Republican is running unopposed, i conditions on $\{R, A\}$. If Z_i is known but ϵ_i is known only to have the distribution F_H, the conditional probabilities for i to choose each alternative when, respectively, the Democrat and the Republican are unopposed are

$$\Pr(Y_i = h \mid Z_i,\ \text{Democrat unopposed}) = \begin{cases} \dfrac{\mu_{i,A}}{\mu_{i,A} + \mu_{i,D}}, & h = A \\ \dfrac{\mu_{i,D}}{\mu_{i,A} + \mu_{i,D}}, & h = D \\ 0, & h = R \end{cases}$$

and

$$\Pr(Y_i = h \mid Z_i,\ \text{Republican unopposed}) = \begin{cases} \dfrac{\mu_{i,A}}{\mu_{i,A} + \mu_{i,R}}, & h = A \\ \dfrac{\mu_{i,R}}{\mu_{i,A} + \mu_{i,R}}, & h = R \\ 0, & h = D \ , \end{cases}$$

where $\mu_{i,h}$, $h \in K$, is defined by (10). Define $\mu_{i,h|\{D,A\}} = \Pr(Y_i = h \mid Z_i,\ \text{Democrat unopposed})$ and $\mu_{i,h|\{R,A\}} = \Pr(Y_i = h \mid Z_i,\ \text{Republican unopposed})$, $h \in K$.

When all that is known is the group E_k to which an elector i belongs, the probabilities are

$$\Pr(Y_i = h \mid i \in E_k,\ \text{Democrat unopposed}) = \int_{\tilde{Z}} \mu_{i,h|\{D,A\}} df_k(Z_i)\ , \quad h \in K$$

$$\Pr(Y_i = h \mid i \in E_k,\ \text{Republican unopposed}) = \int_{\tilde{Z}} \mu_{i,h|\{R,A\}} df_k(Z_i)\ , \quad h \in K\ .$$

Define $\bar{\mu}_{k,h|\{D,A\}} = \Pr(Y_i = h \mid i \in E_k,\ \text{Democrat unopposed})$ and $\bar{\mu}_{k,h|\{R,A\}} = \Pr(Y_i = h \mid i \in E_k,\ \text{Republican unopposed})$, $h \in K$. If the numbers of electors in each group who are in a district with a fully contested race ($M_{k|\{D,R,A\}}$), with an unopposed Democrat ($M_{k|\{D,A\}}$) and with an unopposed Republican ($M_{k|\{R,A\}}$) are common knowledge, with $M_k = M_{k|\{D,R,A\}} + M_{k|\{D,A\}} + M_{k|\{R,A\}}$, then the proportion of electors expected to vote for Republicans is

$$\bar{R} = N^{-1} \sum_{k=1}^{M} \left(M_{k|\{D,R,A\}} \bar{\mu}_{k,R} + M_{k|\{R,A\}} \bar{\mu}_{k,R|\{R,A\}} \right) , \tag{17}$$

and the proportion of electors expected to vote for Democrats is

$$\bar{D} = N^{-1} \sum_{k=1}^{M} \left(M_{k|\{D,R,A\}} \bar{\mu}_{k,D} + M_{k|\{D,A\}} \bar{\mu}_{k,D|\{D,A\}} \right) . \tag{18}$$

Definitions (14) and (15) are unchanged and the characterization of equilibrium goes through as before, with only minor changes.

A Model for Estimation with Survey Data

For the coordinating model to be empirically estimable, the fixed point $(\bar{H}, \bar{V})$ that is the basis for the elector equilibrium must be locally stable. Suppose every elector's belief about $(\bar{H}, \bar{V})$ is slightly perturbed from the fixed-point values, say to $(\bar{H}^{(1)}, \bar{V}^{(1)})$, and then each elector uses $(\bar{H}^{(1)}, \bar{V}^{(1)})$ in (11) and hence evaluates (12), (13), (14) and (15), producing $(\bar{H}^{(2)}, \bar{V}^{(2)})$. The fixed point $(\bar{H}, \bar{V})$ is locally stable if for almost every $(\bar{H}^{(1)}, \bar{V}^{(1)})$ in a neighborhood of $(\bar{H}, \bar{V})$ the sequence $(\bar{H}^{(1)}, \bar{V}^{(1)}), (\bar{H}^{(2)}, \bar{V}^{(2)}), \ldots$ thus produced by repeated cycling through (11), (12), (13), (14) and (15) converges to $(\bar{H}, \bar{V})$. Any equilibrium that occurs in reality must have such a property: the perturbations that inevitably occur would otherwise lead electors away from $(\bar{H}, \bar{V})$.

Assuming that the likelihood function that defines the empirical model specification is correct, the stability condition allows an iterative estimation algorithm to converge to the parameter estimates that characterize the choices electors make in equilibrium. For convergence, in addition to the usual conditions for having found parameter estimates that maximize the likelihood function, the estimated values $(\hat{\bar{H}}, \hat{\bar{V}})$ must be constant over successive iterations of the algorithm. The requirement from the formal model that $(\bar{H}, \bar{V})$ be a fixed point imposes a fixed-point constraint on the maximum likelihood solution.

With survey data we can observe the choices reported by each sampled elector i and a number of other variables that affect electoral choices—a set of variables Z_i. We can use the observed Z_i values and a set of parameter estimates (not necessarily the maximum likelihood estimates [MLEs]) in (10) to compute estimated choice probabilities $\hat{\mu}_{i,h}$, $h \in K$, for each sampled i. We use such estimated probabilities to compute $(\hat{\bar{H}}, \hat{\bar{V}})$ for each set of parameter estimates without having to specify any particular set of groups E_k, by using the sampling weight associated with each elector in each survey to estimate the totals in the formulas for $\bar{H}$ and $\bar{V}$. The sampling weight for i is $1/\omega_i$, where ω_i is proportional to the probability, determined by the sampling design, that i is included in the sample. To compute $\hat{\bar{H}}$ and $\hat{\bar{V}}$ for a sample S of n electors, $i = 1, \ldots, n$, we proceed as follows. Let $S_{\{D,R,A\}}$ denote the subsample in districts with a fully contested race, $S_{\{D,A\}}$ the subsample with an unopposed Democrat and $S_{\{R,A\}}$ the subsample with an unopposed Republican. Given estimates $\hat{\mu}_{i,h}$ and using $\mu_{i,R|\{D,A\}} = \mu_{i,D|\{R,A\}} = 0$, we compute

$$\hat{\bar{R}} = \left(\sum_{i \in S_{\{D,R,A\}}} \frac{\hat{\mu}_{i,R}}{\omega_i} + \sum_{i \in S_{\{R,A\}}} \frac{\hat{\mu}_{i,R|\{R,A\}}}{\omega_i} \right) \Bigg/ \left(\sum_{i=1}^{n} 1/\omega_i \right) \tag{19}$$

and

$$\hat{\bar{D}} = \left(\sum_{i \in S_{\{D,R,A\}}} \frac{\hat{\mu}_{i,D}}{\omega_i} + \sum_{i \in S_{\{D,A\}}} \frac{\hat{\mu}_{i,D|\{D,A\}}}{\omega_i} \right) \Bigg/ \left(\sum_{i=1}^{n} 1/\omega_i \right) . \tag{20}$$

$\hat{\bar{R}}$, $\hat{\bar{D}}$, $\hat{\bar{V}} = \hat{\bar{R}} + \hat{\bar{D}}$ and $\hat{\bar{H}} = \hat{\bar{R}}/\hat{\bar{V}}$ are design-consistent.[9]

For two reasons, $(\hat{\bar{H}}, \hat{\bar{V}})$ is the best we can do to estimate $(\bar{H}_i, \bar{V}_i)$ with survey data. Using $\hat{\mu}_{i,h}$ to estimate $\bar{\mu}_{k_i,h}$ in (16a,b) would underestimate the magnitudes of $(\tilde{\mu}_{i,h} - \bar{\mu}_{k_i,h})/N$, $h \in K$. And with $N \approx 10^8$, survey samples are too small to detect the effects of the deviations from $(\bar{H}, \bar{V})$. For every sampled elector we therefore set $(\hat{\bar{H}}_i, \hat{\bar{V}}_i) = (\hat{\bar{H}}, \hat{\bar{V}})$.

To define the empirical model, in (8a–c) we set $\bar{H}_i = \bar{H}$ and $\bar{V}_i = \bar{V}$, $i = 1, \ldots, n$, and substitute

$b_C \bar{V}^{-1}$ for $(N\bar{V})^{-1}$, where $b_C > 0$ is a constant parameter:

$$x_{i,D} = -b_C \bar{V}^{-1} \bar{H} w_{Ci} + z_{i,D} \tag{21a}$$

$$x_{i,R} = b_C \bar{V}^{-1} \left(1 - \bar{H}\right) w_{Ci} + z_{i,R} \tag{21b}$$

$$x_{i,A} = z_{i,A} \ . \tag{21c}$$

Because the definition of F_H implicitly standardizes the GEV distribution, b_C equals N^{-1} divided by the standard deviation of the elements of the unstandardized disturbance.[10] We also use a technical reparameterization of (9) in order to decrease the correlation between the estimate of τ and the estimates of the parameters of $x_{i,D}$ and $x_{i,R}$.[11] Instead of (9), we use G_i in the form

$$G_i = (v_{i,D} + v_{i,R})^{1-\tau} + v_{i,A} \ , \qquad 0 \leq \tau < 1 \ . \tag{22}$$

Given $T \geq 1$ samples S_t each containing n_t observations of the choices Y_i and variables Z_i, with each observation being chosen with probability proportional to ω_i from a large population ($\omega_i > 0$, $i = 1, \ldots, N_t$), the parameters of the model may be estimated by maximum likelihood. Let $y_{i,h} = 1$ if $Y_i = h$ and $y_{i,h} = 0$ if $Y_i \neq h$, $h \in K$. Including observations from districts that have unopposed candidates, the log-likelihood function is

$$L = \sum_{t=1}^{T} \left(\sum_{i \in S_{\{D,R,A\}t}} \sum_{h \in K} y_{i,h} \log \mu_{i,h} + \sum_{i \in S_{\{D,A\}t}} \sum_{h \in \{D,A\}} y_{i,h} \log \mu_{i,h|\{D,A\}} \right.$$
$$\left. + \sum_{i \in S_{\{R,A\}t}} \sum_{h \in \{R,A\}} y_{i,h} \log \mu_{i,h|\{R,A\}} \right) \ . \tag{23}$$

Iterations to determine the parameter values include recomputation of $(\hat{\bar{H}}, \hat{\bar{V}})$ at each iteration. The estimation algorithm is similar to the one used in Mebane (2000).

A Non-coordinating Moderating Model

We define an empirical model that applies to midterm elections the core idea in Fiorina's (1988; 1992, 73–81) non-coordinating (indeed, non-strategic) theory of institutional balancing by voters in presidential year elections. Fiorina's theory considers a situation in which there are two parties. Each voter has a choice between two candidates for President and two candidates for the legislature, one from each party. All of each party's candidates represent the same policy position. The core idea of the theory is that each voter chooses candidates based on the mix of party control of the presidency and the legislature, either unified or divided government, that would produce a policy outcome nearest the elector's ideal point. In so choosing, it does not matter to the voter how likely it is that the Democratic presidential candidate will win, nor does the voter care what the Democratic party's share of the legislature is likely to be. That the voter ignores the expected election outcome is what makes the theory not a theory of coordinating behavior: no voter's choice depends on the choice or likely choice of any other voter.

We apply the core idea of Fiorina's theory to midterm elections by assuming that at midterm each elector i with $\varsigma_i = 1$ treats the party of the President as fixed in forming a preference between unified or divided government, but otherwise ignores the expected election outcome. Using the party policy positions θ_{Di} and θ_{Ri} defined in (1) and (2), the post-election policies i expects if there is a Democratic majority in the House are

$$\tilde{\theta}_{Di} = \begin{cases} \theta_{Di}, & \text{if Democrat is President} \\ \alpha\theta_{Ri} + (1-\alpha)\theta_{Di}, & \text{if Republican is President ,} \end{cases} \tag{24}$$

and the post-election policies i expects if there is a Republican majority are

$$\tilde{\theta}_{Ri} = \begin{cases} \alpha\theta_{Di} + (1-\alpha)\theta_{Ri}, & \text{if Democrat is President} \\ \theta_{Ri}, & \text{if Republican is President ,} \end{cases} \tag{25}$$

with $0 \leq \alpha \leq 1$. The non-coordinating theory says that, other things equal, i votes for the Democrat instead of the Republican if i's ideal point is closer to the policy expected with a Democratic majority than to the policy expected with a Republican majority, i.e., if $|\theta_i - \tilde{\theta}_{Di}| < |\theta_i - \tilde{\theta}_{Ri}|$. If $|\theta_i - \tilde{\theta}_{Di}| > |\theta_i - \tilde{\theta}_{Ri}|$, then i votes for the Republican instead of the Democrat.

Notice that in the non-coordinating model there can be policy moderation only if $0 < \alpha < 1$.

If $\alpha = 1$, post-election policy always equals the position of the President's party; the equality $|\theta_i - \tilde{\theta}_{Di}| = |\theta_i - \tilde{\theta}_{Ri}|$ always holds, so policy comparisons have no effect on midterm vote choices. If $\alpha = 0$, then the President is irrelevant to post-election policy; $\tilde{\theta}_{Di} = \theta_{Di}$ and $\tilde{\theta}_{Ri} = \theta_{Ri}$ regardless of who is President. The comparison between $|\theta_i - \tilde{\theta}_{Di}|$ and $|\theta_i - \tilde{\theta}_{Ri}|$ reduces to a comparison between $|\theta_i - \theta_{Di}|$ and $|\theta_i - \theta_{Ri}|$. There is no moderation but rather a simple choice between the parties' alternative policies.

Fiorina's theory says nothing about how a balancing calculus may affect turnout decisions. The theory addresses only how voters choose among candidates. To let the non-coordinating model include the possibility of not voting, we use the log-likelihood function of (23), with G_i in the form of (22), based on modified definitions of the observed attributes of each alternative. By formulating the model closely to resemble the coordinating model, we focus the comparison between the models as powerfully as possible on the existence or non-existence of coordination. Defining

$$w_{NCi} = \begin{cases} |\theta_i - \tilde{\theta}_{Ri}|^q - |\theta_i - \tilde{\theta}_{Di}|^q\,, & \text{if } \varsigma_i = 1 \\ 0\,, & \text{if } \varsigma_i = 0\,, \end{cases}$$

we specify the observed attributes as

$$x_{i,D} = -b_{NC} w_{NCi} + z_{i,D} \tag{26a}$$

$$x_{i,R} = b_{NC} w_{NCi} + z_{i,R} \tag{26b}$$

$$x_{i,A} = z_{i,A}\ , \tag{26c}$$

with $b_{NC} \geq 0$ and $q > 0$.[12] Other things equal, increasing w_{NCi} causes the probability of voting for a Democrat to increase.

Tests of Coordination

We use two kinds of tests of whether electors coordinate. We check whether the estimated values of particular model parameters satisfy conditions necessary for coordination to exist. And we use formal hypothesis tests to compare the coordinating model to the non-coordinating model.[13]

If the President solely determines policy ($\alpha = 1$), then there is no coordination among electors because $w_{Ci} = 0$, so that electors' strategies do not depend on $\bar{H}_i$. A necessary condition for coordination is therefore that $\alpha < 1$. We use confidence interval estimates and likelihood-ratio (LR) tests to check whether estimates for α differ significantly from the value that annihilates the possibility of coordination. The LR tests have a non-regularity because the coordinating model does not depend on ρ when $\alpha = 1$. We use equation (3.4) of Davies (1987, 36) to adjust the significance probabilities of the test statistics.

Other conditions necessary for the choice model to describe coordination are that $q > 0$ and that $b_C > 0$. If $q = 0$ then we have the degenerate value $w_{Ci} = 0$. If $b_C = 0$, then whatever the discrepancies $|\theta_i - \tilde{\theta}_i|^q$ may be, they have no effect on electors' choices.

Detailed Choice Model Specifications

To estimate both the coordinating and the non-coordinating models we use data from the NES Post-Election Surveys of years 1978, 1982, 1986, 1990, 1994 and 1998 (Miller and the National Election Studies 1979; 1983; 1987; Miller, Kinder, Rosenstone and the National Election Studies 1992; Rosenstone, Miller, Kinder and the National Election Studies 1995; Sapiro, Rosenstone and the National Election Studies 1999). We pool the data over all years. Some parameters are constant over all years while others vary over years.

We use the observed responses to several seven-point NES survey scales to measure θ_i, ϑ_{Di}, ϑ_{Ri}, and ϑ_{PDi} or ϑ_{PRi}. Following Mebane (2000), we use the variables' empirical cumulative distributions to code the responses in the $[0, 1]$ interval. The codes we use for the NES scales are to be interpreted as measuring the proportion of all survey respondents that support a position as liberal as or more liberal than the indicated position. Each scale either refers to liberal-conservative ideological labels or pertains to a policy issue. Each of the values θ_i, ϑ_{Di}, ϑ_{Ri}, and ϑ_{PDi} or ϑ_{PRi} averages the values for the named referent—self, Democratic or Republican party, Democratic or Republican President—over only the scales for which elector i placed all four referents on the scale. There is no assumption that every elector is using the same substantive policy dimension. We use the method described by Mebane (2000) to determine values of θ_i, ϑ_{Di}, ϑ_{Ri}, and ϑ_{PDi} or ϑ_{PRi} for each i. Appendix B, 9, lists the scales used from each of the surveys.

If an elector i does not provide values for the policy position variables (θ_i, ϑ_{Di}, ϑ_{Ri}, and ϑ_{PDi} or ϑ_{PRi}), we assume that i does not experience policy-related losses, so that such losses do not affect the choices i makes. We set $\varsigma_i = 0$ if there is not a complete set of policy position variable values for i and $\varsigma_i = 1$ if a complete set exists. We include ς_i in $z_{i,A}$. To allow for the possibility of ideologically based mobilization to vote, we also include each elector's ideal point in $z_{i,A}$, using the form $\varsigma_i \theta_i$ to switch the effect off when i lacks a complete set of policy position values.

Evidence that retrospective economic evaluations matter in presidential elections is strong, but it has been controversial whether retrospective economic evaluations matter for candidate choices in House elections at midterm. The best empirical evidence suggests that there are no systematic direct effects.[14] Arcelus and Meltzer (1975) test the idea that economic evaluations affect turnout decisions, finding at best weak evidence for the idea in an analysis of aggregate time series data. Fiorina (1978) also finds little evidence to support the idea in analysis of cross-sectional survey data. To measure retrospective evaluations we use a variable (EC_i) that is based on responses to a question asking whether the national economy has gotten worse or better over the past year (see Appendix B, 1, in the Appendix). We include EC_i in all three sets of observed attributes ($z_{i,h}$, $h \in K$), multiplied by a variable (PP_i) that changes sign depending on the incumbent President's party: $\text{PP}_i = 1$ if Republican; $= -1$ if Democrat.

Party identification has long been known to affect vote choices (e.g. Campbell and Miller 1957) and to be associated with varying rates of voter turnout (Campbell 1966; Converse 1966; Miller 1979). People who support different parties also tend to have different policy preferences and perceptions (Brady and Sniderman 1985). We measure party identification with six dummy variables that correspond to the levels of the NES seven-point scale measure of partisanship, using "Strong Democrat" as the reference category: $\text{PID}_{\text{D}i}$, $\text{PID}_{\text{ID}i}$, $\text{PID}_{\text{I}i}$, $\text{PID}_{\text{IR}i}$, $\text{PID}_{\text{R}i}$ and $\text{PID}_{\text{SR}i}$ (see Appendix B, 2). We include the dummy variables in all three sets of observed attributes.

To take incumbent-related effects into account, we use a pair of dummy variables that indicate whether a Democratic or Republican incumbent is running for reelection or whether there is an open seat: $\text{DEM}_i = 1$ if a Democrat is running for reelection in individual i's congressional district, otherwise $\text{DEM}_i = 0$; $\text{REP}_i = 1$ if a Republican is running for reelection, otherwise $\text{REP}_i = 0$ (see Appendix B, 3). If $\text{DEM}_i = \text{REP}_i = 0$, the district has an open seat. In the choice between candidates we expect to see an incumbency advantage.[15] And because the presence of an incumbent usually means the absence of vigorous opposing campaigns that might mobilize voters, effects of DEM_i and REP_i should indicate that the probability of not voting is higher when an incumbent is running than when there is an open seat.[16]

We include among the attributes of not voting a measure of subjective political efficacy (EFF_i), defined as the average of responses to two survey items: "people like me don't have any say about what the government does" and "I don't think public officials care much what people like me think" (Abramson and Aldrich 1982; Balch 1974). The responses are coded -1 for "agree" and 1 for "disagree." Appendix B, 4, discusses variations in the items, including proxies used in 1986.

Among the attributes of not voting we also include four demographic variables that are frequently observed to have strong effects on voter turnout (Born 1990): education, age, marital status, and time at current residence. We use three dummy variables to measure education: high school diploma, 12+ years of school, no higher degree (ED1_i); AA or BA level degrees, or 17+

years school and no higher degree ($\mathrm{ED2}_i$); advanced degree, including LLB ($\mathrm{ED3}_i$). The reference category for the dummy variables is: 11 grades or less, no diploma or equivalency. Age we measure as time in years, minus 40 (AGE_i). Marital status is a dummy variable (MAR_i) coded one for "married and living with spouse (or spouse in service)" and zero otherwise. Time at current residence (RES_i) is measured in whole years for durations between three and nine years, otherwise it is coded using the same values used by Born (1990): less than 6 months, .25; 6–12 months, or 1 year, .75; 13–24 months, or 2 years, 1.5; ten years or more, 10 (see Appendix B, 5).

To understand the functional form we use for $z_{i,h}$, $h \in K$, recall that in (8a–c) an increase in $x_{i,h}$ represents an increase in the loss elector i expects from choosing $h \in K$. G_i is specified to decrease as $x_{i,h}$ increases, via $v_{i,h} = \exp\{-x_{i,h}\}$, $h \in K$, so that, by (10), the probability that elector i chooses an alternative decreases if the loss expected from that choice increases. In (8a–c), an increase in $z_{i,h}$ implies an increase in $x_{i,h}$, $h \in K$. So any variable that should increase the probability of choosing $h \in K$ and that is included with an additive effect in $z_{i,h}$ should have a negative coefficient. The functional forms for $z_{i,h}$, $h \in K$, are

$$\begin{aligned} z_{i,D} = {} & c_0 - c_{DEM}\mathrm{DEM}_i + c_{EC}\mathrm{PP}_i\mathrm{EC}_i \\ & + c_D\mathrm{PID}_{\mathrm{D}i} + c_{ID}\mathrm{PID}_{\mathrm{ID}i} + c_I\mathrm{PID}_{\mathrm{I}i} + c_{IR}\mathrm{PID}_{\mathrm{IR}i} + c_R\mathrm{PID}_{\mathrm{R}i} + c_{SR}\mathrm{PID}_{\mathrm{SR}i} \end{aligned} \tag{27a}$$

$$\begin{aligned} z_{i,R} = {} & -c_0 - c_{REP}\mathrm{REP}_i - c_{EC}\mathrm{PP}_i\mathrm{EC}_i \\ & - c_D\mathrm{PID}_{\mathrm{D}i} - c_{ID}\mathrm{PID}_{\mathrm{ID}i} - c_I\mathrm{PID}_{\mathrm{I}i} - c_{IR}\mathrm{PID}_{\mathrm{IR}i} - c_R\mathrm{PID}_{\mathrm{R}i} - c_{SR}\mathrm{PID}_{\mathrm{SR}i} \end{aligned} \tag{27b}$$

$$\begin{aligned} z_{i,A} = {} & d_0 + d_1\mathrm{EFF}_i + d_2\mathrm{ED1}_i + d_3\mathrm{ED2}_i + d_4\mathrm{ED3}_i + d_5\mathrm{AGE}_i + d_6\mathrm{MAR}_i + d_7\mathrm{RES}_i \\ & + d_\varsigma(1-\varsigma_i) + d_\theta\varsigma_i\theta_i + d_{REP}\mathrm{REP}_i + d_{DEM}\mathrm{DEM}_i + d_{EC}\mathrm{PP}_i\mathrm{EC}_i \\ & + d_D\mathrm{PID}_{\mathrm{D}i} + d_{ID}\mathrm{PID}_{\mathrm{ID}i} + d_I\mathrm{PID}_{\mathrm{I}i} + d_{IR}\mathrm{PID}_{\mathrm{IR}i} + d_R\mathrm{PID}_{\mathrm{R}i} + d_{SR}\mathrm{PID}_{\mathrm{SR}i}\ , \end{aligned} \tag{27c}$$

where c_0, c_{EC}, d_0, d_{EC} and d_θ are coefficients constant in each year, and the remaining coefficients are constant over all years. The effects measured by the c coefficients primarily contrast the candidate alternatives to one another, while the d coefficients measure effects that contrast the choice not to vote to the choice to vote. For the attributes of the candidates, coefficient signs should be $c_0 < 0$ and c_{EC}, c_{DEM}, c_{REP}, c_D, c_{ID}, c_I, c_{IR}, c_R, $c_{SR} > 0$. For the attributes of the not voting alternative, coefficient signs should be d_ς, d_{REP}, d_{DEM}, d_D, d_{ID}, d_I, d_{IR}, $d_R < 0$, and d_1, d_2, d_3, d_4, d_5, d_6, $d_7 > 0$. The signs of d_0, d_θ and d_{EC} are indeterminate.

To measure choices $y_{i,h}$, $h \in K$, we use individuals' self reports (see Appendix B, 6). The sample size of electors used, pooled over the six NES surveys, is 9639 (by year, 1978–98, the sizes are 1814, 1226, 1972, 1833, 1648, 1146). Only those who did not vote or who voted for either a Democrat or a Republican are included. On the whole, of the 10954 respondents in all the NES data, 1315 were omitted due to missing or invalid data (see Appendix B, 7).

Model Estimates and Results of Tests of Coordination

The coordinating and non-coordinating models produce similar results. The log-likelihood of the coordinating model (-6824.7) is not much greater than that of the non-coordinating model (-6825.4). A formal hypothesis test does not reject the non-coordinating model as an alternative to the coordinating model.

MLEs and standard errors [SEs] for the parameters of the models, using observed attribute specifications (21a–c) and (26a–c) with G_i defined by (22), appear in Table 1.[17] All of the parameters that have the same interpretation in both models have statistically indistinguishable estimates. The MLEs for c_{EC} are near zero for every year except 1990, suggesting that for the most part retrospective economic evaluations do not affect choices between candidates.[18] Except for 1994, the MLEs for d_{EC} are statistically insignificant, so that retrospective economic evaluations appear also to have no systematic effect on the choice not to vote. The MLEs for c_0, c_D, c_{ID}, c_I, c_{IR}, c_R and c_{SR} are appropriate for the usual effects of party identification on candidate choices. The MLEs for

d_0, d_D, d_{ID}, d_I, d_{IR}, d_R and d_{SR} show that, other things equal, strong partisans suffer greater losses from not voting than do weak partisans or independents, while weak partisans and independent leaners suffer greater losses than do pure independents. The MLEs for c_{DEM} and c_{REP} point to a substantial incumbent advantage, while the MLEs for d_{DEM} and d_{REP} show losses from not voting to be smaller when the incumbent is running for reelection. Greater subjective political efficacy, higher education, greater age, being married and having lived longer at one's current residence all increase the loss from not voting and so increase the probability of voting. An elector who does not report a complete set of policy position values ($\varsigma_i = 0$) has a substantially smaller loss from not voting than does an elector who does report policy positions; so the elector who lacks policy positions is much more likely not to vote. For 1994 and 1998 there is a significant tendency for electors who have higher values of θ_i to be more likely to vote than electors who have lower values of θ_i: conservative electors were especially mobilized in those two elections.

*** Table 1 about here ***

In every year, the coordinating model passes the parameter-based tests of the conditions necessary for it to describe coordinating behavior. Table 2 reports the LR test statistics for the constraint $\alpha = 1$, imposed separately for each year. The constraint is rejected in every year. The 95% confidence intervals shown in Table 3 support the same conclusions.[19] Regarding the other necessary conditions, 95% confidence intervals computed as in Table 3 show q (1.28, 1.81) and b_C (1.10, 1.90) to be positive and bounded well away from zero.

*** Tables 2 and 3 about here ***

Moderation, Institutional Balancing and the Midterm Cycle

With expected post-election policy $\tilde{\theta}_i$ defined as in (3), moderation is almost always a feature of every elector's choices in the coordinating model. Unless $\alpha = 1$, every elector intends to produce a policy outcome that is an intermediate combination of the parties' positions. The estimates for $\bar{H}$, in Table 4, show the expected position of the House, $\bar{H}\theta_{Ri} + (1 - \bar{H})\theta_{Di}$, usually to have been close to the midpoint between the parties' positions. The House position was expected to be closer to the Democratic position in 1978, 1982, 1986 and 1990, closer to the Republican position in 1994 and 1998. The MLEs for α in the coordinating model are less than .5 in every year except one (see Table 1), suggesting that electors expected the President to be weaker than the House in determining post-midterm policy.

*** Table 4 about here ***

The distribution of the ordering of electors' ideal points with respect to the post-election policies electors expect according to the coordinating model shows that the moderating mechanism of the coordinating model is capable of generating a midterm cycle of the kind emphasized by Alesina and Rosenthal (1989; 1995), though it need not do so. Table 5 shows that in four of the six years more electors had ideal points located relative to the expected policy $\tilde{\theta}_i$ in a way that gave them an incentive to vote *against* candidates of the same party as the President than had ideal points located relative to $\tilde{\theta}_i$ in a way that gave them an incentive to vote *for* candidates of the same party as the President. In 1978 and 1994, years when the President was a Democrat, respectively 38.7% and 50.0% of electors who had $\theta_{Di} < \theta_{Ri}$ had $\theta_i > \tilde{\theta}_i$ while 19.5% and 30.4% of such electors had $\theta_i < \tilde{\theta}_i$. In 1982 and 1986, when the President was a Republican, respectively 34.5% and 14.1% had $\theta_i > \tilde{\theta}_i$ while 42.3% and 64.0% had $\theta_i < \tilde{\theta}_i$. In 1990, with a Republican President, 33.8% of electors who had $\theta_{Di} < \theta_{Ri}$ had $\theta_i > \tilde{\theta}_i$ while 32.6% had $\theta_i < \tilde{\theta}_i$, a virtual tie. In 1998, with the President a Democrat, 30.9% of electors with $\theta_{Di} < \theta_{Ri}$ had $\theta_i > \tilde{\theta}_i$ while 45.8% had $\theta_i < \tilde{\theta}_i$, suggesting what did occur, namely a midterm gain for the President's party rather than a midterm loss.

*** Table 5 about here ***

For most years the MLEs for the non-coordinating model do not support the theory of non-strategic institutional balancing to produce policy moderation. Only two of the six MLEs for α ($\hat{\alpha}_{78}$, $\hat{\alpha}_{86}$) are statistically distinguishable from zero; $\hat{\alpha}_{82} = \hat{\alpha}_{90} = \hat{\alpha}_{94} = \hat{\alpha}_{98} = 0$. Rather than moderating, the estimates would suggest that in most years electors were making direct choices between the parties' alternative policies.

Nonetheless the non-coordinating model is also capable of generating a midterm cycle. In the non-coordinating model, the separating point for elector i's policy-related voting incentives is the value $\tilde{\theta}_{Mi} = (\tilde{\theta}_{Di}+\tilde{\theta}_{Ri})/2$. If i believes that $\theta_{Di} < \theta_{Ri}$, then i anticipates a smaller policy-related loss from a Democratic House majority if $\theta_i < \tilde{\theta}_{Mi}$ and from a Republican majority if $\theta_i > \tilde{\theta}_{Mi}$. Table 5 shows that using $\tilde{\theta}_{Mi}$ to assess policy-related incentives produces the same pattern of midterm losses and gains as is found using the coordinating model's expected policy $\tilde{\theta}_i$, except for 1990. In 1990, 29.6% of electors who had $\theta_{Di} < \theta_{Ri}$ had $\theta_i > \tilde{\theta}_{Mi}$ while 36.8% had $\theta_i < \tilde{\theta}_{Mi}$, suggesting a small midterm loss in that year.

Unlike the non-coordinating model, the coordinating model features a mechanism that moves voters to their candidate choices.... [Simulation evidence regarding disequilibrium forces and coordinating behavior of strong partisans comes in here.]

Discussion

There is strong evidence to support coordination, but in terms of overall fit to the data there is no clear evidence to reject non-coordinating, non-strategic behavior. The theories are difficult to distinguish statistically given survey sample sizes.

Our interpretation is that the non-coordinating model is not correct, but rather is effectively mimicking the coordinating model. There are nuanced differences that favor the policy-related preference mechanism of the coordinating theory as the more likely generator of midterm cycle phenomena. Because the estimates of α are so often near zero in the non-coordinating model, the coordinating and non-coordinating models are telling very different stories about what electors are doing. In the coordinating model each elector is acting to moderate policy by balancing the President with the House. In the non-coordinating model each elector is (usually) voting either to give the President's party complete control of policy or to give the other party complete control. In the aggregate the two stories are impossible to distinguish. In individual-level data there are clear distinctions between the stories but they are subtle.

Appendix A. Existence of Fixed-Point Pairs $(\bar{H},\bar{V})$

Let Ψ be a bounded set of positive Lebesgue measure that is the parameter space for $\tilde{\lambda}_i$;[20] normally Ψ is a convex set of real vectors. Let $\bar{\mu}_{k,h\ell\jmath}$ denote the values of $\bar{\mu}_{k,h}$, $h \in K$, when evaluated using $\bar{H} = \ell$ and $\bar{V} = \jmath$ for some $\ell \in [0,1]$ and some $\jmath \in [0,1]$. Let $\bar{H}_{\ell\jmath}$ denote the value of $\bar{H}$ as defined by (15) and let $\bar{V}_{\ell\jmath}$ denote the value of $\bar{V}$ as defined by (14) when $\bar{\mu}_{k,h} = \bar{\mu}_{k,h\ell\jmath}$, $h \in K$.

Theorem 2 *For almost every $\psi \in \Psi$, there exist values $\ell, \jmath \in (0,1)$ such that, simultaneously, $\bar{H}_{\ell\jmath} = \ell$ and $\bar{V}_{\ell\jmath} = \jmath$.*

Proof: For $q > 1$, the values $\bar{\mu}_{k,h\ell\jmath}$, $h \in K$, vary continuously as a function of ℓ for each k and $\bar{H}_{\ell\jmath}$ is a continuous function of the $\bar{\mu}_{k,h\ell\jmath}$ values. Hence there is at least one fixed point of $\bar{H}_{\ell\jmath}$ as a function of ℓ for each fixed value of $\jmath$, i.e., there is at least one value ℓ such that $\bar{H}_{\ell\jmath} = \ell$. Because $\bar{H}_{0\jmath} > 0$ and $\bar{H}_{1\jmath} < 1$, the number of fixed points is odd, except on a subset of Ψ of measure zero. For $q > 1$ there is similarly for each ℓ an odd number of fixed points $\bar{V}_{\ell\jmath} = \jmath$. If $q = 1$, the step functions in w_{Ci} imply that $\bar{H}_{\ell\jmath}$ and $\bar{V}_{\ell\jmath}$ do not vary continuously as functions of, respectively, ℓ and $\jmath$, so if $q = 1$ there are not necessarily fixed points $\bar{H}_{\ell\jmath} = \ell$ or $\bar{V}_{\ell\jmath} = \jmath$. If $0 < q < 1$, there is a discontinuity at infinity in w_{Ci} whenever $\theta_i = \tilde{\theta}_i$. But for a finite number N of electors, the number of points of discontinuity is finite. So the values of $\jmath$ for which there is no fixed point $\bar{H}_{\ell\jmath} = \ell$ and the values of ℓ for which there is no fixed point $\bar{V}_{\ell\jmath} = \jmath$ form a set of measure zero.[21] Now consider the graph of the set of fixed points $\bar{H}_{\ell\jmath} = \ell$ as $\jmath$ varies over $[0, 1]$ and the graph of the set of fixed points $\bar{V}_{\ell\jmath} = \jmath$ as ℓ varies over $[0, 1]$. When $q > 1$ both graphs are continuous and so necessarily intersect. That is, there is necessarily at least one pair of values $(\ell, \jmath)$ such that $\bar{H}_{\ell\jmath} = \ell$ and $\bar{V}_{\ell\jmath} = \jmath$. If $0 < q \leq 1$, each graph is in general not continuous, because of the discontinuities in w_{Ci}, but each graph does have a finite number of continuous components. In this case, the graphs need not intersect. But because the number of points of discontinuity is finite, the subset of Ψ for which there is no intersection has measure zero. For finite $N > 0$, the argument holds for arbitrary finite sets of probability measures f_k. *Q.E.D.*

Appendix B. Data Notes

1. Economic Evaluations (EC_i): For 1978 the question refers to "business conditions," with wording, "Would you say that at the present time business conditions are better or worse than they were a year ago?" For 1982–98 the question wording is, "Would you say that over the past year the nation's economy has gotten better, stayed about the same, or gotten worse?" For all years except 1978, the responses are coded "much worse" (-1), "somewhat worse" ($-.5$), "same" (0), "somewhat better" (.5) and "better" (1). For 1978 only three levels of response were recorded, coded here "worse now" ($-.5$), "about the same" (0) and "better now" (.5). The NES variable numbers for each year are 338 (1978), 328 (1982), 373 (1986), 423 (1990), 909 (1994), 980419 (1998).

2. Party Identification ($\mathrm{PID}_{\mathrm{D}i}$, $\mathrm{PID}_{\mathrm{ID}i}$, $\mathrm{PID}_{\mathrm{I}i}$, $\mathrm{PID}_{\mathrm{IR}i}$, $\mathrm{PID}_{\mathrm{R}i}$, $\mathrm{PID}_{\mathrm{SR}i}$): The levels of the party identification scale are Strong Democrat, Democrat, Independent Democratic, Independent, Independent Republican, Republican and Strong Republican. The variable numbers are 433 (1978), 291 (1982), 300 (1986), 320 (1990), 655 (1994), 980339 (1998).

3. Incumbency Status (DEM_i, REP_i): Variable numbers are 4 (1978), 6 (1982), 43 (1986), 58 (1990), 17 (1994), 980065 (1998).

4. Political Efficacy (EFF_i): In 1990, 1994 and 1998 the "don't care" item is worded "public officials don't care much what people like me think," and the five responses ranging from "agree strongly" to "disagree strongly" are coded, in order, -1, $-.5$, 0, .5 and 1. In 1986 only the "don't care" item is available. Variable numbers are 351 and 354 (1978), 531 and 532 (1982), 549 ("don't care," 1986), 509 and 508 (1990), 1038 and 1037 (1994), 980525 and 980524 (1998). In 1986, half the sample was not asked the "don't care" question. We use a proxy variable for those survey respondents (indeed, for all respondents missing a value for var. 549). We construct an index by summing the values of four variables: "did you read about the campaign in any newspapers?" (var. 62), "did you watch any programs about the campaign on television?" (var. 64) and "do you ever discuss politics with your family or friends?" (var. 66), each being coded 1 if yes and 0 otherwise; and interest in the political campaigns (var. 59), coded 1 if "very interested" or "somewhat interested," otherwise coded 0. Respondents with INDEX = 4 are assigned the value 1, those with INDEX $<$ 4 are assigned -1. Support for the proxy comes from a logistic regression model for the binary responses to variable 549 in the half-sample that was asked that question, with INDEX as the regressor: the MLEs give Pr(var. 549 = disagree) $>$ .5 only if INDEX = 4.

5. Education, Marital Status, Residency ($\mathrm{ED1}_i$, $\mathrm{ED2}_i$, $\mathrm{ED3}_i$, MAR_i, RES_i): Variable numbers for education, age, marital status and residency are 513, 504, 505, 628 (1978), 542, 535, 536, 760 (1982), 602, 595, 598, 753 (1986), 557, 552, 553, 684 (1990), 1209, 1203, 1204, 1426 (1994), 980577, 980572, 980573, 980662 (1998).

6. Electoral Choices ($y_{i,h}$): The variable numbers are 470, 473 and 474 (1978), 501, 505 and 506 (1982), 261, 265 and 267 (1986), 279, 287 and 289 (1990), 601, 612 and 614 (1994), and 980303, 980311 and 980313 (1998).

7. Missing Data: Data were missing for the following reasons (some observations had more than one of these problems): 15 cases missing district type information; 399 cases with nonexistant general elections or missing voting behavior data; 141 cases with votes for a candidate other than a Democrat or Republican; 89 cases missing age, marital status or residency; 332 missing efficacy data; 492 missing economic evaluations; 4 cases with vote recorded for challenger in district with incumbent running unopposed; 97 cases missing party identification.

8. Sampling Weights ($1/\omega_i$): In the NES data, ω_i is the number of eligible adults in each household, multiplied by a time-series weight in the year (1994) when part of the Post-Election Study sample was part of a multiyear panel cohort. We rescaled the number of adults and time-series weight variables to give each a mean of 1.0 over the whole of each survey sample. The variable numbers are 38 (1978), 53 (1982), 14 (1986), 29 (1990), 6 and 58 (1994), 980035 (1998).

9. Placement Scales (θ_i, ϑ_{Di}, ϑ_{PDi}, ϑ_{Ri}, ϑ_{PRi}): Here are the brief substantive description and variable numbers for each set of scales for each year. The label "reversed" indicates an item that had its categories reordered to reverse the original 1-to-7 ordering. In years 1982–98 respondents who initially declined to place themselves on the Liberal/Conservative scale, or who initially described themselves as "moderate" on the scale, were asked a follow-up question; we used those responses to categorize them as either "slightly liberal," "moderate" or "slightly conservative." **1978**: Government Guaranteed Job and Living Standard, 357–360; Rights of the Accused, 365–368; Government Aid to Minorities, 373–376; Government Medical Insurance Plan, 381–384; Equal Rights for Women, 389–392; Liberal/Conservative Views, 399–402. **1982**: Liberal/Conservative, 393, 394, 404-406; Defense Spending, 407–410; Government Aid to Minorities, 415–418; Guaranteed Job and Living Standard, 425–428; Equal Rights for Women Scale, 435–438; Government Services/Spending (reversed), 443–446. **1986**: Liberal/Conservative, 385–387, 393, 394; Defense Spending, 405, 406, 412, 413; Involvement in Central America, 428, 429, 435, 436; Government

Services/Spending (reversed), 448, 449, 455, 456. **1990**: Liberal/Conservative, 406–408, 413, 414; Defense Spending, 439, 440, 443, 444; Social/Economic Status of Blacks, 447–450; Government Services/Spending (reversed), 452, 453, 456, 457. **1994**: Liberal/Conservative, 839–841, 847, 848; Government Guaranteed Job and Living Standard, 930, 931, 934, 935; Aid to Blacks, 936–939; Government Services/Spending (reversed), 940, 941, 944, 945; Federal Health Insurance, 950, 951, 954, 955. **1998** (omitting the variable number prefix '980'): Liberal/Conservative, 399, 401, 403, 411, 412; Equal Role for Women, 448, 449, 453, 454; Guaranteed Job and Living Standard, 457, 458, 460, 461; Government Services/Spending (reversed), 463, 464, 468, 469.

Notes

1. Fiorina and Shepsle (1989) take issue with a version of negative voting that focuses on a supposed asymmetry between consequences of things a President does that voters like and consequences of things that voters dislike. The theory we develop involves no claims that evaluations work asymmetrically.

2. Our views regarding the implicit institutional foundations of the model and the realism of its assumptions about what individuals know or believe are the same as those expressed by Mebane (2000) regarding his coordinating voting model.

3. Clearly we are simplifying by ignoring the Senate.

4. Obviously, $\lambda_{i,R} - \lambda_{i,D} = (\bar{H}_{i,R} - \bar{H}_{i,D})(\lambda_{i,R} - \lambda_{i,D})/(\bar{H}_{i,R} - \bar{H}_{i,D})$, if $\bar{H}_{i,R} - \bar{H}_{i,D} > 0$. But if $\bar{H}_{i,R} - \bar{H}_{i,D}$ is very small, $(\lambda_{i,R} - \lambda_{i,D})/(\bar{H}_{i,R} - \bar{H}_{i,D}) \approx d\lambda_i/d\bar{H}_i$.

5. $\lambda_{i,R} - \lambda_{i,A} = (\bar{H}_{i,R} - \bar{H}_{i,A})(\lambda_{i,R} - \lambda_{i,A})/(\bar{H}_{i,R} - \bar{H}_{i,A})$, $(\lambda_{i,R} - \lambda_{i,A})/(\bar{H}_{i,R} - \bar{H}_{i,A}) \approx d\lambda_i/d\bar{H}_i$ and $(\bar{H}_{i,R} - \bar{H}_{i,A}) = (1 - \bar{H}_{i,R})/(N\bar{V}_{i,A})$ give $\lambda_{i,R} - \lambda_{i,A} \approx (N\bar{V}_{i,A})^{-1}(1 - \bar{H}_{i,R})d\lambda_i/d\bar{H}_i$. Similarly, $(\bar{H}_{i,A} - \bar{H}_{i,D}) = \bar{H}_{i,D}/(N\bar{V}_{i,A})$ gives $(\bar{H}_{i,D} - \bar{H}_{i,A})(\lambda_{i,D} - \lambda_{i,A})/(\bar{H}_{i,D} - \bar{H}_{i,A}) = (\bar{H}_{i,D} - \bar{H}_{i,A})(\lambda_{i,A} - \lambda_{i,D})/(\bar{H}_{i,A} - \bar{H}_{i,D}) \approx -(N\bar{V}_{i,A})^{-1}\bar{H}_{i,D}d\lambda_i/d\bar{H}_i$.

6. See Mebane (2000) for general motivation for the GEV distribution. Maddala (1983) gives an introductory discussion of GEV choice models.

7. An exact tie between two $\kappa_{i,h}$ values, $h \in K$, is a measure zero event that may be ignored.

8. Let f_ϵ denote the density of ϵ_i on $\mathbb{R}^3$ (the real line three times). The basic result is

$$\begin{aligned}
&\int_{\tilde{Z}} \int_{\mathbb{R}^3} (\tilde{\mu}_{i,h} - \bar{\mu}_{k_i,h}) df_\epsilon(\epsilon_i) df_{k_i}(Z_i) \\
&\quad = \int_{\tilde{Z}} \int_{\mathbb{R}^3} \tilde{\mu}_{i,h} df_\epsilon(\epsilon_i) df_{k_i}(Z_i) - \bar{\mu}_{k_i,h} \int_{\tilde{Z}} \int_{\mathbb{R}^3} df_\epsilon(\epsilon_i) df_{k_i}(Z_i) \\
&\quad = \int_{\tilde{Z}} \mu_{i,h} df_{k_i}(Z_i) - \bar{\mu}_{k_i,h} = 0 \ , \quad h \in K \ .
\end{aligned}$$

Hence, using independence, the expectation of $N^{-1}\sum_{i=1}^{N}(\bar{V} - \bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}})$ is $N^{-1}\sum_{i=1}^{N}\int_{\tilde{Z}}\int_{\mathbb{R}^3}(\bar{V} -$

$\bar{V}_{i\tilde{\mu}_{i,R}\tilde{\mu}_{i,D}})df_\epsilon(\epsilon_i)df_k(Z_i) = N^{-1}\sum_{i=1}^{N}\int_{\tilde{Z}}\int_{\mathbb{R}^3}\sum_{h\in\{R,D\}}[(\tilde{\mu}_{i,h} - \bar{\mu}_{k_i,h})/N]df_\epsilon(\epsilon_i)df_k(Z_i) = 0$. Using independence, $M \ll N$ (each M_k increases with N), and Slutsky's theorem gives the result for $\bar{H}$.

9. Isaki and Fuller (1982) rigorously develop the relevant concept of consistency.

10. If in the unstandardized distribution $\text{var}(\epsilon_{i,h}) = \frac{1}{6}\pi^2\sigma^2$, $h \in K$ (cf. Johnson, Kotz and Balakrishnan 1995, 12), then $b_C = N^{-1}\sigma^{-1}$. NES survey respondents may overreport the frequency with which they vote. Among the 9,639 cases from years 1978–98 that we use to compute the parameter estimates reported in Table 1, the ω_i-weighted percentage reporting having voted is, by year: 47.7, 55.1, 48.1, 43.8, 55.8, 45.5. These values are the same as the estimates for $\hat{\bar{V}}$ reported in Table 4. Slight inflation in $\hat{\bar{V}}$ should induce slight inflation in $\hat{b}_C$, via the product $\hat{b}_C\hat{\bar{V}}^{-1}$.

11. Using (9), the correlation between estimates $\hat{\tau}$ and $\hat{b}_C$ approaches -1 as $\tau \to 1$; correlations between $\hat{\tau}$ and estimates of parameters in $z_{i,D}$ and $z_{i,R}$ approach -1 for parameters that have positive values and 1 for parameters that are negative.

12. An alternative specification using $x_{i,D} = b_{NC}|\theta_i - \tilde{\theta}_{Di}|^q + z_{i,D}$, $x_{i,R} = b_{NC}|\theta_i - \tilde{\theta}_{Ri}|^q + z_{i,R}$, $x_{i,A} = z_{i,A}$ produces inferior results: the log-likelihood is -6832.8 and MLE $\hat{\tau} = .98$. The latter value suggests that the specification of the candidate attributes is much worse than in (26).

13. With $z_{i,D}$, $z_{i,R}$ and $z_{i,A}$ specified the same way in both models, the models have the same number of free parameters. We use non-nested hypotheses tests (Dastoor 1985) to test whether one model fits the data better. Mebane (2000) details the form of the tests.

14. Erikson (1990) reviews the literature and data through the late 1980s. Relevant work appearing since that time includes Jacobson (1989) and Born (1991).

15. Eubank and Gow (1983) and Gow and Eubank (1984) document pro-incumbent biases in 1978 and 1982 NES data. Our incumbency effects estimates may be exaggerated (cf. Eubank 1985).

16. Including dummy variables based on Jacobson's (1989) measure of candidate quality—whether a candidate has ever held elective office—significantly improves the fit to the data but

does not change any of the results of primary interest in the analysis. Allowing separate effects for Democratic and Republican challengers and for Democratic and Republican candidates in open seats, and then separate effects on candidate choices and turnout, adds eight parameters to the specification of (27a–d). For the coordinating model the log-likelihood with the variables included is -6809.3; for the non-coordinating model it is -6810.1. Of the eight parameters only two are statistically significant: Democratic high-quality challengers get more votes; turnout is higher in an open seat race when the Democrat has high quality. The MLEs for c_{DEM} and c_{REP} do not change much (both equal .72 in the coordinating model), but those for d_{DEM} and d_{REP} become statistically insignificant. Thanks to Gary Jacobson for giving us his candidate quality data for the 1978-98 midterm elections.

17. Estimates were computed using SAS, `PROC NLIN` (SAS Institute 1989–95), with numerical derivatives. Over all years for the coordinating model, the percent correctly classified by "predicting" for each observation the pair of vote choices that has the highest probability using the parameter MLEs is 67.3% (by year, 64.2%, 66.4%, 68.2%, 68.7%, 66.7%, 70.1%). Over all years the average probability of the pair of choices actually made is .57 (by year, .54, .56, .58, .59, .56, .59).

18. The 95% confidence interval for $c_{EC,90}$, computed as in Table 3, is $(-.001, .558)$.

19. Table 1 shows α_{90}, α_{94}, ρ_{78}, ρ_{86}, ρ_{90} and ρ_{98} to have MLEs equal to either 0.0 or 1.0, on the conceptual boundary of the parameter space. Consequently, the asymptotic distributions of the MLEs and the LR test statistics are complicated (Moran 1971; Self and Liang 1987). None of the statistics in Table 2 are close to the critical value for a test based on χ^2_1 (including the adjustment based on Davies 1987), so slight variations from χ^2_1 in the statistics' distributions would not change any conclusions. For the coordinating model, the hypothesis that $\alpha_{90} = \alpha_{94} = \rho_{78} = 0$ and $\rho_{86} = \rho_{90} = \rho_{98} = 1$ implies an asymptotic distribution for the MLEs that is a mixture of 64 censored multivariate normal distributions. We use a bootstrap (20,000 resamples) of the score

vectors associated with the MLEs of Table 1 to tabulate that mixture distribution and estimate the confidence intervals of Table 3.

20. Because $\alpha = 1$ is incompatible with coordination, restrict $\alpha \in [0, 1)$.

21. A fixed point $\bar{H}_{\ell \jmath} = \ell$ fails to exist only if the values $\bar{H} = \ell$ and $\bar{V} = \jmath$ induce $\theta_i = \tilde{\theta}_i$ for some i such that $\limsup_{\ell_i \to \ell} \bar{H}_{\ell_i \jmath} > \ell$ and $\liminf_{\ell_i \to \ell} \bar{H}_{\ell_i \jmath} < \ell$ (the limits exist because $\bar{\mu}_{k,h}$, $h \in K$, is bounded). For finite N, the set of such values ℓ and $\jmath$ has measure zero. Similarly, a fixed point $\bar{V}_{\ell \jmath} = \jmath$ fails to exist only if the values $\bar{H} = \ell$ and $\bar{V} = \jmath$ induce $\theta_i = \tilde{\theta}_i$ such that $\limsup_{\jmath_i \to \jmath} \bar{H}_{\ell \jmath_i} > \jmath$ and $\liminf_{\jmath_i \to \jmath} \bar{H}_{\ell \jmath_i} < \jmath$.

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Table 1: Parameter Estimates for the Coordinating and Non-Coordinating Models

	Coordinating		Non-Coordinating			Coordinating		Non-Coordinating	
parm	MLE	SE	MLE	SE	parm	MLE	SE	MLE	SE
q	1.557	.137	1.433	.208	τ	.769	.068	.732	.068
b_C	1.491	.217	—	—	$d_{0,78}$	−1.184	.185	−1.249	.187
b_{NC}	—	—	1.390	.387	$d_{0,82}$	−1.256	.215	−1.318	.218
α_{78}	.463	.167	.359	.176	$d_{0,86}$	−1.518	.187	−1.594	.190
α_{82}	.143	.141	0*	.192	$d_{0,90}$	−1.630	.200	−1.706	.203
α_{86}	.570	.111	.408	.125	$d_{0,94}$	−1.790	.212	−1.827	.211
α_{90}	0*	.118	0*	.189	$d_{0,98}$	−2.048	.227	−2.095	.229
α_{94}	0*	.072	0*	.154	d_1	.292	.033	.292	.033
α_{98}	.272	.140	0*	.177	d_2	1.099	.071	1.098	.071
ρ_{78}	0*	.353	0*	.373	d_3	1.773	.087	1.770	.087
ρ_{82}	.780	.434	.086	.515	d_4	2.029	.119	2.026	.119
ρ_{86}	1*	.424	1*	.393	d_5	.031	.002	.031	.002
ρ_{90}	1*	.386	1*	.402	d_6	.423	.051	.425	.051
ρ_{94}	.752	.430	.641	.423	d_7	.117	.007	.117	.007
ρ_{98}	1*	.467	1*	.523	d_ς	−.605	.115	−.585	.115
$c_{0,78}$	−1.018	.093	−.990	.093	$d_{\theta,78}$	−.057	.222	−.024	.223
$c_{0,82}$	−.898	.114	−.923	.119	$d_{\theta,82}$	.245	.312	.282	.313
$c_{0,86}$	−.772	.097	−.744	.097	$d_{\theta,86}$	.381	.295	.427	.295
$c_{0,90}$	−.864	.124	−.775	.124	$d_{\theta,90}$	−.169	.260	−.107	.262
$c_{0,94}$	−.871	.091	−.871	.092	$d_{\theta,94}$	.961	.280	.934	.280
$c_{0,98}$	−1.063	.110	−.992	.118	$d_{\theta,98}$	.881	.347	.881	.349
$c_{EC,78}$	.078	.112	.080	.111	$d_{EC,78}$	−.023	.117	−.023	.117
$c_{EC,82}$	.096	.109	.107	.109	$d_{EC,82}$	.015	.132	.015	.133
$c_{EC,86}$	.066	.094	.048	.094	$d_{EC,86}$	−.146	.110	−.146	.110
$c_{EC,90}$	.284	.143	.285	.143	$d_{EC,90}$	−.156	.131	−.149	.131
$c_{EC,94}$	.023	.101	.031	.101	$d_{EC,94}$	−.404	.121	−.408	.121
$c_{EC,98}$	−.061	.144	−.067	.141	$d_{EC,98}$	.152	.156	.153	.156
c_D	.493	.074	.485	.074	d_D	−.833	.081	−.816	.081
c_{ID}	.603	.083	.604	.083	d_{ID}	−.880	.094	−.860	.094
c_I	.946	.093	.931	.093	d_I	−1.265	.104	−1.242	.105
c_{IR}	1.408	.087	1.386	.086	d_{IR}	−.712	.099	−.691	.100
c_R	1.433	.082	1.418	.082	d_R	−.780	.091	−.760	.091
c_{SR}	1.892	.094	1.862	.094	d_{SR}	−.114	.103	−.103	.103
c_{DEM}	.683	.066	.685	.066	d_{DEM}	−.260	.085	−.269	.085
c_{REP}	.636	.067	.631	.067	d_{REP}	−.343	.087	−.348	.087

Note: Maximum likelihood estimates. * indicates a boundary-constrained parameter. Pooled ANES Post-Election Survey data, 1978–98, $n = 9639$ cases. Log-likelihood values: coordinating model, −6824.7; non-coordinating model, −6825.4.

Table 2: Likelihood-ratio Test Statistics for the Constraint $\alpha = 1$, by Year

year	$-2(L_{\text{constrained}} - L)$	sig. prob.
1978	13.2	7.7e-04
1982	35.2	4.3e-09
1986	12.0	1.4e-03
1990	28.6	4.7e-07
1994	53.3	6.4e-13
1998	26.7	6.5e-07

Note: The constraint is imposed separately for each year's α parameter. The significance probability is the upper-tail probability for the χ^2_1 distribution under the null hypothesis $\alpha = 1$, using the method of Davies (1987, eqn. 3.4) to adjust for the nuisance parameter ρ.

Table 3: 95% Confidence Intervals for α

parameter	lower bound	upper bound
α_{78}	.157	.787
α_{82}	0*	.423
α_{86}	.348	.775
α_{90}	0*	.196
α_{94}	0*	.127
α_{98}	.007	.541

Note: Estimates are based on tabulation of an asymptotic mixture distribution of the kind derived in Moran (1971) and Self and Liang (1987), under the hypothesis that $\alpha_{90} = \alpha_{94} = \rho_{78} = 0$ and $\rho_{86} = \rho_{90} = \rho_{98} = 1$. * indicates a boundary-constrained value.

Table 4: Expected Proportion Republican in National House Vote ($\bar{H}$) and Expected Proportion of Electors Voting ($\bar{V}$), by Year

year	$\hat{\bar{H}}$	$\hat{\bar{V}}$
1978	.393	.477
1982	.437	.550
1986	.418	.481
1990	.373	.439
1994	.544	.558
1998	.524	.455

Note: Computed using the parameter MLEs in Table 1 and 1978–98 ANES data.

Table 5: Orderings of Ideal Points and Expected Party Policy Positions, by Year

	Ordering					
year	$\theta_i < \tilde{\theta}_{Mi}, \tilde{\theta}_i$	$\tilde{\theta}_{Mi} < \theta_i < \tilde{\theta}_i$	$\tilde{\theta}_i < \theta_i < \tilde{\theta}_{Mi}$	$\tilde{\theta}_{Mi}, \tilde{\theta}_i < \theta_i$	$\theta_{Di} = \theta_{Ri}$	$\varsigma_i = 0$
1978	19.5	0.0	1.8	36.9	15.3	14.2
1982	38.8	3.5	0.7	33.8	2.1	10.9
1986	61.9	2.1	0.0	14.1	2.5	10.9
1990	32.6	0.0	4.2	29.6	6.2	12.2
1994	29.0	1.4	0.1	49.9	2.3	4.8
1998	45.4	0.4	3.6	27.3	5.1	5.0

Note: $\tilde{\theta}_{Mi} = (\tilde{\theta}_{Di} + \tilde{\theta}_{Ri})/2$. Entries show the percentage of electors in each year who have $\theta_{Di} < \theta_{Ri}$ and the indicated ordering of ideal point and expected policy positions, or who have $\theta_{Di} = \theta_{Ri}$, or who lack policy position values ($\varsigma_i = 0$). Computed using the parameter MLEs in Table 1 and 1978–98 ANES data. Percentages for those with $\theta_{Di} > \theta_{Ri}$ are, by year: $\theta_i < \tilde{\theta}_i$ (5.1, 5.3, 4.7, 7.6, 5.7, 8.3); $\tilde{\theta}_i < \theta_i$ (7.2, 4.9, 3.8, 7.5, 6.9, 5.4). Each observation is weighted by the sampling weight $1/\omega_i$.