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Equilibria and Restoring Forces in Models of Vote Dynamics

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Theories of voting tell us that party vote dynamics have two core components, long-run equilibria and more or less rapid returns to equilibria after short-run deviations. Statistical models used to represent these theories, however, tend to emphasize one component or the other. The unbalanced emphasis leaves the theoretical ideas underspecified and produces biased estimates of both long- and short-run components of vote dynamics. We specify the two components in the familiar form of an error correction model and demonstrate its advantages in terms of its theoretical consistency, simplicity, and precise prediction of whether something is wrong. We illustrate its usefulness by applying it to two sets of analyses reported in the literature and showing that it usually changes the conclusions reported in regard to both the equilibrium levels of party competition and the strength of restoring forces.

1 Introduction

The study of aggregate vote dynamics is an area of political science research where it has proven difficult to specify statistical models in line with the underlying theory. Micro-level voting theories tell us that we should expect to see two prominent features in aggregate party vote divisions: (1) short-lived fluctuations in party vote support, and (2) mostly stable long-run party equilibria of the competitive party balance. That theoretical orientation notwithstanding, statistical models almost always specify aggregate vote dynamics as if the two prominent features are an either/or proposition. They concentrate on either short-run fluctuations from one election to the next or the equilibria themselves. The consequence is underspecified models that miss their theoretical and empirical marks, sometimes by a large margin.

Our aim is to construct a model of aggregate vote dynamics that combines long- and short-run elements so that statistical specifications accurately estimate, in the apt phrase of

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Donald Stokes and Gudmund Iversen (1962), equilibria of party competition and the strength of forces restoring them. Section 2 provides a brief overview of what voting theories tell us about vote dynamics and specifies a statistical model in line with these underlying theories. In the process we show that the model has four desirable properties. It is faithful to its underlying theoretical specification, simple in that it merely combines two commonly used models, familiar in that it comes in the form of an error correction model, and useful in that it provides clear and precise indications of whether something has gone wrong. Section 3 uses the combined model to reexamine inferences about vote dynamics in two sets of literature: (1) U.S. House elections over the course of the twentieth century, and (2) cross-national, cross-temporal series of elections in fifteen Western democracies from 1950 through 1995.

2 A Framework for Analyzing Vote Dynamics

2.1 *The Issue*

It can be vacuous advice to say "get the correct specification." Indeed, it is vacuous advice if it is a directive to go out and uncover the truth in theory and fact. The correct specification we have in mind, however, means moving faithfully from an underlying theory of voting to a statistical model that accords with the theory. The theory itself might have shortcomings, but we could hardly expect to learn that if the model used to estimate and test it were a discordant representation in the first place. So, first thing first, what we want to accomplish in this section is the assurance that the statistical model of vote dynamics is a faithful representation of theory.

Theories of party voting as they pertain to established democracies hold that there exist long-run party equilibria and short-run perturbations. This is explicitly so for the Michigan School's social-psychological theory of voting. In the absence of short-term forces running in favor of one party or the other, due to candidates and issues of the day (Stokes 1966), voters have long-term party attachments that form a theoretically and empirically derived "normal vote" baseline (Converse 1966). Sociological theories also envision long- and short-term forces, resting in their view on social cleavages. Stefano Bartolini and Peter Mair (1990, 3) approach their study of vote dynamics from a social cleavage perspective and introduce their analysis with this thought: "Electoral stabilisation appears as a necessary prerequisite for democratic consolidation.. . . a degree of electoral instability appears necessary in order to ensure democratic responsiveness and accountability." To them, on one hand, mostly stable long-term party-vote divisions signal that political conflict has been organized in a manner that comports with enduring lines of cleavage in a society. On the other hand, short-run perturbations animate the democratic process, occasionally making good on the threat of party alternation. So it is, too, with continuous information updating theories associated with the rational-actor theories of voting (see, e.g., Fiorina 1977; Erikson et al. 2002, 127–136, 237–283).

Put differently, in any democracy that could be labeled stable and competitive, it is difficult to imagine a theory of voting that would disavow the roles of equilibria vote divisions and short-lived deviations. Given some form of stable party competition, fluctuations have to be deemed more likely to return to equilibria divisions than to drift untethered toward noncompetitive party domination, as if in a random walk. How quickly deviations recede and whether transition forces enter and move the systems to new equilibria positions are important questions, but all theories of voting of which we are aware posit some sort of long-run equilibria around which short-run perturbations create longer- or shorter-lived deviations. A statistical model used to represent macro-level vote dynamics must therefore incorporate these two core components while allowing for estimation of possible equilibria transitions and possible varying speeds (strengths) of restoring forces.

2.2 *General Framework*

An error correction model (ECM) can be used to take statistical account of the two theoretically relevant components. As a general class, ECMs have the attractive qualities of being able to incorporate and estimate short- and long-term dynamics (Engle and Granger 1987; Beck 1991, 1992; Durr 1992; De Boef 2001). While often applied to time series data involving cointegrated series, such as economic expectations and domestic policy sentiment (Durr 1993), they are broadly applicable to circumstances with short- and long-term dynamic components. As Suzanna De Boef and Luke Keele (2005, 12) remark, "The term error correction model applies to any statistical model that directly estimates the rate at which Y_t changes to return to equilibrium after a change in X_t."

Chris Wlezien and Robert Erikson, for example, specify a form of ECM and apply it to a single series of American presidential election campaign polls (Wlezien and Erikson 2002, 972; see also 989–91). Our purpose is similar, but our model construction takes and generalizes an important lesson from Pierre Perron (1989). Perron shows that an unaccounted-for exogenous break in a series can make the series appear as if it is following a unit root process even though, except for the one-time break, the perturbations in the series are transitory. Put in terms of vote dynamics as modeled here, this means that once such a break is taken into account, forces restoring party competition are stronger than they originally appear. Moreover, put in generalized terms relevant to vote dynamics analyses, not taking account of "breaks" (differences in equilbria) of various sorts makes the estimated forces restoring party competition appear weaker than they truly are. At least three different types of breaks are relevant to vote dynamics. The one most similar to what Perron had in mind occurs when party support undergoes a regime shift but that shift is not taken into account (e.g., Erikson 1988). A second type occurs when modeling a series of incumbent votes, different parties are incumbents, but the difference is not taken into account (Campbell 1985). A third occurs when estimating dynamics for multiple national series in a pooled analysis but differences between party equilibria vote levels are not taken into account (Powell and Whitten 1993; Palmer and Whitten 1999; Samuels 2004, Meguid 2005).

The task we set for ourselves in the next three subsections is to pull together a model of vote dynamics that takes account of the short- and long-run features so that we have a generally applicable model that produces unbiased estimations of equilibria and of the power of restoring forces.

2.3 *A Base Model*

We start with vote dynamics in a two-party system. The base model relates a vote percentage received by a party in a current election, t, to that party's vote percentage in an immediately prior election, $t-1$:

$$V_t = \alpha + \beta V_{t-1} + \mu_t, \tag{1}$$

where V is one party's vote percentage in the current, t, and immediately prior, $t-1$, elections; α, β, and μ_t are, respectively, the intercept, slope, and a well-behaved error term.

Duff Spafford (1971) first brought this model to the attention of political scientists studying vote dynamics when he used it as an extension of Stokes and Iversen's (1962) probability formulation for estimating the likelihood of forces restoring party competition in U.S. congressional elections. In this equation form, Spafford was able to address two key questions: (1) are there restoring forces and, if so, (2) to what equilibrium level will party-vote percentages return? The equilibrium for a given party is calculated from the coefficients as:

$$\text{Vote Equilibrium} = \alpha/(1-\beta). \tag{2}$$

The slope, β, records the proportion of the deviation from equilibrium in the previous election retained by the party in the current election. Alternatively stated, the quantity (1 − β) is the proportion of the party's vote deviation from equilibrium at the previous election that evaporates in the current election. Or, more simply put, (1 − β) is the power of the forces restoring equilibrium. Given that we are dealing with vote support as it develops through time, one can also interpret (1 − β) as the speed with which the vote returns to its equilibrium level (Price and Sanders 1993).[1]

To see how the two parameters capture the important concepts of equilibrium and restoring forces, it is useful to consider a party's vote as an explicit function of the two features (see Spafford 1971, 183). Call the equilibrium vote *E*. In a current election, a party's vote is equal to that equilibrium plus whatever proportion, β, of the deviation from the equilibrium at the previous election it can retain—i.e., plus $\beta(V_{t-1} - E)$. In equation form,[2]

$$V_t = E + \beta(V_{t-1} - E) + \mu_t. \tag{3}$$

Because at the moment we are dealing with one party with a fixed equilibrium, *E* is a constant. Therefore, we can rearrange and write:

$$V_t = 1 - \beta(E) + \beta V_{t-1} + \mu_t. \tag{4}$$

[1]Over a series of *k* elections the proportion of a deviation retained is β^k. The number of elections, *k*, that it would take to return, say, .9 of the way from a deviation toward the equilibrium is $[\log_e(1-.9)/\log_e\beta] = k$.

[2]β will normally have a value between zero and one. Its range of possible values, however, includes the following:

(1) $\beta = 0$, the current vote equals the equilibrium vote. The current vote is independent of the deviation at the previous election. Hence, the expected reversion to the equilibrium vote is exact and immediate.

(2) $-1 < \beta < 1$, the deviation in the current election is a fraction of what it was in the previous election. Through successive elections, the deviations grow progressively smaller so that a current vote approaches the equilibrium vote, where
 (a) $0 < \beta < 1$, the movement toward the equilibrium is through successive fractions β^t.
 (b) $-1 < \beta < 0$, the movement approaches the equilibrium through successively dampening oscillations above and below the equilibrium.

(3) $\beta = \pm 1$, the previous deviation is retained for the current vote and into the future. This reflects a random walk process.
 (a) $+1$, the previous deviation is maintained at a new level.
 (b) -1, there are permanent oscillations, above and below the equilibrium vote, equal in magnitude to the previous deviation.

(4) $\beta > +1$ or $\beta < -1$, the deviation at the current election grows larger with the passage of time, where
 (a) $> +1$, the deviations grow larger, moving in the same direction as the deviation.
 (b) < -1, the deviations grow larger, moving in an oscillating pattern above and below the starting point.

The equilibrium vote can therefore be calculated by dividing the quantity $[1 - \beta(E)]$ by $1 - \beta$. By definition, β records the proportion of the previous deviation that is retained, and $1 - \beta$ records the extent to which forces restore the vote to its equilibrium position.[3]

Take, for example, an estimation that reveals:

$$V_t = 20 + .6V_{t-1} + e_t. \tag{5}$$

The vote level to which party support tends is 50%—i.e., [20/(1 − .6)]. If party support deviates from the 50% mark, then it is expected to return two-fifths of the way toward 50% at the next election. That is, if a party's vote were to rise to 55%, then it would be expected to be 53% at the next election—i.e., 20 + .6(55) = 53, which is two-fifths of the way from the +5 deviation, $V_{t-1} = 55$, toward the equilibrium of 50. From the new point of 53%, support at the next election is expected to move to 51.8, which is two-fifths of the way toward 50% from 53%.

This simple autoregressive equation is an elegant statement about a party's vote equilibrium and the pace of reversion to the equilibrium position following a short-run deviation. The catch is that everything we have said is contingent upon an analysis of vote percentages for a single party with a fixed equilibrium. Therefore, it is not a model that can be transferred directly to applications for many of the vote series that political scientists want to analyze. As we shall see, with due attention to the two core dynamic components, it generalizes to other situations—but if and only if one heeds the "due attention" caveat.

2.4 *Different Equilibria*

Most analyses of vote dynamics involve parties with varying equilibria, because the analysis investigates two or more parties, changing equilibria of a single party, or both. An analysis might investigate party votes across multiple political subdivisions, as when it involves Democratic party votes across the fifty U.S. states (Deboef and Stimson 1995). Also, a party's equilibrium levels of support could change through time, as when the U.S. national partisan regime changed in association with the New Deal period (Waterman, Oppenheimer, and Stimson 1991). And an analysis might involve switching incumbents, as when the series tracks both incumbent Democrats and Republicans (e.g., Erikson 1988) or when the series tracks various incumbent parties and party coalitions within and across nations (e.g., Powell and Whitten 1993; Samuels 2004).

The adverse consequences of ignoring variance in the different equilibria can be large. For one thing, the estimations misidentify equilibria by implicitly assuming that there is

[3]The base model written in equation (4) is equivalent to the base model equation used by Oppenheimer, Stimson, and Waterman to analyze their exposure thesis (Oppenheimer, Stimson, and Waterman 1986; Waterman, Oppenheimer, and Stimson 1991). While those authors were interested in Democratic Party House seats, when written with respect to Democratic Party House votes their *sequence and exposure* ideas would have the following form (see ibid., 375).

$$(V\%_t - V_{t-1}) = (\beta - 1)(V_{t-1} - E) + \mu_t.$$

This is the same as

$$V_t = \beta V_{t-1} - \beta E - V_{t-1} + E + V_{t-1} + \mu_t,$$

or

$$V_t = \beta V_{t-1} - \beta E + E + \mu_t,$$

or, more simply,

$$V_t = (1 - \beta)E + \beta V_{t-1} + \mu_t.$$

just one captured by the intercept. In addition, the estimated effect of votes in the preceding election, β, will be upwardly biased toward 1.0 in direct relation to the proportion of variance in the vote series associated with the diverse equilibria. In substantive terms this means the strength of restoring forces (i.e., $1 - \beta$) will be understated.

The bias in β comes from the fact that, with diverse equilibria in a vote series, equation (4) with a single equilibrium now has varying equilibria and becomes

$$V_t = 1 - \beta(E_t) + \beta V_{t-1} + \mu_t, \tag{6}$$

where all terms but E_t have been previously defined, and E_t is now a variable, rather than a constant, taking different values at different times, t. (Or the different equilibria refer to various i units—e.g., states, countries—so that each variable would be subscripted as in $V_{i,t}$, $E_{i,t}$, $V_{i,t-1}$, and $\mu_{i,t}$.)

The bias in the V_{t-1} coefficient when omitting the equilibrium variable can be written as

$$\mathrm{E}(\mathrm{b}_{\mathrm{VV'}}) = \beta_{\mathrm{VV'}} + \beta_{\mathrm{VE}}\mathrm{b}_{\mathrm{EV'}}, \tag{7}$$

where $\mathrm{E}(\mathrm{b}_{\mathrm{VV'}})$ is the estimated relationship between vote percentages in the current (V_t) and preceding (V', V-prime, for V_{t-1}) election; $\beta_{\mathrm{VV'}}$ is the true relationship for those two variables; β_{VE} is the true relationship between vote percentages in a series of current elections and equilibria vote percentages; and $\mathrm{b}_{\mathrm{EV'}}$ is the observed relationship in one's data between equilibria vote percentage levels and vote percentages in the series of immediately preceding elections.

Because coefficients $\beta_{\mathrm{VV'}}$ and β_{VE} are related—$\beta_{\mathrm{VE}} = (1 - \beta_{\mathrm{VV'}})$—the bias added by ignoring the different equilibria is $(1 - \beta_{\mathrm{VV'}})\ \mathrm{b}_{\mathrm{EV'}}$. That is,

$$\mathrm{E}(\mathrm{b}_{\mathrm{VV'}}) = \beta_{\mathrm{VV'}} + (1 - \beta_{\mathrm{VV'}})\mathrm{b}_{\mathrm{EV'}}. \tag{8}$$

And since[4]

$$\mathrm{b}_{\mathrm{EV'}} \approx \mathrm{r}^2_{\mathrm{EV'}}, \tag{9}$$

[4]By definition, the bivariate relationship between a series and its equilibria is $\beta_{\mathrm{VE}} = 1.0$, so for an estimated series of V in the preceding elections

$$\mathrm{b}_{\mathrm{V'E}} \approx 1.0.$$

And since

$$\mathrm{b}_{\mathrm{V'E}} = \mathrm{r}_{\mathrm{V'E}}(\mathrm{s}_{\mathrm{V'}}/\mathrm{s}_{\mathrm{E}}),$$

therefore

$$\mathrm{r}_{\mathrm{V'E}} = \mathrm{b}_{\mathrm{V'E}}(\mathrm{s}_{\mathrm{E}}/\mathrm{s}_{\mathrm{V'}}).$$

And since $\mathrm{b}_{\mathrm{V'E}} \approx 1.0$,

$$r_{\mathrm{V'E}} \approx (\mathrm{s}_{\mathrm{E}}/\mathrm{s}_{\mathrm{V'}}).$$

Given that $\mathrm{r}_{\mathrm{Y'E}}$ equals $\mathrm{r}_{\mathrm{EY'}}$,

$$\mathrm{b}_{\mathrm{EV'}} \approx \mathrm{r}_{\mathrm{EV'}}(\mathrm{s}_{\mathrm{E}}/\mathrm{s}_{\mathrm{V'}}) \approx (\mathrm{s}_{\mathrm{E}}/\mathrm{s}_{\mathrm{V'}})(\mathrm{s}_{\mathrm{E}}/\mathrm{s}_{\mathrm{V'}}),$$

or

$$\mathrm{b}_{\mathrm{EV'}} \approx (\mathrm{s}^2_{\mathrm{E}}/\mathrm{s}^2_{\mathrm{V'}}) \approx \mathrm{r}^2_{\mathrm{EV'}}.$$

we have

$$E(b_{VV'}) \approx \beta_{VV'} + (1 - \beta_{VV'})r^2_{EV'}. \tag{10}$$

Therefore,

$$E(b_{VV'}) \approx \beta_{VV'} + r^2_{EV'} - \beta_{VV'}r^2_{EV'}. \tag{11}$$

As the proportion of a series' variance due to varying equilibria increases and the equilibria are omitted from the estimation, the amount of bias in the estimated persistence increases in a direct linear form. Therefore, unless there is zero variance in equilibria (as in equation [4]) or a series is on a random walk, which means $\beta_{VV'}$ is 1.0 and there is no equilibrium (either diverse or singular), then $\beta_{VV'} < 1.0$ and therefore its estimated effect is biased toward 1.0.

The reasoning can be understood intuitively by recognizing that persistence always estimates the return to whatever equilibrium is implicit in a model. With two or more equilibria in one's data, as when analyzing incumbent votes of parties with equilibria at 45% and 55%, and with a specification treating the varying equilibria as singular, the persistence in returning to the erroneously implied single equilibrium will be very slow. Persistence is overestimated; forces restoring equilibria are underestimated.

In substantive terms, the extent to which an analysis overstates the effect of retained deviations and, its flip side, understates the power of forces restoring equilibria depends on the substantive situation under investigation—i.e., how much variance exists in the equilibria. When equilibria are not much different—e.g., the British Conservative equilibrium, about 43.5%, versus British Labour equilibrium, about 40.5%—the effect will be small. In the United States, with a six- to seven-point difference between Democratic equilibria before and after 1930 or between Democrats and Republicans as they alternate as incumbents, the effect will be larger. When the differences in equilibria are especially large, as when an analysis involves minority-party incumbents and majority coalitions in Sweden, the overstatement will be especially large—e.g., as when the Swedish FP (People's Party), with a 14.1% equilibrium, is the incumbent party versus the situation in which Swedish incumbent parties are a coalition of the SDA (Social Democratic Labor) plus Center Party (CP), with an equilibrium over 60%. And when an analysis is cross national, one is virtually assured of a very large overstatement.

An alternative way to describe the problem is to say an analysis that overlooks varying equilibria is overlooking fixed effects. It is well established that omitting relevant fixed effects from a first-order model, as in equation (1), biases upwardly the coefficient on a lagged dependent variable (Maddala 1971; Nickell 1981; Kiviet 1995; see also Perron 1989, who adds a substantive context when making this point). But, except from drawing attention to consequences of omitted fixed effects, there are three reasons to prefer treating the omitted equilibria for what they are, equilibria, rather than generic fixed effects. First, theory can be used as a guide to identify the relevant fixed effects. Second, theory can be leveraged for its specific predictions and used to test whether we have identified the relevant fixed effects. Third, experience as adduced from the literature tells us that it is often difficult to see how to indicate and incorporate the fixed effects.

Recognizing that vote dynamic fixed effects are varying equilibria allows theory to point an analysis in the right direction. In particular, in an application to vote dynamics, theory tells us what sort of fixed effects are always theoretically relevant. They include whenever different parties are in an analysis and whenever there have been structural changes in a party system (e.g., abrupt realignments such as the New Deal or secular realignments such as the declining support for Christian parties in Europe).

Conceptualizing the fixed effects in terms of their theoretical status as equilibria provides important foreknowledge, whereas fixed effects, as such, often have the flavor of atheoretical control variables. The coefficient on an equilibria variable has an expected value of 1.0. That is because vote equilibria are party vote percentages around which support tends to fluctuate and to which support tends to return after a fluctuation. In other words, equilibria are parties' long-run expected vote percentages.[5]

To see how we know that the coefficient on an equilibria variable is 1.0, suppose we are estimating a model with $k - 1$ dummy variables and associated fixed effects (α), where k is the number of different incumbent parties and party coalitions. The dynamic specification with fixed effects could be written as

$$V_t = \alpha_1 + \beta V_{t-1} + \alpha_2 D_2 + \alpha_3 D_3 + \cdots + \alpha_k D_k + \mu_t, \tag{12}$$

where D_i are dummy variables for various incumbent parties or coalitions and α_i are their fixed effects. Dropping the baseline intercept and collecting all k dummy-variable fixed effects, we have

$$V_t = \beta V_{t-1} + \Sigma\alpha_i D_i + \mu_t. \tag{13}$$

Given $D_i = 1$ anytime the dummy variable is operative, the summation can be written as $\Sigma D\alpha_i$, making clear that D has a value of 1.0 when standing as a coefficient for the fixed effects summarizing various equilibria in a single variable, α_i. Of course, the logic applies to all situations in which equilibria are identifiable as particular units—e.g., parties and party coalitions.

Thinking about the issue in this way highlights what appears to be a problem with a fixed-effects specification. Treating omitted equilibria as omitted fixed effects is difficult, due to their nongenerality. For instance, when an analysis is organized to investigate congressional party votes (or seats) of incumbent presidential parties, the difference in equilibria of the Republicans in contrast to that of the Democrats is sometimes taken into account (Erikson 1988), but at other times it is not (e.g., Campbell 1985, 1997). In cross-national analysis of incumbent party votes, differences between the equilibria of incumbent parties in different nations have not been considered (see, e.g., Powell and Whitten

[5]In a single equilibrium case, the implicit coefficient on the intercept is 1.0. In a multiple equilibria case the explicit coefficient is 1.0. This can be seen by rearranging the equation (4) version of the base model

$$V_t = 1 - \beta(E_t) + \beta V_{t-1} + \mu_t$$

as

$$V_t = 1E_t + \beta(V_{t-1} - E) + \mu_t,$$

where in the single equilibrium case E is constant and in the multiple equilibrium case E_t is a variable.

It must be added that in theoretically richer models for which substantive variables enter to capture the equilibria, the estimated effects of the theoretically specified equilibria forces will replace the effect of the vote equilibria variable and reduce its coefficient from 1.0 toward 0 (for an example in the context of government and party Left-Right positions, see, e.g., McDonald and Budge 2005, 107–8). Indeed, it will ultimately go to 0 if the theoretically richer variable does capture all the equilibria forces. Macropartisanship is a good candidate for capturing the equilibria (Erikson, MacKuen, and Stimson 2001), as is the social group component of votes (Axelrod 1972). Specifying models with theoretically richer equilibrium forces takes us down a path that leads away from the core component model we are developing, risking diversion from the principal point of specifying the core-component model. In the space available, the diversion is not worth the risk of obscuring that principal point.

1993; Anderson 1995; Palmer and Whitten 1999; Samuels 2004; Meguid 2005). And in a situation in which a party's equilibria involve structural adjustments in the form of secular growth or decay, as is the case for many European Christian parties, fixed effects may be impossible to generalize.

2.5 *Incorporating Various Equilibria*

It is not as if varying equilibria are always overlooked. Indeed, once in a while the problem runs the other way: varying equilibria are taken into account and the forces restoring equilibria are overlooked. This is what Edward Tufte did in his analysis of U.S. House vote dynamics (1974, 139–48; 1975; 1977).

Tufte was interested in House vote percentages for an incumbent president's party, especially whether those percentages are influenced by the economy and presidential popularity. Rather than gauge the current vote in relationship to the previous vote, Tufte constructed a normalized vote from a moving average of each incumbent party's vote over the previous eight elections. The dynamic core components of his model take the form:

$$I_{it} = \phi + \lambda E_{it} + \varepsilon_{it}, \tag{14}$$

where I_{it} is incumbent party i's vote at time t and E_{it} is a normalized, equilibria vote for incumbent party i at time t calculated as the average vote for party i over the previous eight elections.

Tufte's approach addresses the problem of analyzing various equilibria by making the equilibria a variable in the equation. His model also allows estimation of whether the normalized vote variable represents the equilibria values. If it does, then $\lambda = 1$ and $\phi = 0$. There is, however, an implicit assumption built into this equation. The equation implies that a deviation from the respective equilibria will return to equilibrium immediately. The assumption is built into his analysis because the equation omits explicit reference to the deviation of the vote at the previous election. Substantively, it says that the forces restoring party competition to equilibria are total and immediate. This may be true in any one application, but it will not always be true. Thus the Tufte form of a vote dynamics model generally understates the retention of a previous vote deviation and, with that, generally overstates the power of restoring forces.

To uncover when, where, and to what extent an over- versus an understatement arises, we want to estimate its value empirically. This can be accomplished by adding a term to the Tufte equation that takes account of the short-run deviations. A model that incorporates estimations for vote tendencies toward long-run equilibria and also estimates the short-run speed of the dynamic adjustments around the equilibria is:

$$I_{it} = \phi + \lambda E_{it} + \beta(I_{it-1} - E_{it}) + \nu_{it}, \tag{15}$$

where β is the proportion of the deviation at the previous election that is retained at the current election.[6] If we have properly characterized the equilibria, the clear and precise expectations are for $\phi = 0$ and $\lambda = 1$. Furthermore, movement toward the respective equilibria takes place at a speed of $1 - \beta$.

[6]This is an ECM in its fundamental form. Given E(λ) is 1.0, we could write Y_{it} as ($I_{it} - E_{it}$), and the remaining right-hand-side elements (i.e., $\{I_{it-1} - E_{it}\}$) represent deviations from equilibrium in the preceding period. Therefore β records the proportion of the deviation (error) retained in the current outcome (see Engle and Granger 1987; Beck 1991; Durr 1992; for a more general explanation of estimating models with potential retention of error see Hausman 1978).

This is a generalization of equation (4). Written explicitly in the form of equation (4) but with varying equilibria, we have

$$I_{it} = (1 - \beta)E_{it} + \beta I_{it-1} + \nu_{it}, \tag{16}$$

where E_{it} represents the equilibria values for different i parties (or the same party over different regimes at different times). Multiplying through on the first term, we have

$$I_{it} = 1E_{it} - \beta E_{it} + \beta I_{it-1} + \nu_{it}. \tag{17}$$

And rearranging, we have

$$I_{it} = 1E_{it} + \beta(I_{it-1} - E_{it}) + \nu_{it}, \tag{18}$$

which is the same as equation (15) with the precise implications that the intercept is zero ($\phi = 0$) and the slope on the equilibria variable is one ($\lambda = 1.0$). This is an ECM in its simple single-series form (Beck 1991; as in Wlezien and Erikson 2002, 972).

We now have an model with (1) a parameter, λ, that tells us the effect of long-run equilibrium forces, (2) a parameter, β, that tells us the persistence of previous short-run deviations, and (3) a parameter, ϕ that tells us whether any aspects of the equilibria have been left unaccounted for. Moreover, the specification provides two clear indicators of whether something is wrong. If $\lambda \neq 1$ and/or if $\phi \neq 0$, we know that we have not properly characterized the equilibria.[7]

3 Applications

The theoretical development of a model can be compelling in its own right, but seeing the model applied is all the more convincing. We first apply our combined (error correction) model to the major two-party vote percentages in elections for the U.S. House of Representatives throughout the twentieth century, 1900–1998. Our purposes are to illustrate two points: (1) how omission of changed equilibria affects the estimate of short-term persistence, and (2) how one can evaluate alternative measures of equilibria. Thereafter, we apply the model to elections in fifteen Western democracies from the time of each nation's first election in the 1950s through the mid-1990s. Here, too, we want to illustrate two points: (1) how important it is to incorporate cross-national, cross-party differences in equilibria when various systems are under investigation, and (2) how within-party dynamic equilibria affect estimates of short-term persistence.[8]

3.1 *U.S. House Elections*

The usual loss of House seats by the president's party in midterm elections has given rise to repeated attempts to model vote (and seat) dynamics (for a review, see Jacobson 2004, 151–70). One of the early attempts was by Spafford (1971) where, as we have said, he was interested in modeling the forces restoring party competition—in his case from 1900

[7]The equation could be written with the recent deviation term expressed in a level form, I_{it-1}, and we would have

$$I_{it} = \phi + \gamma E_{it} + \beta I_{it-1} + \nu_{it}.$$

In this form, however, we lose sight of the useful evaluative standard that the equilibrium coefficient has a theoretically expected value of 1.0, since $\gamma = (\lambda - \beta)$, which is expected to be $1 - \beta$ just as in the base model (equation [4]) as amended for generality in equation (18).

[8]Data details for both sets of analyses and the data themselves are available at http://cdp.binghamton.edu/papers.html.

through 1960. None of his five models included a term for the changed equilibrium in the Democrats' vote share associated with the New Deal.[9] We want to include the changed equilibria as one illustration of its effect, as such, and to estimate how the inclusion affects estimation of forces restoring equilibria.

3.1.1 Changing Equilibria

The base model, estimated for the entire twentieth century, is

$$\begin{aligned} P_t &= \underset{(6.04)}{21.64} + \underset{(.118)}{.574}\, P_{t-1} \\ \text{adj } R^2 &= .32 \quad s_e = 3.94 \quad N = 50, \end{aligned} \tag{19}$$

where P_t and P_{t-1} are Democratic Party vote percentage in the current and immediately preceding election. The estimated Democratic Party vote equilibrium is 50.8 (i.e., 21.64/[1 – .574]), and the forces restoring Democratic vote levels to equilibrium are modest, .426 (i.e., 1 – .574 = .426).

Both the equilibrium states of the party vote shares and the speed of adjustment toward equilibria are different after taking account of the equilibrium shift associated with the New Deal. With the addition of a dummy variable for elections before and after 1931, we find

$$\begin{aligned} P_t &= \underset{(6.31)}{32.92} + \underset{(.134)}{.289}\, P_{t-1} + \underset{(1.35)}{4.75}\, \Delta_t \\ \text{adj } R^2 &= .45 \quad s_e = 3.55 \quad N = 50, \end{aligned} \tag{20}$$

where Δ_t is a dummy variable scored 1 after the partisan regime change (1932–98)[10] and 0 before. The Democratic equilibria are 46.3 in the period prior to the New Deal and 53.0 from the time of the regime change through the end of the century. Because equation (19) ignores the different equilibria it implicitly assumes that restoring forces are moving party competition back to an intermediate point between the two equilibria. Consequently, persistence is overstated and the power of the restoring forces is understated. Without taking account of the equilibrium shift, the restoring forces are estimated to be proceeding at a slower pace of .426 (i.e., 1 – .574), compared with the more rapid pace of .711 (i.e., 1 – .289) when the change is taken into account.[11]

3.1.2 Evaluating Equilibria

The Tufte approach to congressional vote dynamics concentrates on movements in relation to long-run equilibria. He used the average Democratic vote over the previous eight

[9]The point is to illustrate the influence of including versus excluding explicit consideration of a changed equilibrium. It is decidedly not to criticize Spafford. Indeed, we hasten to add that three of Spafford's five estimated models include a time trend term, which does much indirectly to capture the changed equilibrium (Spafford 1971, 182).

[10]Our results change slightly when we treat the partisan regime shift as having started in 1930 rather than 1932. They change in similar ways if we exclude the years of the regime transition period, 1930–1938. In both cases, the equilibria are approximately the same as reported in the text but the slope on P_{t-1} is about .05 higher.

[11]It could be that we are overlooking another partisan regime shift after 1980 (Campbell 1997; see also Meffert, Norpoth, and Ruhil 2001). We estimated a model with a dummy variable for the post-1980 period and found evidence of a shift in the predicted direction, but that shift is not estimated reliably enough to pass a test of statistical significance at conventional levels: $b = -.763$; $s_b = 1.390$; $t = -.549$; $p = .29$, one-tail test. Nor is it estimated reliably enough for us to conclude that the efficiency-bias trade-off favors inclusion (i.e., magnitude of $t < 1.0$).

elections to establish equilibria values. When we apply that model to elections throughout the twentieth century (losing the elections from 1900 through 1910 because our data to calculate the eight-election average go back only to 1896), we find, as did Erikson (1988, 1023–25), that it performs poorly. The results show

$$\begin{aligned} P_t &= 29.48 + .428\ P_{t-1\ldots8} \\ &\quad\ (11.94)\ \ (.234) \\ \text{adj } R^2 &= .05 \quad s_e = 4.70 \quad N = 44(\text{year} > 1910), \end{aligned} \tag{21}$$

where $P_{t-1\ \ldots\ 8}$ is the average Democratic House vote over the previous eight elections. The fit is poor, and the equilibrium indicator could hardly be said to be valid. If the eight-election average were a valid indicator of equilibrium, its coefficient would be 1.0. At .428 it is not even respectably close.

The problem is not so much that the eight-election average does not mark some sort of equilibrium; rather, it is that the equilibria it marks do not travel in a useful way through the equilibrium shift associated with the New Deal. Tufte was careful to set the average to the previous eight elections, given that his analysis began with the 1946 election. Counting back eight elections took him to 1930. He therefore did not have to worry that his average would be calculated over two distinguishable partisan regimes. To see how disruptive the partisan regime shift is to the eight-election average standing in as equilibria, we apply his equation to the periods 1912–1930 and 1946–1998. For this set of elections, the equation is

$$\begin{aligned} P_t &= -3.59 + 1.056\ P_{t-1\ldots8} \\ &\quad\ (12.63)\quad (.245) \\ \text{adj } R^2 &= .33 \quad s_e = 4.03 \quad N = 37(\text{year} > 1910, \neq 1932\text{–}44). \end{aligned} \tag{22}$$

The fit is much better. More to the main point, the eight-election average is operating as an equilibria variable should. It has a coefficient statistically indistinguishable from 1.0, and the intercept is statistically indistinguishable from 0.

Adding the short-run deviations to equation (22) shows, contrary to Tufte's assumption, that forces restoring equilibrium are not total and immediate.

$$\begin{aligned} P_t &= 1.26 + .966\ P_{t-1\ldots8} + .417(P_{t-1} - P_{t-1\ldots8}) \\ &\quad\ (12.10)\ (.234) \qquad\qquad (.181) \\ \text{adj } R^2 &= .40 \quad s_e = 3.81 \quad N = 37(\text{year} > 1910, \neq 1932\text{–}44). \end{aligned} \tag{23}$$

Clearly the effect of deviations from equilibrium is nonzero. There are forces restoring equilibria but they are not so strong as to have the vote level revert to equilibria immediately. Rather, following a given deviation, the Democratic vote percentage moves about three-fifths of the way back toward equilibria. As expected, the eight-election average has a coefficient near 1.0, and the intercept is indistinguishable from zero.

Now, however, we have two indicators of equilibria. Tufte's excludes seven elections during the regime transition (1932–44) and causes us to lose six more at the start of the series (1900–10), but it has the intuitive appeal of including a dynamic element as part of the measurement of equilibria. The other indicator, a fixed-effect 0-1 indicator, lacks the intuitively appealing dynamic equilibria but allows for inclusion of all years in the series.

We can evaluate one against the other by turning the fixed-effect dummy variable and its coefficient around so that it expresses the two equilibrium points as such and estimates the effect of short-run deviations. To do so, we borrow the recommendation from Waterman, Oppenheimer, and Stimson (1991, 375) and score the regime change equilibria variable R_t as the average Democratic House vote percentage for the periods 1900–30 and 1932–98. The short-run deviations are then the vote in the preceding election minus the respective equilibria—i.e., $(P_{t-1} - R_t)$. In this formulation, the results are

$$\begin{gathered} P_t = \underset{(10.53)}{-3.38} + \underset{(.157)}{.380}(P_{t-1} - R_t) + \underset{(.205)}{1.061}\, R_t \\ \text{adj } R^2 = .46 \quad s_e = 3.62 \quad N = 37(>1910, \neq 1932\text{–}44). \end{gathered} \tag{24}$$

The Waterman et al. equilibria variable functions as it should in the sense that its coefficient is statistically indistinguishable from 1.0 and the intercept is statistically indistinguishable from 0. And while that was true for the Tufte formulation, the fit is better using the Waterman et al. variable. There is, in other words, nothing to commend the Tufte variable in comparison to that of Waterman et al. Both indicators perform as equilibria should, but the Waterman et al. variable produces a better fit for the set of elections to which both can be applied and, shown immediately below, it applies to all fifty observations.

Estimating the dynamics over all fifty elections, we find

$$\begin{gathered} P_t = \underset{(8.41)}{-.90} + \underset{(.134)}{.289}(P_{t-1} - R_t) + \underset{(.165)}{1.018}\, R_t \\ \text{adj } R^2 = .45 \quad s_e = 3.55 \quad N = 50. \end{gathered} \tag{25}$$

This is the same equation as the one using the dummy variable and P_{t-1} term. Thus the coefficient on the deviation variable is the same: .289. We also see that the pre- and post-means are a good approximation of the equilibria. Its coefficient is near 1.0 and the intercept is near zero.

By reevaluating Tufte's formulations for analyzing vote dynamics, we find that it is desirable to make two adjustments. His assumption that forces restoring equilibria are total and immediate—i.e., there is no short-run persistence—is not supported (see equation [21]). Furthermore, his eight-election moving average equilibria indicator is less generalizable and less accurate than the Waterman et al. indicator specifying just two fixed equilibria, before and after the partisan regime transition associated with the New Deal—equation (23) compared with equation (24)—and with broader coverage in equation 25.[12]

[12] In addition to the vote dynamics as such, Tufte and others are often concerned with identifiable forces that drive vote dynamics—e.g., the state of the economy and the popularity of the president. In most vote series, omission of either an equilibria variable or a short-run vote deviations variable will not bias the estimated economic or popularity effects but will make them inefficient. The expected lack of bias comes from the conjoined facts that movements in economic forces and popularity will not usually be correlated much if at all with equilibria. Equilibria are mostly stable across a substantial time, such as a generation, while economic forces and popularity ebb and flow in shorter cyclical and seasonal patterns, as well as with very short-lived particularistic economic shocks and personalities. Nor is there much reason to expect that party votes above or below equilibrium *at the time of the previous election* are correlated with ups and downs of the economy or popularity. Thus bias in these estimates due to underspecification of the dynamic components usually is not much of a concern. The inefficiently estimated economic and popularity effects when varying equilibria are omitted comes principally from the fact that the numerator of the coefficient's standard error, $\sigma_{Y|X}$, will be overstated by failing to take account of relevant variation in Y. Interestingly, it is the unreliability of findings about economic voting that presents this body of literature with its "crucial question" (Lewis-Beck and Paldam 2000, 114; see also Dorussen and Palmer 2002, and before them Paldam 1991, as discussed in the next section).

3.2 *Cross-National Analysis*

U.S. House elections with their recurring patterns of presidential party midterm loss have proven to be a useful case for studying vote dynamics. However, it has not been easy to generalize models of House vote dynamics to the study of elections elsewhere. In reference to cross-national analyses of vote dynamics, particularly vote dynamics associated with economic conditions, Martin Paldam wrote this on the basis of evidence from the 1980s: "In spite of considerable efforts very little is 'cut and dried' in this field, and again and again discussions flare up when this or that result is found to be lacking in stability" (Paldam 1991, 9, where "lacking in stability" means lacking consistency cross nationally and/or cross temporally; see also Nannestad and Paldam 1994). Reflecting on evidence from the 1990s, Michael Lewis-Beck and Paldam underscore that same point, saying that the unstable findings are still the "crucial question" (Lewis-Beck and Paldam 2000, 114; see also Dorussen and Palmer 2002). We intend to solve one part of the instability puzzle by extending our model of long- and short-term vote dynamics to the analysis of cross-national, cross-temporal fluctuations in incumbent votes.

3.2.1 Application Assuming Stable Equilibria

G. Bingham Powell and Guy Whitten's (1993) cross-national analysis of economic voting as a mechanism for electoral accountability was a milestone in cross-national macro-level voting analysis. They wanted to know whether vote support for incumbent parties was hurt by poor economic conditions and helped by good economic conditions. Their model focused implicitly on short-run dynamics and asked whether they ebbed and flowed in concert with economic circumstances. Their important theoretical innovation is the hypothesis that voter reactions depend on clarity of government responsibility. Where responsibility is clearest, in systems using single-member districts with a plurality rule, voters are expected to more easily identify which party deserves the credit or blame and reward or punish them accordingly. Where responsibility is blurred, as in coalition governments, elections as instruments for holding governments accountable would be less effective (Powell and Whitten 1993; see also Downs 1957, 142–63; Powell 2000, 52–55).

As far as the vote dynamics are concerned, Whitten and Harvey Palmer (1999, 59) recognize that the clarity of responsibility thesis implies that "where responsibility for policy making is less clear [e.g., coalition governments] government political parties' vote shares are more stable across elections." This leads to three related hypotheses.

(1) Voting patterns in multiparty systems with a coalition incumbent government will have weak forces restoring equilibrium (i.e., β will be relatively large).
(2) Voting patterns in multiparty systems with a single-party incumbent government, which still require voters to confront a prospective difficulty when it comes to predicting governments that might form after a current election, will have mid-range forces restoring equilibrium.
(3) Voting patterns in major two-party systems, with single-party governments and only one party as a plausible alternative, will have the largest effect from forces restoring equilibrium (i.e., will have the smallest β among the three situations).

The top portion of Table 1 reports the results using the dynamic components of the Powell-Whitten/Whitten-Palmer model. With this model we find support for the three hypotheses, as did the previous studies (Powell and Whitten 1993; Whitten and Palmer 1999; see also Palmer and Whitten 1999, 2002). The coefficients indicate that votes from

Table 1 Estimates of vote dynamics by system types, depending on whether party equilibria are or are not taken into account

	Multiple Incumbent Parties & PR System (N = 88)	*Single Incumbent Party & PR System (N = 46)*	*Single Incumbent Party & SMD System (N = 71)*
Taking No Account of Party Equilibria			
Incumbent vote% $_{t-1}$	.998** (.037)	.803** (.066)	.472** (.151)
Intercept	−2.205 (2.252)	7.335** (2.853)	21.806** (7.121)
Summary Statistics			
adj R^2	.894	.767	.112
s_e	5.184	3.681	6.711
Taking Account of (Static) Party Equilibria			
Incumbent vote% $_{t-1}$ *minus* Incumbent mean vote%	.678** (.113)	.472** (.151)	.146 (.161)
Incumbent mean vote%	1.000** (.035)	.935** (.083)	1.055** (.204)
Intercept	−1.957 (2.157)	2.428 (3.388)	−2.478 (9.019)
Summary Statistics			
adj R^2	.903	.790	.262
s_e	4.962	3.495	6.117

Note. The standard error of each coefficient appears next to it in parentheses.
The models can be estimated across system types in a single model with system-type dummy variables and interaction terms. In that form, the summary statistics for the model not taking account of different equilibria are adjusted $R^2 = .838$ and $s_e = 5.498$; for the model taking account of different equilibria they are adjusted $R^2 = .859$ and $s_e = 5.132$.
Source: Compiled by authors based on voting data in Volkens, Schnapp, and Lass (1992), various issues of *European Journal of Political Research*, and incumbency status information in Waldendorp, Keman, and Budge (2000). See the Center for Democratic Performance Web site at Binghamton University for a listing of the data, http://cdp.binghamton.edu/papers.html.
$^*p < .05$; $^{**}p < .01$; one-tail test applied to slopes, and two-tail tests applied to intercepts.

the preceding election in multiparty incumbent governments, as predicted by Palmer and Whitten, are highly persistent. The .998 slope would seem to suggest virtually complete stability from one election to the next, such that the vote outcomes follow a random walk. Proportional representation (PR) systems with single-party incumbents appear to have the second most persistent effect from the previous election, and two-party, single-member district (SMD) systems have the least persistent effect.[13] In other words, the restoring forces under PR with multiparty incumbents are nonexistent, .002 (i.e., 1 − .998); under single-party incumbent governments they are not especially powerful, .197 (i.e., 1 − .803); and under major two-party SMD systems, they are more powerful, .528 (i.e., 1 − .472).

These interpretations assume that, within any one of the three circumstances, all coalitions of parties or all single-incumbent parties have the same equilibrium vote. That is not plausible. It would mean that American Democrats and Republicans, British Labour and Conservatives, Canadian Liberals and Progressive Conservatives, among others, have the same equilibrium vote level. It would also mean that the competition between coalitions

[13]Formal tests of statistical significance reveal that each system type is statistically significantly different from the other two, $p < .05$ using a one-tail test.

of parties in government and their opposition is the same everywhere—e.g., single-party incumbents such as the Swedish FP and SDA are expected to have the same equilibrium, and multiparty coalitions such as the Swiss grand coalition of four major parties have the same equilibrium vote as, for instance, the Irish coalition of Fine Gael and Labour.

The bottom portion of Table 1 reports results based on our combined model. A party's equilibrium vote is measured at its postwar mean vote percentage, where a coalition government's equilibrium is the sum of each partner's postwar mean. The results show that the short-run dynamics in all three circumstances are much greater than when the long-run equilibria are excluded. Also, the near-to-1.0 slopes on the incumbent equilibrium votes and the near-to-zero intercepts suggest that the measured indicators are doing a decent job of indicating the diverse equilibria. In substantive terms, it should be said that the rank-ordered effects of the three system types continue to square with the Whitten-Palmer expectations.

The small and statistically insignificant .146 coefficient among SMD systems indicates that the forces restoring equilibrium are almost fully in force at the next election. For single-party incumbent governments in systems with a plausible potential for coalition governments, the restoring forces are less powerful than under SMD rules but more so than under PR systems when incumbent governments are coalition governments. In PR systems with coalition incumbent governments, two-thirds of the deviation at the previous election is retained.[14]

3.2.2 Application Allowing for Dynamic Equilibria

The analyses reported in Table 1 treated each party as having a fixed-in-time equilibrium. This is probably not an accurate portrayal of all parties that have sat in governments from 1950 through 1995. Support for Christian parties, for instance, has been slowly eroding throughout the postwar period. Also, almost everywhere one-time minor parties have tended to win higher vote percentages during the 1970s and 1980s compared with the 1950s and 1960s (Dalton, McAllister, and Wattenberg 2000, 38–43). If there are shifting equilibria for some parties, the effect on the analysis reported in Table 1 will be to make the retaining forces appear more powerful than they truly are, just as we saw in the U.S. case ignoring the shift in equilibria associated with the New Deal.

We have analyzed potential equilibria shifts for each of the seventy-nine parties in our fifteen nations. Table 2 reports estimated trends for each. The time variable is scored: 1950 = 0; each year thereafter adds 1.0; and months add fractions calculated by scoring January = 0.5 … December = 11.5 and computing (month/12). As a safeguard against confusing a trend with the usual vote loss by incumbent parties, the analysis controls for whether a party was an incumbent at the time of the election.

Of the seventy-nine party series, just over half—forty—show statistically significant trends, eleven positive and twenty-nine negative. Seven of the eleven positive trends are for parties in the liberal family, although, another five party series in the liberal family show statistically significant negative trends. Included among the twenty-nine party series showing declining trends are Christian parties in six of nine countries. The only positive trend among Christian parties is that of the Norwegian Christian People's Party (KF). The one other party family generally on the decline is the social democrats. Eight of the twenty Social Democratic party series have statistically significant negative trends. Just one, the mid-1960s Dutch Democrats 66 (D66), shows a statistically significant positive trend.

[14]The estimated slope on the short-run deviations in SMD systems is statistically significantly different from the other two systems, but the slopes for the one-party versus multiparty PR systems are not statistically significantly different from each other.

Table 2 Estimated trends in party vote support, 1950–1995, controlling for incumbent status

Nation *CMPid*	*Party*	*Mean*	*a*	*Trend*	*Incumb*	R^2	*N*	*stddev*	s_a	s_b	s_b
Australia											
320	ALP	45.51	46.836	−.064	.360	.044	18	3.44	1.828	.091	2.425
810 & 620	CP&LIB	46.04	50.811	−.139*	−2.484	.191	18	3.02	2.798	.074	1.958
Austria											
320	SPÖ	44.99	49.265	−.042	−3.583	.069	13	4.46	5.148	.102	4.291
420	FPÖ	8.76	3.770	.223*	−2.264	.296	13	5.25	2.782	.109	5.285
520	ÖVP	41.70	53.608	−.378*	−5.149*	.688	13	5.68	2.852	.081	2.149
Belgium											
320	BSP	31.28	37.891	−.421*	−1.046	.765	9	4.65	1.735	.105	1.827
321	SP	13.12	14.702	.000	−2.400*	.970	6	1.26	.779	.020	.242
322	PS	13.41	15.406	−.019	−1.938	.620	6	1.28	2.840	.074	.833
420	LIB	14.88	10.820	.617*	−2.850	.786	6	4.96	2.862	.198	2.566
421	PVV	10.92	6.649	.145*	−1.074	.751	9	1.59	1.452	.041	.624
422	PLP	7.34	.743	.198*	1.095	.686	8	1.97	2.291	.074	.998
520	PSC/CVP	42.25	52.607	−.722	−5.768	.845	5	5.25	3.615	.251	3.272
521	CVP	20.94	26.772	−.186	*always*	.249	10	3.31	3.710	.114	—
522	PSC	8.96	13.329	−.139*	*always*	.692	10	1.48	1.065	.033	—
911	WR	2.65	10.544	−.263*	−.394	.711	9	2.43	2.136	.069	1.611
912	FDF	2.83	4.649	−.070	1.625	.253	10	1.56	1.737	.059	1.609
913	VU	7.03	4.604	.108	−1.958	.183	14	3.06	1.855	.070	2.440
Canada											
320	NDP	14.99	12.419	.119	*never*	.123	14	4.19	2.262	.091	—
420	LIB	39.66	41.854	−.143	1.593	.144	14	5.55	3.856	.127	3.076
620	CON	36.10	39.378	−.158	.364	.047	14	8.99	5.437	.218	5.259
951	SC	4.75	8.513	−.188*	*never*	.281	13	3.94	2.055	.091	—

Continued

Table 2 (continued)

Nation *CMPid*	*Party*	*Mean*	*a*	*Trend*	*Incumb*	R^2	*N*	*stddev*	s_a	s_b	s_b
Denmark											
210	VS	2.08	2.619	−.019	*never*	.021	10	.87	1.320	.045	—
220	DKP	2.31	3.812	−.074*	*never*	.334	17	1.57	.636	.027	—
230	SF	8.32	4.498	.138	*never*	.189	15	3.24	2.332	.079	—
320	SD	35.83	40.131	−.215*	.996	.397	19	4.83	2.290	.071	1.882
330	CD	4.99	6.561	−.036	−.956	.115	10	2.02	4.131	.135	1.838
410	RP	7.27	9.425	−.092	−.260	.159	19	3.19	1.435	.055	1.645
420	LIB	17.46	22.793	−.219*	−.773	.374	19	5.04	2.002	.076	2.002
520	KrF	2.90	7.168	−.129*	.062	.668	10	1.08	1.356	.044	.603
620	CON	16.11	15.769	−.054	4.243*	.214	19	4.54	2.004	.076	2.062
951	PP	9.42	25.712	−.488*	*never*	.648	10	4.25	4.326	.127	—
952	JP	2.43	5.289	−.129*	−1.741	.572	18	2.13	.730	.029	1.561
Germany											
320	SPD	37.92	33.324	.060	7.498*	.645	12	5.04	2.161	.076	1.965
420	FDP	8.85	9.578	−.019	−.298	.025	12	1.99	1.736	.052	1.769
521	CDU	45.89	49.845	−.110*	−1.857	.392	12	2.48	1.773	.050	1.342
Ireland											
—	RP	2.14	3.559	−.197*	.783	.948	5	1.40	.562	.053	.669
—	PL	2.65	4.506	−.228	−.888	.832	4	.97	.957	.102	.788
320	ILP	11.82	13.792	−.029	−3.649*	.268	14	3.49	1.962	.067	1.825
520	FG	31.71	32.491	.019	−3.451	.148	14	4.60	2.793	.095	2.598
620	FF	45.51	48.424	−.052	−2.650*	.337	14	2.71	1.492	.049	1.347
Italy											
220	PCI	26.19	25.678	.022	*never*	.003	10	5.03	3.689	.140	—
320	PSI	12.13	12.928	−.045	1.319	.071	9	2.03	1.712	.074	2.232

Continued

Table 2 (continued)

Nation *CMPid*	*Party*	*Mean*	*a*	*Trend*	*Incumb*	R^2	*N*	*stddev*	s_a	s_b	s_b
330	PSDI	4.16	5.502	−.068*	.808	.646	9	1.08	.534	.021	.552
410	PRI	2.85	.947	.085*	−.245	.809	10	1.28	.633	.020	.492
420	PLI	3.43	5.102	−.077	.683	.227	10	1.76	1.295	.057	1.723
520	DC	37.22	43.217	−.255*	*always*	.737	10	3.78	1.424	.054	—
710	MSI	5.83	5.391	.019	*never*	.038	10	1.21	.872	.033	—
Netherlands											
310	PPR	2.20	6.097	−.131	−.810	.390	6	1.29	2.936	.100	1.438
320	PvdA	29.01	28.869	.001	.219	.001	13	3.49	2.851	.087	2.221
330	D66	7.30	−.398	.276*	−3.035	.570	9	3.77	3.575	.112	2.290
420	VVD	14.30	8.943	.284*	−2.429	.740	13	4.57	1.645	.056	1.422
521	CDA	30.70	41.771	−.313	*always*	.165	6	4.72	12.586	.352	—
522	KVP	27.12	34.719	−.574*	*always*	.626	7	5.54	2.976	.198	—
523	ARP	9.52	11.439	−.054	−1.408	.792	7	.96	.541	.036	.737
524	DS70	2.68	15.336	−.493	.058	.889	4	2.41	5.196	.193	1.767
525	CHU	7.61	11.203	−.179*	−1.427	.812	7	1.50	1.092	.044	.822
New Zealand											
320	LAB	42.61	46.891	−.188*	.035	.342	15	4.30	1.974	.078	2.287
620	NAT	43.79	55.042	−.285*	−6.470*	.684	15	5.00	2.366	.063	1.845
Norway											
220/221	NKP/SL	6.29	4.299	.084	*never*	.189	11	2.56	1.561	.058	—
320	AP	41.65	49.229	−.317*	−.086	.675	11	5.10	2.788	.078	2.218
420	Ven	5.83	10.827	−.207*	−.486	.651	11	3.39	1.496	.054	1.756
520	KF	9.17	10.138	−.045	.377	.212	11	1.31	.845	.031	.886
620	Høyre	21.52	17.157	.161	3.001	.245	11	5.27	3.297	.124	4.044
810	SP	8.32	7.516	.049	−1.353	.072	11	3.17	2.227	.082	2.334

Continued

Table 2 (continued)

Nation *CMPid*	*Party*	*Mean*	*a*	*Trend*	*Incumb*	R^2	*N*	*stddev*	s_a	s_b	s_b
Sweden											
220	VP	4.89	3.985	.038*	*never*	.341	15	0.87	.396	.015	—
320	SDA	44.89	49.712	−.140*	−1.858	.358	15	2.79	2.391	.054	1.758
420	FP	14.07	22.052	−.310*	−3.099	.774	15	5.54	1.561	.064	2.067
520	KF	2.56	−1.210	.133*	−.251	.432	10	1.81	1.817	.064	1.882
620	MUP	17.56	13.641	.161*	1.549	.378	15	3.82	1.827	.072	3.739
810	CP	14.67	16.913	−.030	−5.433	.219	14	5.46	3.024	.108	3.105
Switzerland											
320	SP	23.54	27.717	−.153*	−.646	.676	12	2.85	1.313	.044	1.624
420	FDP	22.73	23.991	−.053*	*always*	.409	12	1.20	.554	.020	—
520	CVP	21.04	23.963	−.123*	*always*	.806	12	1.98	.524	.019	—
810	SVP	11.65	11.161	.020	*always*	.057	12	1.23	.720	.026	—
United Kingdom											
320	LAB	40.50	47.466	−.406*	2.501	.803	13	6.74	2.159	.074	1.928
420	LIB	11.03	4.755	.314*	*never*	.572	13	5.61	1.949	.082	—
620	CON	43.57	46.114	−.187*	2.218	.351	13	4.08	1.931	.081	2.117
United States											
320	DEM	45.23	46.348	−.087	2.416	.092	11	6.45	5.296	.175	4.614
620	REP	50.24	50.486	−.210	7.160	.216	11	7.94	5.190	.201	5.279

Note. Always and *never* refer to parties that have always or never been incumbents at the time of an election. CMPid is the party code from the Comparative Manifesto Project (see Budge et al. 2001, 193–213). Time is coded in years: 1950 = 0, with months as fractions: (month − .5)/12. See the Center for Democratic Performance Web site at Binghamton University for a listing of the data, http://cdp.binghamton.edu/papers.html.

*Slope statistically significant at $p \leq .05$, one tail; most intercepts are significantly different from zero.

Table 3 Estimates of vote dynamics by system type, after adjusting incumbent party equilibria for dynamic movements

	Multiple Incumbent Parties & PR System (N = 88)	*Single Incumbent Party & PR System (N = 46)*	*Single Incumbent Party & SMD System (N = 71)*
Incumbent vote% $_{t-1}$ *minus* Incumbent time-varying equilibria	.292** (.109)	.014 (.164)	−.004 (.158)
Incumbent time-varying equilibria	.983** (.030)	.991** (.064)	1.009** (.164)
Intercept	−.444 (1.850)	.611 (2.639)	−.203 (7.348)
Summary statistics			
adj R^2	.931	.851	.360
s_e	4.216	2.945	5.697

Note. The standard error of each coefficient appears next to it in parentheses.
Source: Compiled by authors based on voting data in Volkens, Schnapp, and Lass (1992), various issues of *European Journal of Political Research*, and incumbency status information in Waldendorp, Keman, and Budge (2000). See the Center for Democratic Performance Web site at Binghamton University for a listing of the data, http://cdp.binghamton.edu/papers.html.
$*p < .05$; $**p < .01$; one-tail test applied to slopes, and two-tail tests applied to intercepts.

The dynamic qualities of some parties' equilibria values can be incorporated into estimations of vote dynamics by replacing the party mean variable with a trend-adjusted variable. We have rescored the party means of the parties that show a statistically significant trend so that the adjusted mean value at each election takes the party's trend into account.[15] With those adjustments, the model with an adjusted equilibria variable (E^A) and short-run deviations takes this form:

$$I_{it} = \alpha + \lambda E^A_{it} + \beta\left(I_{it-1} - E^A_{it}\right) + \eta_{it}. \tag{26}$$

The reestimated dynamics for the three system types are reported in Table 3. The results indicate an improvement over the nondynamic equilibria model results (Table 1, bottom portion). For each of the three system types, the overall fit of the model is improved, as judged by the adjusted R^2 and s_e values. Of additional importance is the fact that the coefficients themselves describe an interesting set of dynamics. All three slopes for the trend-adjusted equilibrium variables are close to 1.0, and all three intercepts are close to 0.

Even more important theoretically, the effects of deviations at the previous election are smaller than those reported in Table 1. Each estimates more powerful restoring forces than was apparent from the nondynamic equilibrium measurements. In particular, the single-incumbent parties in systems operating according to PR rules now show that restoring forces are fully operating by the next election. Indeed, the vote dynamics of single-party incumbents in PR and SMD systems look virtually identical. When and where there are multiple incumbent parties, on the other hand, the change is comparatively slow moving.

[15]The adjustments ignore the coefficients on the *Incumbent* variable in Table 2. Calculations proceeded in three steps. First, we determined the mean time for each party. Next, we scored the party at its mean vote percentage at exactly that mean time point. Third, we adjusted a party mean according to the magnitude of each statistically significant party trend. A party with a statistically insignificant trend was scored at its mean vote throughout.

In that case about two-thirds ($1 - .366$, i.e., .634) of the deviation from the mean at the previous election is adjusted at the current election. This is consistent with a wholly retrospective version of the Whitten-Palmer (and Downs) proposition about the difficulty of figuring out what is rational to do in the face of prospective coalition governments.[16] Regardless of whether prospective government formations by parties are more (SMD) or less (PR) predictable, as long as a single party has been holding the reins of government, party support tends to be dynamic in the sense of returning to its equilibrium level at the next election. Where the reins have been in multiple hands, however, the adjustments move more slowly.

4 Conclusion

Analysis of vote dynamics must take into account long-run equilibria and short-run deviations simultaneously. A focus on one but not the other leaves us with half an analysis, half an answer, and, quite likely, a half-right answer. That much is apparent from full consideration of the core components of vote dynamic models presented in our first section and from all the analyses reported in our second section.

The only circumstance under which it will not be important to pay close attention to both the long and short of vote dynamics is when the equilibrium party vote division is the same for all parties under investigation. Otherwise, changed equilibria, such as that associated with the partisan regime change around the time of the New Deal, or different equilibria, as in cross-national analyses, greatly affect the estimated dynamics. Overlooking equilibrium changes or differences distorts the estimated effects of short-run deviations. Their effects are overstated, so that by implication forces restoring party vote divisions to their equilibrium are understated. Models that account for changing and different equilibria reveal that short-run deviations are not likely to become incorporated as long-run components of party vote support. Rather, they are likely to evaporate, often as quickly as the next election.

We have also shown that it is unwise to assume equilibria are all that count. Thus, one does not want to assume that any potential carryover effects of short-run deviations will assuredly evaporate by the next election. Our analyses of U.S. House elections and of coalition governments indicate that such an assumption will not always be valid. In both situations, about one-third to two-fifths of a deviation from equilibrium at the previous election carries forward to the next election.

Our arguments and analyses lead to one principal message, which can be stated in substantive and methodological terms. Substantively speaking, most analyses of vote dynamics understate the power of forces restoring party vote divisions to their equilibrium levels. The reason is that the dual roles that equilibrium levels play in describing party vote divisions—i.e., in the long-run *and* in estimating how the long run affects estimations of short-run processes—have not been entirely appreciated. We have underscored this diagnosis by working through the specification of vote dynamic equations and surveying

[16]There is also a plausible structural rather than a psychological explanation for the greater retention of previous deviations in coalitions' aggregate vote percentages. Electors, after all, vote for parties, not for governments as such. Transferring one's vote from a disfavored government party has different implications for the aggregate results under coalitions compared with single-party governments. Under single-party governments, transfers entail an automatic loss of votes for the government. Under coalitions, a transferred vote can as well go to another government party as to an opposition party. Unfortunately no easily specified pattern of gains and losses for coalition partners emerged when we analyzed various prespecified uniform-type expectations about how votes would shift between parties if the above- and below-equilibrium deviations are redistributed among parties in and out of government.

how they variously estimate long- and short-run dynamics. We have also shown how analyses of long- and short-run dynamics can be effectively combined. Methodologically speaking, what we have said stands as a reminder that among the ever-present difficulties in statistical analysis is the one that involves taking the important step from theoretical thoughts to an equation that represents those thoughts. The study of party vote dynamics is a case in which the step has proven difficult. Our combined model, in the form of an error correction equation, carries us a long way toward understanding why that has been so and, what is more, points to a solution.

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