February, 2007

Presidential and Congressional Vote-Share Equations

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Abstract

Three vote-share equations are estimated and analyzed in this paper, one for presidential elections, one for on-term House elections, and one for mid-term House elections. The sample period is 1916–2006. Considering the three equations together allows one to test whether the same economic variables affect each and to examine various serial correlation and coattail possibilities. The resulting three equation model can then be analyzed dynamically, which is done in Section 4.

The main conclusions are briefly: 1) There is strong evidence that the economy affects all three vote shares and in remarkably similar ways. 2) There is no evidence of any presidential coattail effects on the on-term House elections. The presidential vote share and the on-term House vote share are highly positively correlated, but this is because they are affected by some of the same variables. 3) There is positive serial correlation in the House vote in that the previous mid-term House vote share positively affects the on-term House vote share and the previous on-term House vote share positively affects the mid-term House vote share. 4) The presidential vote share has a negative effect on the next mid-term House vote share. The most likely explanation for this is a balance argument, where voters are reluctant to let one party become too dominant. Ruled out as possible explanations for this fourth result is any reversal of a coattail effect, since there is no evidence of

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an effect in the first place, and a regression to the mean, since the positive serial correlation in the House vote implies no such regression. Also, it is not simply voting against the party in the White House, because the presidential variable is a vote share variable not a 0,1 incumbency variable.

1 Introduction

While there is general agreement in the literature that the economy affects voting behavior for president in the United States, there is no such agreement regarding voting behavior for Congress. In recent work, the results in Erikson (1990), Alesina and Rosenthal (1989), and Lynch (2002) are negative regarding the effects of the economy on votes for Congress, whereas the results in Jacobson (1990), Kiewiet and Udell (1998), and Grier and McGarrity (2002) are positive. In addition, there is no general agreement about the size, if any, of presidential coattails on on-term congressional elections and the effect of any coattails on the next mid-term congressional election.

In this paper three vote-share equations are estimated, one for presidential elections, one for on-term House elections, and one for mid-term House elections. The sample period is 1916–2006, which results in 23 observations per equation. An advantage of considering the three equations together is that one can test whether the same economic variables affect each and examine various serial correlation and coattail possibilities. The presidential vote equation is the one originally presented in Fair (1978), with the current version in Fair (2006). The theory behind this equation is reviewed in Section 2. This theory is also used to guide the specification of the House equations. The equations are then estimated and tested in Section 3, and the resulting three equation model is analyzed in Section 4. The results are summarized in Section 5. Maximum likelihood estimates and some coattail tests are presented in Appendix A, and the data are presented in Appendix B.

It will be seen that the three economic variables that are significant in the presidential equation are also significant in the on-term House equation. Also, remarkably, the hypothesis that the estimated *relative weights* on the three economic variables in the presidential equation are the same in the on-term House equation is not rejected. On the other hand, the *absolute size* of the coefficient estimates in the on-term House equation is only about .6 the size of the coefficient estimates in the presidential equation. In addition, the party's vote share in the previous (mid-term) House election is a significant explanatory variable in the on-term House equation with a coefficient of about .6. (For the presidential equation no lagged-share variables are significant.) The estimates thus show that the on-term House equation is similar to the presidential equation, but with a smaller absolute effect of the economic variables on the vote share and with the addition of a lagged-share variable. There is no evidence of a presidential coattail effect on the on-term House elections. A party's presidential vote share and on-term House vote share are highly positively correlated, but this is explained by the fact that the same economic variables appear in both equations.

In the mid-term House equation two economic variables, similar to two of the three economic variables in the other two equations, are significant or nearly significant. Focusing only on these two economic variables, the hypothesis that the estimated relative weights in the presidential equation are the same in the mid-term House equation is not rejected. Again, the absolute size of the coefficient estimates is smaller, about .5 the size of the coefficient estimates in the presidential equation. As in the on-term House equation, the party's vote share in the previous (on-term) House election is a significant variable in the mid-term House equation. It has a coefficient estimate of about .75. In addition, the party's vote share in the previous presidential election is a significant variable in the mid-term House equation, with a negative coefficient estimate of about $-.35$. The estimates thus show that the economy also matters for mid-term House elections, as does the party's previous performances in both the House and presidential elections. Doing well in the previous on-term election in the House helps a party's performance in the next mid-term House election, whereas doing well in the previous presidential election hurts. It is argued in Section 3 that the most likely explanation of this negative effect is that, other things equal, voters like balance.

It will also be seen that the hypothesis that the on-term and mid-term House equations are the same is strongly rejected by the data, as is the hypothesis that the presidential equation and either of the House equations are the same. These rejections thus suggest that constraining the coefficients in any pair of equations to be the same is problematic. Kramer (1971) in his classic paper constrained the coefficients in his equation explaining the presidential vote to be the same as the coefficients in his equation explaining the congressional vote. He found that the presidential vote was not very responsive to economic conditions, which, as discussed in Fair (1978), may have been due to this constraint. Erickson (1990, pp. 394–395) also argues that pooling mid-term and on-term House elections is a misspecification. Of the papers mentioned above, Erikson (1990), Jacobson (1990) and Lynch (2002) deal only with mid-term elections and so don't impose any constraints. Kiewiet and Udell (1998) present only estimates for the case in which the on-term and mid-term House equations are constrained to have the same coefficients, although their F tests generally reject the hypothesis that the coefficients are the same. Alesina and Rosenthal (1989) are unusual in presenting estimates for both the House and the Senate, but their House equation treats both the on-term and mid-term elections the same. Grier and McGarrity (2002) also combine the on-term and mid-term House elections except for adding a dummy variable that is one in on-term elections and zero in mid-term elections.

2 Theory

Presidential Equation

The following is a review of the theoretical framework in Fair (1978), modified slightly to be able to deal with House elections at the end of this section. Consider a presidential election. Assume that there are only two political parties, Democratic (D) and Republican (R), and consider a presidential election held at time t. (An election held at time t will be referred to as election t.) Let U_{it}^D denote voter i's expected future utility if the Democratic candidate is elected, and let U_{it}^R denote the same thing if the Republican candidate is elected. These expectations should be considered as being made at time t. Let V_{it} be a variable that is equal to 1 if voter i votes for the Democratic candidate and to 0 if voter i votes for the Republican candidate. The first main postulate of the model is that

$$V_{it} = \begin{cases} 1 & \text{if } U_{it}^D > U_{it}^R \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

Equation (1) states that voter i votes for the candidate that gives him or her the highest expected future utility.

Let $td1$ denote the last election from t back that the Democratic party was in power; let $td2$ denote the second-to-last election from t back that the Democratic party was in power; let $tr1$ and $tr2$ denote the same things for the Republican party; and let M_j denote some measure of economic performance of the party in power during the four years[1] prior to election j. If the Democratic party was in power at time t, then $td1$ is equal to t; otherwise $tr1$ is equal to t. Also, let $DPER_t^D$ be equal to 1 if a Democratic incumbent is running again and 0 otherwise, and let $DPER_t^R$ be equal to 1 if a Republican incumbent is running again and 0 otherwise. Finally, let DUR_t^D denote a duration variable that is 1 if the Democratic party has been in power for two consecutive terms, 1 + k if three consecutive terms, 1 + $2k$ if four consecutive terms, and so on, and 0 otherwise, and let DUR_t^R denote the similar variable for the Republican party. k is chosen in the empirical work on best-fitting grounds. The value chosen was 0.25, although the results are not sensitive to alternative values like 0.00 and 0.50. The second main postulate of the model is that

$$U_{it}^D = \xi_{it}^D + \beta_1 \frac{M_{td1} - M^*}{(1+\rho)^{t-td1}} + \beta_2 \frac{M_{td2} - M^*}{(1+\rho)^{t-td2}} + \gamma_1 DPER_t^D + \gamma_2 DUR_t^D \tag{2}$$

[1] Actually, not quite four years, since elections are held in early November. In the empirical work, data for the fourth quarter of the fourth year are not used in the measures of performance.

$$U_{it}^R = \xi_{it}^R + \beta_3 \frac{M_{tr1} - M^*}{(1+\rho)^{t-tr1}} + \beta_4 \frac{M_{tr2} - M^*}{(1+\rho)^{t-tr2}} + \gamma_1 DPER_t^R + \gamma_2 DUR_t^R \quad (3)$$

where β_1, β_2, β_3, β_4, γ_1, and γ_2 are unknown coefficients and ρ is an unknown discount rate. The ξ_{it}^D and ξ_{it}^R variables are specific to voter i for election t and are assumed not to depend on any of the other variables. M^* is (in the voters' minds) the "normal" or "neutral" value of M. It is assumed to be the same across elections. As discussed below, γ_1 is expected to be positive and γ_2 is expected to be negative.

Equations (2) and (3) determine how expectations are formed, and, as discussed in Fair (1978), they are general enough to incorporate the theories of Downs (1957), Kramer (1971), and Stigler (1973). Kramer's theory is a special case, where $\rho = \infty$ and $\beta_1 = \beta_3$. In Stigler's theory voters weight both recent and past periods, but recent periods more, which corresponds to a positive (but not infinite) value of ρ. Downs' theory is probably best characterized as one in which voters acquire more information than Kramer assumes, but less that Stigler assumes. Thus, for example, β_2 and β_4 might be zero for Downs but not for Stigler.

The $DPER$ and DUR variables in equations (2) and (3) are picking up opposite effects. The duration variable says that expected future utility under an incumbent party is lower, other things being equal, the longer has the party been in power. The person variable says that expected future utility under an incumbent party is higher, other things being equal, if the President himself (himself so far) is running again. In the first case a lack of variety decreases utility—a party wears out its welcome—and in the second case it increases it—a President himself is a familiar figure and this may add to expected future utility. It will be seen that both of these variables are significant in the presidential vote equation, with opposite signs.

Three further "aggregation" assumptions are needed to allow an aggregate voting equation to be estimated. The first is that the coefficients β_1, β_2, β_3, β_4, γ_1, γ_2, and ρ in equations (2) and (3) are the same for all voters and that all voters use the same measure of performance and the same value of M^*. Differences across voters are reflected only in the ξ_{it}^D and ξ_{it}^R variables. Let

$$\psi_{it} = \xi_{it}^R - \xi_{it}^D \tag{4}$$

$$q_t = \beta_1 \frac{M_{td1} - M^*}{(1+\rho)^{t-td1}} + \beta_2 \frac{M_{td2} - M^*}{(1+\rho)^{t-td2}} - \beta_3 \frac{M_{tr1} - M^*}{(1+\rho)^{t-tr1}} - \beta_4 \frac{M_{tr2} - M^*}{(1+\rho)^{t-tr2}}$$
$$+\gamma_1 DPER_t + \gamma_2 DUR_t \tag{5}$$

where $DPER_t = DPER_t^D - DPER_t^R$ and $DUR_t = DUR_t^D - DUR_t^R$. Then under this first assumption and using equations (2) and (3), equation (1) can be written:

$$V_{it} = \begin{cases} 1 & \text{if } q_t > \psi_{it} \\ 0 & \text{otherwise} \end{cases} \tag{6}$$

The second aggregation assumption is that ψ_{it} is evenly distributed across voters in each election between $a + \delta_t$ and $b + \delta_t$, where $a < 0$ and $b > 0$. δ_t is specific to election t, but a and b are constant across all elections. The third aggregation assumption is that there are an infinite number of voters in each election. The last two assumptions imply that ψ_t is uniformly distributed between $a + \delta_t$ and $b + \delta_t$, where the i subscript is now dropped from ψ_{it}. The probability density function for ψ_t, denoted $f(\psi_t)$, is

$$f(\psi_t) = \begin{cases} \frac{1}{b-a} & \text{for } a + \delta_t < \psi_t < b + \delta_t \\ 0 & \text{otherwise} \end{cases} \tag{7}$$

The cumulative distribution function for ψ_t, denoted $F(\psi_t)$, is

$$F(\psi_t) = \begin{cases} 0 & \text{for } \psi_t \leq a + \delta_t \\ \frac{\psi_t - a - \delta_t}{b-a} & \text{for } a + \delta_t < \psi_t < b + \delta_t \\ 0 & \text{for } \psi_t \geq b + \delta_t \end{cases} \tag{8}$$

Let V_t denote the Democratic share of the two-party vote in election t. From the above assumptions, V_t is equal to the probability that ψ_t is less than or equal to q_t. The probability that ψ_t is less than or equal to q_t is merely the cumulative distribution function evaluated at q_t, so that[2]

$$V_t = -\frac{a}{b-a} + \frac{q_t}{b-a} - \frac{\delta_t}{b-a} \tag{9}$$

It will be convenient to rewrite equation (9) as

$$V_t = \lambda_0 + \lambda_1 q_t + \epsilon_t \tag{10}$$

where $\lambda_0 = -a/(b-a)$, $\lambda_1 = 1/(b-a)$, and $\epsilon_t = -\delta_t/(b-a)$. Finally, combining equations (5) and (10) yields:

$$\begin{aligned} V_t = \lambda_0 + \lambda_1\beta_1\frac{M_{td1} - M^*}{(1+\rho)^{t-td1}} + \lambda_1\beta_2\frac{M_{td2} - M^*}{(1+\rho)^{t-td2}} - \lambda_1\beta_3\frac{M_{tr1} - M^*}{(1+\rho)^{t-tr1}} \\ -\lambda_1\beta_4\frac{M_{tr2} - M^*}{(1+\rho)^{t-tr2}} + \lambda_1\gamma_1 DPER_t + \lambda_1\gamma_2 DUR_t + \epsilon_t \end{aligned} \tag{11}$$

Given assumptions about the measure of performance and about ϵ_t, equation (11) can be estimated.

To review the theory, ψ_{it} in equation (4) is the Republican "bias," positive or negative, for voter i for election t. q_t in equation (5) is the difference in expected

[2]If ψ_t is normally distributed rather than uniformly distributed, then V_t in equation (9) is no longer a linear function of q_t. However, since V_t only varies between about 0.35 and 0.65, V_t will be approximately linear in q_t over its relevant range if ψ_t is normally distributed.

future utility for each voter between the Democratic and Republican candidates from the economic measures and the $DPER$ and DUR variables. Equation (6) says that voter i votes for the Democratic candidate if q_t exceeds ψ_{it} and for the Republican candidate otherwise. Equation (7) then states how the Republican bias is distributed across voters in election t. If, for example, δ_t is randomally distributed across elections, then the bias is randomally distributed across elections. The bias is zero for election t if $a = -b$ and $\delta_t = 0$.

Note that the right hand side variables in equations (2) and (3) are meant to be causal—to directly affect expected future utility. They are not simply meant to be correlated with expected future utility. For example, a survey of voters asking them how they think the president is doing or how they plan to vote is likely to be correlated with their expected future utility under each party, but it is not that their answers directly affect their expected future utility. Their answers are just reflecting it. Survey variables are thus not appropriate for the theory.

In the empirical work in Fair (1978), which considered only presidential elections, the hypothesis that $\beta_1 = \beta_3$ was tested and not rejected. In addition, the estimates of ρ were very large, and for practical purposes they were infinite. The results thus supported Kramer's (1971) theory over those of Downs (1957) and Stigler (1973). If $\beta_1 = \beta_3$ and ρ is infinite, equation (11) becomes[3]

$$V_t = \lambda_0 + \lambda_1\beta_1(M_t - M^*)I_t + \lambda_1\gamma_1 DPER_t + \lambda_1\gamma_2 DUR_t + \epsilon_t \qquad (12)$$

where I_t equals 1 if there is a Democratic incumbent and -1 if there is a Republican incumbent.

[3]If ρ is infinite, the M_{td2} and M_{tr2} terms in equation (11) drop out.

Finally, nothing precludes there being more than one measure of performance. Assume that M_t is a linear function of three economic variables:

$$M_t - M^* = \omega_1(M_{1t} - M_1^*) + \omega_2(M_{2t} - M_2^*) + \omega_3(M_{3t} - M_3^*) \qquad (13)$$

Substituting (13) into (12) then yields:

$$V_t = \alpha_0 + \alpha_1 M_{1t} I_t + \alpha_2 M_{2t} I_t + \alpha_3 M_{3t} I_t + \alpha_4 DPER_t + \alpha_5 DUR_t + \alpha_6 I_t + \epsilon_t \quad (14)$$

where $\alpha_0 = \lambda_0, \alpha_1 = \lambda_1\beta_1\omega_1, \alpha_2 = \lambda_1\beta_1\omega_2, \alpha_3 = \lambda_1\beta_1\omega_3, \alpha_4 = \lambda_1\gamma_1, \alpha_5 = \lambda_1\gamma_2,$ and $\alpha_6 = -(\lambda_1\beta_1\omega_1 M_1^* + \lambda_1\beta_1\omega_2 M_2^* + \lambda_1\beta_1\omega_3 M_3^*)$. Equation (14) is the equation that is estimated in the next section for presidential elections.

House Equations

Consider first the on-term House elections. If it is the case that voters praise or blame the party in power in the White House for the economy, then the above theory can with one exception carry over directly to the on-term House elections, where the "party in power" means the party in the White House. The exception is the question of how to incorporate the possibility that a party's vote share in the previous House election has an effect on its vote share in the current House election.

One way to do this is to assume that δ_t depends on the previous vote share:

$$\delta_t = \theta_0 + \theta_1(V_{t-2}^{cc} - 50) + \eta_t \quad , \qquad \theta_1 < 0 \qquad (15)$$

where V_{t-2}^{cc} is the Democratic share of the two-party vote in the previous mid-term House election.[4] Remember that δ_t reflects how the Republican bias is distributed

[4]Subtracting 50 in equation (15) only affects the estimate of the constant term. Otherwise, the estimated equation is exactly the same.

across voters in election t, and so equation (15) says that the Republican bias as it relates to the House depends on the previous results for the House. If θ_1 is negative, then equation (15) says that the Republican bias in the current on-term House election depends negatively on the Democratic party's performance in the previous mid-term House election.

Without considering the lagged vote share variable and under the assumptions that $\beta_1 = \beta_3$ and that ρ is infinite, equation (14) is relevant for the on-term House elections, where the left-hand-side variable is the Democratic share of the two-party on-term House vote. In the theory just realize that "candidate" means candidate for representative rather than for president and that all voters in the country are included in the distribution of the Republican bias variable, ψ_{it}. Postulating that δ_t is determined as in equation (15) has the effect of simply adding V_{t-2}^{cc} to the right hand side of equation (14). Since $\epsilon_t = -\delta_t/(b-a)$, equation (15) can be solved for ϵ_t and this expression substituted into equation (14). Equation (14) is the same except that the constant term is now $\alpha_0 - \theta_0/(b-a) + 50\theta_1/(b-a)$, the coefficient on V_{t-2}^{cc} is $-\theta_1/(b-a)$, and the error term is $-\eta_t/(b-a)$. Since θ_1 is negative, the coefficient on V_{t-2}^{cc} is positive. Equation (14) as so modified is the equation that is estimated in the next section for the on-term House elections.

Consider now the mid-term House elections. Again, if it is the case that voters praise or blame the party in power in the White House for the economy, then the above theory can be carried over, although the time period for the measure of performance is different. For presidential and on-term House elections the time period is the 15 quarters prior to the election, whereas for mid-term House elections the time period since the new (or re-elected) president has taken over is only 7 quarters. Also, the variable $DPER$ is not relevant because there is no presidential election at the same time. Regarding possible effects of previous vote shares, if a party's vote shares in both the previous presidential election and the previous on-term House election affect the party's vote share in the current mid-term House election, this can be incorporated into the theory by assuming that

$$\delta_t = \phi_0 + \phi_1(V^c_{t-2} - 50) + \phi_2(V^p_{t-2} - 50) + \mu_t \quad , \quad \phi_1 < 0, \quad \phi_2 > 0, \quad (16)$$

where V^c_{t-2} is the Democratic share of the two-party vote in the previous on-term House election and V^p_{t-2} is the Democratic share of the two-party vote in the previous presidential election.

Without considering the lagged vote share variables, equation (14) is also relevant for the mid-term House elections, where the left-hand-side variable is the Democratic share of the two-party mid-term House vote. Also, the $DPER$ variable is dropped, and the time period for the economic variables is just the first 7 quarters of an administration, not the first 15. Postulating that δ_t is determined as in equation (16) has the effect of simply adding V^c_{t-2} and V^p_{t-2} to the right hand side of equation (14). Again, since $\epsilon_t = -\delta_t/(b-a)$, equation (16) can be solved for ϵ_t and this expression substituted into equation (14). Equation (14) is the same except that the constant term is now $\alpha_0 - \phi_0/(b-a) + 50\phi_1/(b-a) + 50\phi_2/(b-a)$, the coefficient on V^{cc}_{t-2} is $-\phi_1/(b-a)$, the coefficient on V^p_{t-2} is $-\phi_2/(b-a)$, and the error term is $-\mu_t/(b-a)$. Since ϕ_1 is negative, the coefficient on V^c_{t-2} is positive, and since ϕ_2 is positive, the coefficient on V^p_{t-2} is negative. Equation (14) as so modified is the equation that is estimated in the next section for the mid-term House elections.

3 Estimated Equations and Tests

The Presidential Equation

The variables that are used in the estimation work are listed in Table 1. The coefficient estimates are presented in Table 2: there is one estimate for the presidential equation and two each for the on-term and mid-term House elections. Table 3 presents the predicted values and estimated residuals from these five regressions.

Consider first the presidential equation. The first economic variable, G, is the growth rate (at an annual rate) of real per capita GDP in the first three quarters of the election year. The second, P, is the absolute value of the inflation rate (at an annual rate) in the first 15 quarters of the administration. The third, Z, is the number of quarters in the first 15 in which the growth rate of per capital GDP exceeded 3.2 percent at an annual rate. There is thus one short horizon variable, G, and two that pertain to the entire period of the administration up to the time of the election, P and Z.

The variable Z is a "good news" variable in that it measures the number of quarters in the administration in which the growth rate was noticeably strong. There is some evidence from psychology experiments that people tend to remember extreme outcomes more than normal ones, and Z can be considered to be a measure of extreme positive growth outcomes. Like the value for k in the definition of DUR, the cutoff value of 3.2 percent for Z was chosen on best-fitting grounds. As discussed below, values of 2.7 and 3.7 gave similar results. A "bad news" variables was also tried, but it was not significant in any of the specifications.

Table 1
Variables

Variable	Definition
V^p	Democratic share of the two-party presidential vote.
V^c	Democratic share of the two-party on-term House vote.
V^{cc}	Democratic share of the two-party mid-term House vote.
I	1 if there is a Democratic presidential incumbent at the time of the election and -1 if there is a Republican presidential incumbent.
$DPER$	1 if a Democratic presidential incumbent is running again, -1 if a Republican presidential incumbent is running again, and 0 otherwise.
DUR	0 if either party has been in the White House for one term, 1 [-1] if the Democratic [Republican] party has been in the White House for two consecutive terms, 1.25 [-1.25] if the Democratic [Republican] party has been in the White House for three consecutive terms, 1.50 [-1.50] if the Democratic [Republican] party has been in the White House for four consecutive terms, and so on.
WAR	1 for the elections of 1918, 1920, 1942, 1944, 1946, and 1948, and 0 otherwise.
G	growth rate of real per capita GDP in the first three quarters of the on-term election year (annual rate).
G^{cc}	growth rate of real per capita GDP in the first three quarters of the mid-term election year (annual rate).
P	absolute value of the growth rate of the GDP deflator in the first 15 quarters of the administration (annual rate) except for 1920, 1944, and 1948, where the values are zero.
P^{cc}	absolute value of the growth rate of the GDP deflator in the first 7 quarters of the administration (annual rate) except for 1918, 1942, and 1946, where the values are zero.
Z	number of quarters in the first 15 quarters of the administration in which the growth rate of real per capita GDP is greater than 3.2 percent at an annual rate except for 1920, 1944, and 1948, where the values are zero.
Z^{cc}	$\frac{15}{7}$ times number of quarters in the first 7 quarters of the administration in which the growth rate of real per capita GDP is greater than 3.2 percent at an annual rate except for 1918, 1942, and 1946, where the values are zero.

• Sample period: 1916, 1920, ..., 2004 for the V^p and V^c equations and 1918, 1922, ..., 2006 for the V^{cc} equation.

Table 2
Estimated Equations

	Eq. 1 V^p	Eq. 2 V^c	Eq. 2a V^c	Eq. 3 V^{cc}	Eq. 3a V^{cc}
$Index$	–	–	0.584	–	0.528
			(6.89)		(2.42)
$G \cdot I$	0.680	0.413	0.397	–	–
	(6.14)	(4.11)			
$P \cdot I$ or $P^{cc} \cdot I$	−0.657	−0.305	*−0.384*	−0.464	*−0.347*
	(−2.26)	(−1.18)		(−2.27)	
$Z \cdot I$ or $Z^{cc} \cdot I$	1.075	0.641	*0.628*	0.479	*0.568*
	(4.31)	(2.84)		(1.84)	
$DPER$	3.30	2.62	2.70	–	–
	(2.34)	(2.47)	(2.89)		
DUR	−3.33	–	–	–	–
	(−2.75)				
I	−2.74	−4.74	−4.42	−2.27	−2.85
	(−1.08)	(−2.60)	(−4.83)	(−1.79)	(−2.78)
WAR	5.61	4.11	3.69	−0.31	0.40
	(2.09)	(1.74)	(2.21)	(−0.14)	(0.20)
$CNST$	47.32	49.56	49.56	48.78	48.81
	(75.54)	(87.87)	(93.55)	(68.11)	(68.97)
$V^{cc}_{-2} - 50$	–	0.637	0.630	–	–
		(4.93)	(5.64)		
$V^{c}_{-2} - 50$	–	–	–	0.796	0.748
				(4.59)	(4.63)
$V^{p}_{-2} - 50$	–	–	–	−0.326	−0.355
				(−2.35)	(−2.67)
SE	2.54	2.22	2.09	2.30	2.27
R^2	0.914	0.864	0.863	0.815	0.808
No. obs.	23	23	23	23	23

• Estimation method: OLS.
• Estimation period: 1916–2004 for V^p and V^c, 1918-2006 for V^{cc}.
• t-statistics are in parentheses.
• $Index$ for V^c is $0.680 \cdot G \cdot I - 0.657 \cdot P \cdot I + 1.075 \cdot Z \cdot I$. The hypothesis that the weights in this index are correct is not rejected: F-value of 0.048, which with 2,15 degrees of freedom has a p-value of 0.953.
• $Index$ for V^{cc} is $-0.657 \cdot P^{cc} \cdot I + 1.075 \cdot Z^{cc} \cdot I$. The hypothesis that the weights in this index are correct is not rejected: F-value of 0.656, which with 1,16 degrees of freedom has a p-value of 0.430.
• Values in italics are implied values.

Table 3
Predicted Values and Estimated Residuals from Table 2

	Act.	Eq. 1		Act.	Eq. 2		Eq. 2a		Act.	Eq. 3		Eq. 3a		
t	V^p	$\hat{V}^p$	$\hat{u}^p$	V^c	$\hat{V}^c$	$\hat{u}^c$	$\hat{V}^c$	$\hat{u}^c$	V^{cc}	$\hat{V}^{cc}$	$\hat{u}^{cc}$	$\hat{V}^{cc}$	$\hat{u}^{cc}$	$t+2$
1916	51.7	49.8	-1.9	48.9	49.2	0.3	49.2	0.3	45.1	44.8	-0.3	44.9	-0.2	1918
1920	36.1	39.1	3.0	38.0	41.1	3.1	41.2	3.2	46.4	45.2	-1.2	44.3	-2.1	1922
1924	41.8	42.0	0.3	42.1	46.2	4.1	46.3	4.2	41.6	42.4	0.8	42.6	1.1	1926
1928	41.2	42.8	1.7	42.8	42.6	-0.3	42.5	-0.3	45.9	47.4	1.5	47.9	2.0	1930
1932	59.2	61.2	2.1	56.9	54.7	-2.2	54.7	-2.2	56.2	51.2	-5.0	51.3	-4.9	1934
1936	62.5	63.9	1.5	58.5	61.2	2.8	61.1	2.6	50.8	52.3	1.5	51.5	0.7	1938
1940	55.0	55.8	0.8	53.0	54.7	1.7	54.9	1.9	47.7	46.9	-0.7	46.8	-0.9	1942
1944	53.8	52.2	-1.5	51.7	51.8	0.1	51.8	0.0	45.3	46.3	1.1	46.3	1.0	1946
1948	52.4	50.9	-1.4	53.2	50.0	-3.2	50.0	-3.3	50.0	51.3	1.3	51.1	1.1	1950
1952	44.6	45.2	0.6	50.2	48.9	-1.3	48.9	-1.3	52.8	52.3	-0.5	52.8	0.0	1954
1956	42.2	43.6	1.4	51.2	51.4	0.2	51.2	0.0	56.4	54.8	-1.6	55.1	-1.3	1958
1960	50.1	49.1	-1.0	54.5	55.6	1.2	55.5	1.0	52.4	53.6	1.2	53.7	1.3	1962
1964	61.3	61.3	-0.1	57.7	57.1	-0.6	57.2	-0.5	51.3	52.8	1.5	52.9	1.5	1965
1968	49.6	50.1	0.5	50.8	51.3	0.4	51.2	0.3	54.2	53.2	-1.1	53.0	-1.2	1970
1972	38.2	41.6	3.4	52.7	50.8	-1.8	50.9	-1.7	58.6	58.7	0.1	58.2	-0.4	1974
1976	51.1	50.5	-0.6	57.2	57.4	0.2	57.7	0.5	54.4	52.9	-1.6	53.5	-0.9	1978
1980	44.7	45.7	1.0	51.3	49.6	-1.7	49.3	-1.9	56.2	55.0	-1.2	54.5	-1.7	1982
1984	40.8	37.9	-2.9	52.8	49.9	-2.9	50.0	-2.7	55.1	56.4	1.3	56.7	1.6	1986
1988	46.1	49.5	3.4	54.0	55.0	0.9	54.9	0.9	54.1	55.3	1.2	55.0	0.9	1990
1992	53.5	49.1	-4.3	52.8	52.9	0.1	52.8	0.0	46.4	48.6	2.2	48.4	2.0	1994
1996	54.7	53.0	-1.8	49.8	48.4	-1.5	48.5	-1.3	49.4	48.3	-1.1	48.6	-0.8	1998
2000	50.3	49.6	-0.6	49.8	49.6	-0.2	49.6	-0.1	47.6	51.7	4.1	52.1	4.5	2002
2004	48.8	45.4	-3.4	48.6	49.1	0.5	49.0	0.3	54.2	50.7	-3.5	50.9	-3.3	2006
RMSE			2.05			1.79		1.80			1.92		1.95	

- $\hat{u}^p = \hat{V}^p - V^p$.
- $\hat{u}^c = \hat{V}^c - V^c$.
- $\hat{u}^{cc} = \hat{V}^{cc} - V^{cc}$.
- RMSE = root mean squared error.

The other explanatory variables in the presidential equation have been discussed in Section 2 except for WAR. The values of P and Z are large for the elections of 1920, 1944, and 1948, due in large part to the world wars, and they have been zeroed out in the estimation. This treatment leads to the WAR variable being an explanatory variable in equation (14). To see this, assume that in equation (13) both

$(M_{2t} - M_2^*)$ and $(M_{3t} - M_3^*)$ are multiplied by $(1 - WAR_t)$, where WAR_t is 1 in 1920, 1944, and 1948, and 0 otherwise. This then adds WAR_t as an explanatory variable in equation (14) with a coefficient of $\lambda_1\beta_1\omega_2M_2^* + \lambda_1\beta_1\omega_3M_3^*$. WAR_t is thus added to the equation because of M_2^* and M_3^*.

The estimates of the presidential equation in Table 2 show that the three economic variables are significant, as are $DPER$ and DUR. A one percentage point increase in the growth rate leads to a 0.680 percentage point increase in the vote share; a one percentage point increase in the inflation rate leads to a 0.657 decrease in the vote share, and an increase in the number of strong growth quarters by one leads to an increase in the vote share of 1.075 percentage points. If an incumbent is running again, there is an advantage of 3.30 percentage points. The estimated standard error is 2.54 percentage points. The estimated residuals in Table 3 show that for the 2004 election the Democratic share was underpredicted by 3.4 percentage points: President Bush should have done better according to the equation.

The original specification of the presidential equation is in Fair (1978), and over the years some specification changes have been made as new observations have become available. Because of the small number of observations, data mining—spurious correlation—is a potentially serious problem in the process of searching for explanatory variables. Possible data mining issues in the present case are 1) the use of 3.2 percent as the cutoff for the Z variable and the use of .25 in the definition of DUR, both of which were chosen on best-fitting grounds, 2) not counting Ford as an incumbent running again for the $DPER$ variable, and 3) the adjustments for the two world wars. There is, however, some evidence in support of the view that data mining is not a problem. First, the specification of the presidential equation has not changed since the 1992 election. The specification that was used for the estimation period through 1992 (specified in 1994) is the same one that was used for the estimation periods through 1996, 2000, and 2004. The only change since 1992 has been the reestimation of the equation through the latest data. The equation has thus been around in its present form for over 12 years.

Second, when the equation is estimated only through 1960 (12 observations), the coefficient estimates are fairly stable.[5] Both G and Z are still highly significant, and P has a t-statistic of -1.42. Third, the coefficient estimates are fairly robust to 1) the use of 2.7 or 3.7 percent instead of 3.2 percent as the cutoff for the Z variable, 2) the use of 0.00 or 0.50 instead of 0.25 as the increment for the DUR variable, and 3) counting Ford as an incumbent running again for the $DPER$ variable. The results are more sensitive to the treatment of the two world wars. If the adjustment for the wars is not made, the t-statistic for the inflation variable falls in absolute value to -1.56, although both G and Z remain significant with only slightly smaller coefficient estimates. The fits are worse if the growth variable is only for the second and third quarters of the election year or for the four quarters before the election, but the growth variable always remains highly significant. The inflation variable looses its significance if only 11 quarters or only 7 quarters before the election are used instead of 15, although its coefficient estimate is always negative. The presidential equation is thus fairly robust; it seems unlikely that the significance of the economic variables is spurious.

[5] This result and the others discussed in this paragraph are presented in Fair (2006). In Fair (2006) the left hand side variable is the incumbent party's vote share rather than the Democratic party's vote share, but this makes no difference to the results. If $\tilde{V}_t^p$ is the incumbent party's vote share, then $\tilde{V}_t^p = V_t^p \cdot I_t + .5(1 - I_t)$. Using this definition and the fact that $I_t \cdot I_t = 1$, the equation to be estimated can be specified either way.

None of the lagged-share variables was significant when added to the presidential equation. When $V^p_{-4} - 50$ was added, it had a coefficient estimate of 0.030 with a t-statistic of 0.17. When $V^c_{-4} - 50$ was added, it had a coefficient estimate of 0.177 with a t-statistic of 1.06. When $V^{cc}_{-2} - 50$ was added, it had a coefficient estimate of 0.036 with a t-statistic of 0.23.

The On-Term House Equation

No new explanatory variables are required for the on-term House equation except the lagged value of the mid-term House share, denoted V^{cc}_{-2} in Table 2. Two estimates are presented for this equation, one where the three economic variables are unconstrained and one where the weights on these variables are constrained to be those estimated in the presidential equation. The duration variable, DUR, was not close to being significant in any of the House regressions, and so it was dropped from the estimation for the House equations. (It has a coefficient estimate of 0.271 with a t-statistic of 0.27 when added to equation 2a in Table 2, and it has a coefficient estimate of -0.462 with a t-statistic of -0.45 when added to equation 3a.)

The results for the on-term House equation show that two of the three economic variables (G and Z) are significant when the economic variables are entered separately. The other variable, P, has the expected sign but with a t-statistic of only -1.18. When the relative weights are imposed, the resulting index variable is highly significant, with a coefficient estimate of 0.584. The hypothesis that the restrictions are correct is not rejected. Imposing the restrictions hardly changes the fit, with an F-value of only 0.048 and a resulting p-value of 0.953. The $DPER$ variable is significant, which says that when a presidential incumbent is running again, this helps his party in the House vote. The previous mid-term share variable is significant, with a coefficient estimate of 0.630 in equation 2a and a t-statistic of 5.64.

No other lagged-share variable was significant when added to the on-term House equation. When $V^c_{-4} - 50$ was added to equation 2a, it had a coefficient estimate of 0.192 with a t-statistic of 1.07. When $V^p_{-4} - 50$ was added, it had a coefficient estimate of 0.027 with a t-statistic of 0.24.

Overall, the results for the on-term House equation provide strong support for the view that the economy affects on-term House elections. In terms of the theory in Section 2, the significance of the previous mid-term share variable suggests that the distribution of the Republican bias across voters for the House election is not random from election to election. If, say, the Republican party has done well in the last (mid-term) House election in that V^{cc}_{-2} is small, then δ_t will be larger than otherwise. In this sense there is positive serial correlation in the bias.

There is no evidence of a presidential coattail effect on the on-term House vote. Tests regarding the error structure similar to those in Kramer (1971) and Ferejohn and Calvert (1984) are performed in Appendix A, and the results indicate no coattail effects. Perhaps even more compelling, when V^p, the actual presidential vote share in the election, is added to equation 2a, it is not significant, with a coefficient estimate of 0.092 and a t-statistic of 0.52. Also, when the estimated error from the presidential equation, $V^p - \hat{V}^p$, is added, it is not significant, with a coefficient estimate of 0.182 and a t-statistic of 0.85. It is true that V^p and V^c are highly positively correlated (correlation coefficient of 0.68 over the 23 elections), but this is due to the fact that both are affected by similar variables, namely the three economic variables and $DPER$. There is no evidence that the presidential vote directly affects the on-term House vote.

Regarding data mining issues for the on-term House equation, no searching was done over the economic variables. The exact three economic variables that have been used in the presidential vote equation since 1992 were simply used in the on-term House equation.

The Mid-Term House Equation

Two new explanatory variables are needed for the mid-term House equation in addition to the two lagged-share variables, V^c_{-2} and V^p_{-2}. These are P^{cc} and Z^{cc}. They are the same as P and Z, respectively, except that they pertain to the first 7 quarters of the administration rather than the first 15. For comparison purposes, Z^{cc} is multiplied by $\frac{15}{7}$ to give it the same order of magnitude as Z.

It turned out that G was never close to being significant in the mid-term House equation, and so it was dropped. For example, when it is added to equation 3a in Table 2, it has a coefficient estimate of 0.022 with a t-statistic of 0.27. Table 2 shows that when the other two economic variables are included separately, P^{cc} has a t-statistic of -2.27 and Z^{cc} has a t-statistic of 1.84. When the weights on these two variables are constrained to be those estimated in the presidential equation, the resulting index variable is significant, with a coefficient estimate of 0.528. The hypothesis that the restrictions are correct is not rejected. The F-value is 0.656 and the resulting p-value is 0.430.

The two lagged-share variables are significant. In equation 3a in Table 2 the coefficient estimate for the previous (on-term) House vote share is 0.748 with a t-statistic of 4.63 and the coefficient estimate for the previous presidential vote share is -0.355 with a t-statistic of -2.67. Holding the previous presidential vote share constant, an increase in the previous (on-term) House vote share of 1 percentage point increases the current (mid-term) House vote share by 0.748 percentage points. The theoretical explanation for this is the same as that above for the effect of the previous mid-term House vote share on the current on-term House vote share. The coefficient in this case is slightly larger: 0.748 versus 0.630. So again there is positive serial correlation in the bias regarding the House elections. On the other hand, holding the previous (on-term) House vote share constant, an increase in the previous presidential vote share of 1 percentage point *decreases* the current (mid-term) House vote share by 0.355 percentage points.

The negative coefficient estimate for the previous presidential vote share in the mid-term House equation is a robust result. For example, when the estimated error from the presidential equation, $V^p_{-2} - \hat{V}^p_{-2}$, is added to equation 3a, it is not significant, with a coefficient estimate of -0.267 and a t-statistic of -1.07. $V^p_{-2} - 50$ is still significant, with a coefficient estimate of -0.346 and a t-statistic of -2.61. Also, when $V^{cc}_{-4} - 50$ is added to equation 3a, it is not significant (coefficient estimate of -0.158 and t-statistic of -0.88) and $V^p_{-2} - 50$ is still significant, with a coefficient estimate of -0.415 and a t-statistic of -2.76. The overall results thus strongly show that there is positive serial correlation in the House vote in that 1) the previous mid-term House vote positively affects the on-term House vote and

2) the previous on-term House vote positively affects the mid-term House vote. The coefficient estimates (equations 2a and 3a) are 0.630 and 0.748, respectively. But the results also show that the previous presidential vote has a negative effect on the mid-term House vote.

An important question is why this negative presidential vote effect? In the theory in Section 2 this means that the Republican bias for the mid-term election depends positively on the size of the previous Democratic presidential vote share. The larger the Democratic share, the more the bias in favor of the Republicans. But a deeper question is why is this the case? It can't be from a reversal of a positive coattail effect in the previous election because there is no evidence of a coattail effect in the first place. It also can't simply be a vote against the party in the White House at the time of the mid-term election because it is the size of the previous presidential vote share that matters, not which party controls the White House. For example, if the Democrats get 42 percent in one presidential election and 48 percent in another, losing both times, the mid-term equation says that the Democrats will still get more mid-term House votes in the first case than in the second, other things being equal. Note also that since there are economic variables in the mid-term House equation, effects of a good or bad economy have already been taken into account. Also, there is not a reversion to the mean, other things being equal, but the opposite: the previous on-term House vote share has a positive effect on the mid-term House vote share.

One possible explanation for the negative presidential effect is a balance argument. If voters, other things being equal, don't like one party becoming too dominant, they may tend to vote more against a party in the mid-term election the better the party has done in the previous presidential election. The idea of balance is stressed in Alesina and Rosenthal (1989) and Erickson (1988). Neither of these studies uses the previous presidential vote share as an explanatory variable in the House equations, instead using 0,1 incumbency dummy variables, but the balance idea can be carried over to the vote share.[6]

Erickson (1990, p. 394) in discussing "the presidential penalty" in mid-term elections argues for a balance effect over simply voting against the party in the White House no matter what. He also argues against any economic effects: "In any case the economy is not responsible. Midterm loss results under all economic circumstances. And the severity of midterm loss is not predictable from the health of the economy." (p. 394). The present results run counter to this and show significant economic effects in the mid-term equation. There is, however, nothing inconsistent with there existing both a balance effect and economic effects, as found here. In the mid-term House equation both the economic variables and the previous presidential vote share variable are significant.

Regarding the lagged-share variables, sometimes in the literature, following Tufte (1975), the left hand side variable in House equations is taken to be the party's current vote share minus the party's mean House vote share in the past eight elections, and sometimes it is taken to be the change in the vote share from

[6]Erickson (1988, p. 1023, fn. 4) reports that he added the previous presidential vote share to his mid-term House equation and got a negative, but insignificant, coefficient estimate. This negative coefficient estimate is consistent with the present results, although in the present case the coefficient estimate is also significant. Campbell (1985) has a party's previous presidential vote share as an explanatory variable in an equation explaining the change in the party's House seats in the mid-term election. The coefficient estimate is negative and significant. Campbell (1985, p. 1154) attributes this in part to coattail effects and surge-and-decline (regression to the mean) effects, which, as argued above, seems unlikely to be the correct explanation.

the previous election. Neither of these specifications is consistent with the present results. First, no lagged-share variables were found to be significant more than two years (one election) back, which argues against using the eight-election mean share. Second, the coefficient estimates of the lagged House vote share variables are significantly less than one, which argues against using the change in the vote share and thus imposing a coefficient of one.

As with the on-term House equation, no searching was done for the mid-term House equation regarding the economic variables. The only change was that the period of interest is the first 7 quarters of an administration rather than the first 15.

Finally, it should be obvious from Table 2 that the three equations are not the same. To begin with, the coefficient estimates of the $Index$ variables are significantly different from one. But even more compelling, the equations have some different explanatory variables. The results strongly suggest that the equations should not be constrained to have the same coefficients.

4 Three Equation Model

Equations 1, 2a, and 3a in Table 2 form a three equation model that can be analyzed as a complete system. Because of the lagged values in equations 2a and 3a, the House predictions in Table 3, which are based on the actual values of the lagged variables, are not the same as those generated from a dynamic solution of the model. Given the actual values of all the variables except the three vote share variables, a dynamic solution can be computed from 1916 through 2006, where the predicted vote share variables from the previous election are used in solving for the current election. This solution has no effect on the presidential predictions because there are no lagged values in equation 1: the predicted values of V^p from the dynamic solution are the same as those in Table 3. The predicted values of V^c and V^{cc} are different, and these are presented in Table 4.

The root mean squared error (RMSE) for V^c for the dynamic solution is 2.13 percentage points in Table 4, which compares to 1.80 in Table 3. For V^{cc} the RMSE is 2.50 versus 1.95 in Table 3. Thus, not surprisingly, the fit is somewhat worse for the dynamic solution, since this solution uses no actual values of the lagged-share variables except the House vote share for 1914 (the initial condition).

The three equation model can also be used to examine the effects over time of changing the economic variables. Since the model is linear, it does not matter in which year the change is made regarding the dynamic effects. For illustration, three experiments were run. For each experiment the estimated residuals were first added to the equations and taken to be exogenous. This means that when the model is solved using the actual values of all the exogenous variables, a perfect tracking solution results: the predicted values are equal to the actual values. For the first experiment, G was increased by 1 and the model solved. Since G is the growth rate in the first three quarters of the election year, this change is for the period between a mid-term election and the next on-term election. The difference between the predicted value of a variable and its actual values is the estimated effect of this change. The results are reported in Table 5 in percentage points.

Table 5 shows that the presidential vote share is 0.680 percentage points higher in the first election after the change and then the same thereafter. As noted above, there are no dynamic effects in the presidential equation, and so there is only a

Table 4
Dynamic Solution of Equations 1, 2a, and 3a in Table 2

t	V^c	$\hat{V}^c$	$\hat{u}^c$	V^{cc}	$\hat{V}^{cc}$	$\hat{u}^{cc}$	$t+2$
1916	48.9	49.2	0.3	45.1	45.8	0.7	1918
1920	38.0	41.6	3.7	46.4	46.0	-0.4	1922
1924	42.1	46.0	3.9	41.6	45.4	3.9	1926
1928	42.8	45.0	2.1	45.9	48.9	3.0	1930
1932	56.9	56.6	-0.3	56.2	50.4	-5.8	1934
1936	58.5	57.4	-1.1	50.8	50.2	-0.6	1938
1940	53.0	54.5	1.5	47.7	47.7	0.0	1942
1944	51.7	51.8	0.1	45.3	46.9	1.6	1946
1948	53.2	51.0	-2.3	50.0	50.0	-0.1	1950
1952	50.2	48.9	-1.3	52.8	51.6	-1.2	1954
1956	51.2	50.5	-0.8	56.4	54.0	-2.4	1958
1960	54.5	54.0	-0.5	52.4	53.7	1.3	1962
1964	57.7	58.0	0.3	51.3	53.1	1.8	1965
1968	50.8	52.3	1.4	54.2	53.9	-0.4	1970
1972	52.7	50.7	-2.0	58.6	55.6	-3.1	1974
1976	57.2	55.8	-1.4	54.4	52.7	-1.8	1978
1980	51.3	48.2	-3.1	56.2	51.9	-4.3	1982
1984	52.8	47.3	-5.5	55.1	53.6	-1.5	1986
1988	54.0	54.0	0.0	54.1	53.7	-0.3	1990
1992	52.8	52.6	-0.2	46.4	49.8	3.4	1994
1996	49.8	50.7	0.9	49.4	49.8	0.4	1998
2000	49.8	49.9	0.2	47.6	52.5	4.9	2002
2004	48.6	52.0	3.4	54.2	54.6	0.4	2006
RMSE			2.13			2.50	

- $\hat{u}^c = \hat{V}^c - V^c$.
- $\hat{u}^{cc} = \hat{V}^{cc} - V^{cc}$.
- RMSE = root mean squared error.
- The solution values for V^p are the same as those in Table 3.

Table 5
Effects of Changing Economic Variables

	Experiment 1			Experiment 2			Experiment 3		
Year	V^p	V^c	V^{cc}	V^p	V^c	V^{cc}	V^p	V^c	V^{cc}
2	–	–	–	–	–	–	–	–	1.215
4	0.680	0.397	–	1.075	0.627	–	1.075	1.393	–
6	–	–	0.056	–	–	0.088	–	–	0.661
8	0.000	0.035	–	0.000	0.056	–	0.000	0.416	–
10	–	–	0.026	–	–	0.042	–	–	0.311
12	0.000	0.017	–	0.000	0.026	–	0.000	0.196	–
14	–	–	0.012	–	–	0.020	–	–	0.147
16	0.000	0.008	–	0.000	0.012	–	0.000	0.092	–
18	–	–	0.006	–	–	0.009	–	–	0.069
20	0.000	0.004	–	0.000	0.006	–	0.000	0.043	–

• Experiment 1: G changed by 1.
• Experiment 2: Z changed by 1.
• Experiment 3: Z changed by 1 and Z^{cc} changed by 1 times $\frac{15}{7}$.
• Values are in percentage points. Each is the value of the variable after the change minus the value of the variable before the change.

one-time effect. The on-term House vote is 0.397 higher in the first election. This value is 0.584, the coefficient estimate for $Index$ in equation 2a in Table 2, times 0.680. This effect is smaller than that for the presidential vote. The next mid-term House vote is then larger, by 0.056 percentage points. This value is the net effect in equation 3a of the positive effect from the larger previous on-term House vote and the negative effect from the larger previous presidential vote. The next on-term House election is then 0.035 larger, which is because of the larger previous mid-term House vote. Then the next mid-term House vote is larger, by 0.026, because of the larger previous on-term House vote, and so on. The effects after the first election are all fairly small.

For the second experiment Z was increased by 1—one additional quarter of strong growth. Z^{cc} was not changed, which means that the additional quarter is in the period between a mid-term election and the next on-term election. The results are also presented in Table 5. The pattern for this experiment is the same as the pattern for the first experiment. The effects for the first election after the change are 1.075 and 0.627 percentage points, respectively, for the presidential and on-term House vote, and then small positive effects for the House votes after that.

For the third experiment Z was increased by 1 *and* Z^{cc} was increase by 1 times $\frac{15}{7}$. This means that the additional strong growth quarter is in the period between an on-term election and the next mid-term election. The results are in Table 5. In this case the first effect is on the mid-term House vote, which is larger by 1.215 percentage points. In the next on-term election the presidential vote is larger by 1.075, which is the same as it is for the second experiment. But the on-term House vote is now 1.393 larger rather than 0.627 larger, primarily because it is positively affected by the larger previous mid-term House vote. The next mid-term House vote is 0.661 larger, which again is the net effect of the positive effect of the larger previous on-term House vote and the negative effect of the larger previous presidential vote. Then in the next on-term election the House vote is 0.416 larger, and so on. As should be obvious, this experiment shows that the House vote is more affected by the economy if the change takes place before a mid-term election than after it because of the positive serial correlation of the House vote share variables.

To save space, experiments changing the inflation rate are not reported here, but the stories are similar except with a negative sign.

5 Conclusion

Considering the three vote share equations together has allowed various tests to be made. The main conclusions are the following.

1. There is strong evidence that the economy affects all three vote shares. Not only that, but the relative weights on the economic variables are the same for the presidential and on-term House elections and are the same for two of the three economic variables for the presidential and mid-term House elections.

2. There is no evidence of any presidential coattail effects on the on-term House elections. The presidential vote share and the on-term House vote share are highly positively correlated, but this is because they are affected by some of the same variables.

3. There is positive serial correlation in the House vote in that the previous mid-term House vote share positively affects the on-term House vote share and the previous on-term House vote share positively affects the mid-term House vote share. The results in Table 5 are examples of the dynamic effects.

4. The presidential vote share has a negative effect on the next mid-term House vote share. This cannot be due to the reversal of a coattail effect, since there is no evidence of an effect in the first place. Also, it is not simply voting against the party in the White House, because the presidential variable is a vote share variable not a 0,1 incumbency variable. It is also not a regression to the mean in that the above mentioned positive serial correlation in the House vote implies no such regression. The most likely explanation is a balance argument, where voters are reluctant to let one party become too dominant.

On a few technical matters, first, it is obvious from Table 2 that the three equations are not the same, and so it is problematic to constrain any of the equations to be the same. Second, arguments have been presented in Section 3 that suggest that data mining may not be a serious issue for the current specifications. The presidential equation is robust to a number of small changes; no searching has been done for either the on-term or mid-term House equation; and the presidential equation has not been changed since 1992. Third, the maximum likelihood estimates in Appendix A are very similar to those in Table 2, and so the model is robust to the estimation method. Fourth, the equations in Table 2 are structural, or causal, in that no survey variables like presidential approval ratings and vote intentions have been used. The aim is to explain voting behavior, not necessarily forecast it. The equations can be used for forecasting, but only after forecasting the economic variables first. It may be the case that for pure forecasting purposes, especially a few months before an election, the use of various voter surveys produces more accurate forecasts than can be obtained using the equations in Table 2.

Note finally that no attempt has been made in this study to explain the number of House seats per party. Translating vote shares into House seats is a complicated matter, and this is beyond the scope of this study. However, if one had an equation that explained House seats as a function of vote shares, this equation could be added to the three equations in Table 2, producing a four equation model explaining House seats.

Appendix A: FIML Estimates and Coattail Tests

It will be convenient to write the three equations that are estimated in Table 2 as:

$$V_t^p = X_t^p \alpha^p + u_t^p \tag{17}$$

$$V_t^c = X_t^c \alpha^c + \lambda_1^c (V_{t-2}^{cc} - 50) + u_t^c \tag{18}$$

$$V_{t+2}^{cc} = X_{t+2}^{cc} \alpha^{cc} + \lambda_1^{cc} (V_t^c - 50) + \lambda_2^{cc} (V_t^p - 50) + u_{t+2}^{cc} \tag{19}$$

where $t = 1916, 1920, \ldots, 2004$, X_t^p is the 1×8 vector of explanatory variables in the presidential equation, X_t^c is the 1×7 vector of explanatory variables except V_{t-2}^{cc} in the on-term House equation, X_{t+2}^{cc} is the 1×5 vector of explanatory variables except V_t^c and V_t^p in the mid-term House equation, and α^p, α^c, and α^{cc} are 8×1, 7×1, and 5×1 vectors of coefficients respectively.

If the errors terms u_t^p, u_t^c, and u_{t+2}^{cc} are uncorrelated with each other and across time and if there are no restrictions on the coefficients, then the maximum likelihood (ML) estimates of equations (17), (18), and (19) are simply the ordinary least squares (OLS) estimates in Table 2 under ”Eq.1,” “Eq.2,” and “Eq.3.” The coefficient restrictions that are imposed in Eq.2a and Eq.3a in Table 2 are in the present notation:

$$\alpha_2^c = \alpha_2^p (\alpha_1^c / \alpha_1^p) \tag{20}$$

$$\alpha_3^c = \alpha_3^p (\alpha_1^c / \alpha_1^p) \tag{21}$$

$$\alpha_2^{cc} = \alpha_3^p (\alpha_1^{cc} / \alpha_2^p) \tag{22}$$

where the subscripts on the α coefficients correspond to the variables (excluding $Index$) in order in Table 2. If the error terms are uncorrelated with each other and across time but the above restrictions are imposed, then the ML estimates are not the same as the OLS estimates in Table 2 because for the ML estimates the restrictions affect all three equations whereas for the OLS estimates the restrictions affect only the second and third equations. Even without the restrictions imposed, the ML estimates will differ from the OLS estimates if the error terms are assumed to be correlated with each other.

ML estimates with the coefficient restrictions (20)–(22) imposed and under the assumption that the errors terms are correlated with each other are presented in Table A. The parameters to estimate are the α and λ coefficients in equations (17), (18), and (19) and the variances and covariances of the error terms. Denote the variances of the three error terms as $\sigma^2_{u^p}$, $\sigma^2_{u^c}$, and $\sigma^2_{u^{cc}}$. The results in Table A are similar to those in Table 2. The estimated t-statistics in Table A, unlike those in Table 2, are not adjusted for degrees of freedom, which is the main reason for the generally larger t-statistics in Table A. The estimated standard errors (square roots of the estimated variances) are 2.06, 1.80, and 2.00 percentage points for the three equations respectively. The correlations of the error terms, not reported in Table A, are fairly small. The correlation coefficients are 0.207 for the error terms in equations (17) and (18), -0.314 for equations (17) and (19), and 0.168 for equations (18) and (19). These low correlations help explain the similarity of the results between Tables 2 and A.

Table A
Maximum Likelihood Estimates

	Eq. 1 V^p	Eq. 2 V^c	Eq. 3 V^{cc}
$G \cdot I$	0.688	0.392	–
	(8.28)	(6.35)	
$P \cdot I$ or $P^{cc} \cdot I$	−0.682	*−0.389*	−0.315
	(−3.54)		(−1.93)
$Z \cdot I$ or $Z^{cc} \cdot I$	1.069	*0.610*	*0.493*
	(5.72)		
$DPER$	2.85	2.83	–
	(2.50)	(3.38)	
DUR	−3.60	–	–
	(−3.95)		
I	−2.29	−4.33	−2.43
	(−1.31)	(−4.08)	(−2.60)
WAR	5.71	3.53	0.27
	(2.78)	(2.25)	(0.16)
$CNST$	47.31	49.58	49.04
	(94.06)	(108.88)	(72.54)
$V^{cc}_{-2} - 50$	–	0.626	–
		(6.63)	
$V^{c}_{-2} - 50$	–	–	0.690
			(4.74)
$V^{p}_{-2} - 50$	–	–	−0.307
			(−2.48)
SE (σ_{u^p}, σ_{u^c}, $\sigma_{u^{cc}}$)	2.06	1.80	2.00
No. obs.	23	23	23

• Estimation method: ML.
• Coefficient constraints (20)–(22) imposed.
• Errors assumed to be correlated across equations.
• t-statistics are in parentheses, not adjusted for degrees of freedom.
• Values in italics are implied values.

Regarding coattail effects, Kramer (1971) tested these by postulating that (using the current notation):

$$u^p_t = u_t + v_t \tag{23}$$

$$u_t^c = u_t + \gamma v_t \tag{24}$$

$$u_{t+2}^{cc} = w_{t+2} \tag{25}$$

where u_t, v_t, and w_{t+2} are uncorrelated with each other and over time and where u_t and w_{t+2} have the same variance. From these assumptions γ can be estimated by ML. γ is a measure of a coattail effect. Kramer also assumed that the same variables appear in each of the three equations (except for the different time period for the mid-term equation) with the same coefficients. His estimate of γ was about 0.3.

For present purposes equations (17), (18), and (19) were estimated by ML under Kramer's assumptions about the error terms but not under the assumption that the equations have the same coefficients. The three coefficient restrictions, (20)–(22), were imposed, but no other coefficient restrictions were. The ML estimate of γ was -0.479, which has the wrong sign regarding a coattail effect. The other coefficient estimats were little changed from those in Table A.

Another ML estimation was done in which it was assumed that

$$u_{t+2}^{cc} = w_{t+2} - \gamma v_t \tag{26}$$

This assumes that the positive coattail effect in the on-term House election is undone in the mid-term election. It was still assumed for this specification that w_{t+2} and u_t have the same variance. The ML estimate of γ was -0.258, also of the wrong expected sign.[7] There is thus no evidence of a coattail effect from

[7]Ignoring the part of the likelihood function that does not depend on the unknown parameters, the log of the likelihood function in this case is (T = 23):

$$-T \log \sigma_u \sigma_v \sigma_w (1-\gamma) - \frac{1}{2}\Sigma_{t=1}^{T}(u_t^2/\sigma_u^2 + v_t^2/\sigma_v^2 + w_{t+2}^2/\sigma_u^2)$$

these results. This is consistent with the low correlation of the error terms across equations noted above.

Ferejohn and Calvert (1984) assume regarding the error terms in the presidential and on-term House equationis that (using the current notation):

$$u_t^p = \epsilon_t^p + v_t \tag{27}$$

$$u_t^c = \epsilon_t^c + \gamma v_t \tag{28}$$

where ϵ_t^p and ϵ_t^c are assumed to have the same variance, denoted, say, σ^2 and to have covariance $\rho\sigma^2$, where ρ is the correlation coefficient. v_t is assumed to be uncorrelated with ϵ_t^p and ϵ_t^c, with its variance denoted σ_v^2. This specification differs from Kramer's in that ϵ_t^p and ϵ_t^c are not the same. Under these assumptions, the variance of u_t^p is $\sigma^2 + \sigma_v^2$, the variance of u_t^c is $\sigma^2 + \gamma^2\sigma_v^2$, and the covariance of u_t^p and u_t^c is $\rho\sigma^2 + \gamma\sigma_v^2$.

Now, the ML estimates in Table A yield a value of 4.26 for the variance of u_t^p, a value of 3.24 for the variance of u_t^c, and a value of 0.77 for the covariance. Given

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where

$$u_t = \frac{1}{1-\gamma}V_t^c - \frac{\gamma}{1-\gamma}V_t^p - \frac{1}{1-\gamma}(X_t^c\alpha^c + \lambda_1^c(V_{t-2}^{cc} - 50)) + \frac{\gamma}{1-\gamma}X_t^p\alpha^p$$

$$\begin{aligned} v_t &= \frac{1}{1-\gamma}(V_t^p - V_t^c - X_t^p\alpha^p + X_t^c\alpha^c + \lambda_1^c(V_{t-2}^{cc} - 50)) \\ w_{t+2} &= V_{t+2}^{cc} - X_{t+2}^{cc}\alpha^{cc} - \lambda_1^{cc}(V_t^c - 50) - \lambda_2^{cc}(V_t^p - 50) \\ &+ \frac{\gamma}{1-\gamma}(V_t^p - V_t^c - X_t^p\alpha^p + X_t^c\alpha^c + \lambda_1^c(V_{t-2}^{cc} - 50)) \end{aligned}$$

There are 20 unconstrained coefficients to estimate plus σ_u^2, σ_v^2, and γ, where σ_u^2 is the variance of u_t and σ_v^2 is the variance of v_t. If the error term for the mid-term equation is Kramer's original specification in (25) rather than (26), then w_{t+2} is simply $V_{t+2}^{cc} - X_{t+2}^{cc}\alpha^{cc} - \lambda_1^{cc}(V_t^c - 50) - \lambda_2^{cc}(V_t^p - 50)$. The present likelihood function differs from Kramer's in that the coefficients are not assumed to be the same across equations.

these three estimates and given a value of ρ, one can solve for σ^2, σ_v^2, and γ, with γ the parameter of interest. Ferejohn and Calvert used their estimates to solve for γ for values of ρ ranging from -1 to 1. The values of γ ranged from about 0.50 to 0.25, which is in the ballpark of Kramer's 0.3 estimate. In the present case, however, the above three estimates lead to a range of γ of 0.80 to -0.71 (0.80 for $\rho = -1$, 0.54 for $\rho = 0$, and -0.71 for $\rho = 1$). There is thus no information here regarding the value of γ.

Appendix B: The Data

The data that were used for the estimates in Table 2 are presented in Table B. Quarterly data on nominal GDP, real GDP, and population are needed to construct G, G^{cc},P, Z, P^{cc}, and Z^{cc}. Let GDP denote nominal GDP, let $GDPR$ denote real GDP, and let POP denote population. Let a subscript k denote the kth quarter of the sixteen-quarter period of an administration. Also, let $Y = GDPR/POP$, which is real per capita GDP, and let $GDPD = GDP/GDPR$, which is the GDP deflator. Then G, G^{cc}, P, and P^{cc} are constructed as:

$$G = [(Y_{15}/Y_{12})^{(4/3)} - 1] \cdot 100$$

$$G^{cc} = [(Y_7/Y_4)^{(4/3)} - 1] \cdot 100$$

$$P = [(GDPD_{15}/GDPD_{16}(-1))^{(4/15)} - 1] \cdot 100$$

$$P^{cc} = [(GDPD_7/GDPD_{16}(-1))^{(4/7)} - 1] \cdot 100$$

Table B
Data for the V^p and V^c Equations

t	V^p	V^c	I	$DPER$	DUR	WAR	G	P	Z
1916	51.682	48.881	1	1	0.00	0	2.229	4.252	3
1920	36.119	37.957	1	0	1.00	1	-11.463	0.000	0
1924	41.756	42.093	-1	-1	0.00	0	-3.872	5.161	10
1928	41.180	42.838	-1	0	-1.00	0	4.623	0.183	7
1932	59.159	56.874	-1	-1	-1.25	0	-14.499	7.200	4
1936	62.458	58.476	1	1	0.00	0	11.765	2.497	9
1940	54.999	52.967	1	1	1.00	0	3.902	0.081	8
1944	53.774	51.706	1	1	1.25	1	4.279	0.000	0
1948	52.370	53.241	1	1	1.50	1	3.579	0.000	0
1952	44.595	50.214	1	0	1.75	0	0.691	2.362	7
1956	42.236	51.212	-1	-1	0.00	0	-1.451	1.935	5
1960	50.087	54.453	-1	0	-1.00	0	0.377	1.967	5
1964	61.344	57.676	1	1	0.00	0	5.109	1.260	10
1968	49.596	50.843	1	0	1.00	0	5.043	3.139	7
1972	38.211	52.663	-1	-1	0.00	0	5.914	4.815	4
1976	51.052	57.193	-1	0	-1.00	0	3.751	7.630	5
1980	44.697	51.283	1	1	0.00	0	-3.597	7.831	5
1984	40.830	52.778	-1	-1	0.00	0	5.440	5.259	8
1988	46.098	54.012	-1	0	-1.00	0	2.178	2.906	4
1992	53.455	52.765	-1	-1	-1.25	0	2.662	3.280	2
1996	54.736	49.842	1	1	0.00	0	3.121	2.062	4
2000	50.265	49.768	1	0	1.00	0	1.219	1.605	8
2004	48.767	48.632	-1	-1	0.00	0	2.690	2.325	1

• The values of P for 1920, 1944, and 1948 before multiplication by zero are 16.535, 5.644, and 8.482, respectively, and the values of Z are 5, 14, and 5.

where (-1) means the previous four-year election period. To construct Z and Z^{cc} one needs to define the growth rate in a given quarter, which for quarter k is $g_k = [(Y_k/Y_{k-1})^4 - 1] \cdot 100$ for quarters 2 through 16 and $g_k = [(Y_1/Y_{16}(-1))^4 - 1] \cdot 100$ for quarter 1. Z is then the number of quarters in the first 15 quarters of an administration in which g_k is greater than 3.2, and Z^{cc} is $\frac{15}{7}$ times the number of quarters in the first 7 quarters of an administration in which g_k is greater than 3.2.

The data on nominal GDP were obtained as follows. Annual data for 1929-1945

Table B (continued)
Data for the V^{cc} Equation

t	V^{cc}	I	WAR	G^{cc}	P^{cc}	Z^{cc}
1914	50.338					
1918	45.096	1	1	22.006	0.000	0.0000
1922	46.400	-1	0	14.368	11.480	12.8571
1926	41.572	-1	0	3.461	0.117	10.7143
1930	45.871	-1	0	-11.341	2.615	4.2857
1934	56.184	1	0	12.777	4.086	8.5714
1940	50.815	1	0	4.398	0.013	6.4286
1942	47.662	1	1	15.596	0.000	0.0000
1946	45.272	1	1	-3.590	0.000	0.0000
1950	50.044	1	0	13.642	0.115	6.4286
1954	52.771	-1	0	-0.779	0.789	2.1429
1958	56.397	-1	0	-1.425	2.753	2.1429
1962	52.422	1	0	3.653	1.185	8.5714
1966	51.337	1	0	3.533	2.596	10.7143
1970	54.226	-1	0	0.009	5.056	2.1429
1974	58.629	-1	0	-2.929	8.167	4.2857
1978	54.436	1	0	6.025	6.711	8.5714
1982	56.219	-1	0	-2.872	7.062	4.2857
1986	55.085	-1	0	2.217	2.518	2.1429
1990	54.083	-1	0	0.697	3.904	4.2857
1994	46.418	1	0	2.678	2.278	4.2857
1998	49.394	1	0	2.789	1.295	8.5714
2002	47.593	-1	0	1.441	2.063	0.0000
2006	54.200	-1	0	2.324	2.965	2.1429

- Observation of V^{cc} for 1914 needed for the V^{c} equation.
- The values of P^{cc} for 1918, 1942, and 1946 before multiplication by zero are 15.735, 7.950, and 9.558, respectively, and the values of Z^{cc} are 10.7143, 15.0000, and 4.2857.

and quarterly data for 1947:1-2006:3 were obtained from the Bureau of Economic Analysis (BEA) website on October 27, 2005. Quarterly data for 1946:1-1946:4 were obtained from the BEA website on October 30, 2002. Quarterly data for 1913:1-1945:4 are available from Balke and Gordon (1986), pp. 789-795. The Balke and Gordon values for 1913:1-1928:4 were used exactly, but the values for 1929:1-1945:4 were adjusted to take account of the new BEA annual data. For 1929:1-1945:4 each quarterly value for a given year was multiplied by a splicing factor for that year. The splicing factor is the ratio of the BEA value for that year to the respective yearly value in Balke and Gordon (1976), pp. 782-783.

The data on real GDP were obtained in a similar way. Annual data for 1929-1946 and quarterly data for 1947:1-2006:3 were obtained from the BEA website on October 27, 2006. Quarterly data for 1913:1-1946:4 are available from Balke and Gordon (1986), pp. 789-795. The Balke and Gordon values were spliced to the BEA values. All the Balke and Gordon quarterly values for 1913:1-1929:4 were multiplied by the same number. This number is the ratio of the BEA value for 1929 to the 1929 value in Balke and Gordon (1976), p. 782. For 1930:1-1946:4 each Balke and Gordon quarterly value for a given year was multiplied by a splicing factor for that year. The splicing factor is the ratio of the BEA value for that year to the respective yearly value in Balke and Gordon (1976), pp. 782-783.

The data on population were obtained as follows. For 1913-1928 annual data were obtained from U.S. Department of Commerce (1973), pp. 200-201, A114 series. Each of these observations was multiplied by 1.000887, a splicing factor. The splicing factor is the ratio of the A114 value for 1929 in U.S. Department of Commerce (1973) to the value for 1929 in Table 8.2 in U.S. Department of Commerce (1992). For 1929-1945 annual data were obtained from U.S. Department of Commerce (1992), Table 8.2. Quarterly observations for 1877:1-1945:4 were obtained by interpolating the annual observations using the method presented in Fair (1994), Table B.6. For 1946:1-2006:3 quarterly data were obtained from the BEA website on October 27, 2006.

Turning now to the vote data, V^p is the Democratic vote divided by the Democratic plus Republican vote except for the 1924 election. For 1924, V^p is the

Democratic vote plus .765 times the LaFollette vote divided by the Democratic plus Republican plus LaFollette vote. The presidential vote data for 1916 were obtained from U.S. Department of Commerce (1975), pp. 1078-1079. For 1920-1932 the data were obtained from U.S. Department of Commerce (1988), p. 232, for 1936-1992 the data were obtained from U.S. Department of Commerce (1997), p. 271, and for 1996-2000 the data were obtained from U.S. Department of Commerce (2001), p. 233. The vote data for the 2004 election were obtained from the U.S. Department of Commerce website.

V^c and V^{cc} are the Democratic House vote divided by the Democratic plus Republican House vote. No adjustments were made to these data. The House vote data for 1914–1970 were obtained from U.S. Department of Commerce (1975), p. 1084. For 1972, 1974, and 1976 the data were obtained from U.S. Department of Commerce (1978), p. 512; for 1978 and 1980 from U.S. Department of Commerce (1982–1983), p. 481; for 1982 from U.S. Department of Commerce (1986), p. 245; for 1984, 1986, and 1988 from U.S. Department of Commerce (1990), p. 249; for 1990 and 1992 from U.S. Department of Commerce (1994), p. 274; for 1994 and 1996 from U.S. Department of Commerce (1998), p. 283; for 1998 and 2000 from U.S. Department of Commerce (2002), p. 241; for 2002 from U.S. Department of Commerce (2004-2005), p. 244; for 2004 from U.S. Department of Commerce (2006), p. 251; and from 2006 from David Mayhew's personal calculations.

I, $DPER$, DUR, and WAR are defined in the text. In the construction of $DPER$ Ford is not counted as an incumbent running again, since he was not an elected vice president, whereas the other vice presidents who became president while in office are counted.

References

[1] Alesina, Alberto, and Howard Rosenthal, 1989, "Partisan Cycles in Congressional Elections and the Macroeconomy," *American Political Science Review*, 83, 373–398.

[2] Balke, Nathan S., and Gordon, Robert J., 1986, "Appendix B Historical Data," in Robert J. Gordon (ed.), *The American Business Cycle: Continuity and Change*, Chicago: University of Chicago Press.

[3] Campbell, James E., 1985, "Explaining Presidential Losses in Midterm Congressional Elections," *The Journal of Politics*, 47, 1140–1157.

[4] Downs, Anthony, 1957, *An Economic Theory of Democracy*, New York: Harper and Row.

[5] Erikson, Robert S., 1988, "The Puzzle of Midterm Loss," *Journal of Politics*, 50, 1011–1029.

[6] Erikson, Robert S., 1990, "Economic Conditions and the Congressional Vote: A Review of the Macrolevel Evidence," *American Journal of Political Science*, 34, 373–399.

[7] Fair, Ray C., 1978, "The Effect of Economic Events on Votes for President," *Review of Economics and Statistics*, 60, 159-173.

[8] Fair, Ray C., 1994, *Testing Macroeconometric Models*, Cambridge, MA: Harvard University Press.

[9] Fair, Ray C., 2006, "The Effect of Economic Events on Votes for President: 2004 Update."

[10] Ferejohn, John A., and Randall L. Calvert, 1984, "Presidential Coattails in Historical Perspective," *American Journal of Political Science*, 28, 127–146.

[11] Grier, Kevin B., and Joseph P. McGarrity, 2002, "Presidential Party, Incumbency, and the Effects of Economic Fluctuations on House Elections," *Public Choice*, 110, 143–162.

[12] Jacobson, Gary C., 1990, "Does the Economy Matter in Midterm Elections?" *American Journal of Political Science*, 34, 400–404.

[13] Kiewiet, D. Roderick, and Michael Udell, 1998, "Twenty-Five Years After Kramer: An Assessment of Economic Retrospective Voting Based Upon Improved Estimates of Income and Unemployment," *Economics and Politics*, 10, 219–248.

[14] Kramer, Gerald H., 1971, "Short-Term Fluctuations in U.S. Voting Behavior, 1896–1964," *The American Political Science Review*, 65, 131-143.

[15] Lynch. G. Patrick, 2002, "Midterm Elections and Economic Fluctuations: The Response of Voters Over Time," *Legislative Studies Quarterly*, 27, 265–294.

[16] Stigler, George J., 1973, "General Economic Conditions and National Elections," *The American Economic Review*, 63, 160–167.

[17] Tufte, Edward R., 1975, "Determinants of the Outcomes of Midterm Congressional Elections," *The American Political Science Review*, 69, 812–826.

[18] U.S. Department of Commerce, 1973, *Long Term Economic Growth, 1860-1970*, Washington, DC: U.S. Government Printing Office.

[19] U.S. Department of Commerce, 1975, *Historical Statistics of the United States, Colonial Times to 1970*, Washington, DC: U.S. Government Printing Office.

[20] U.S. Department of Commerce, 1978, 1986, 1988, 1990, 1994, 1997, 1998, 2001, 2002, 2004–2005, 2006, *Statistical Abstract of the United States*, Washington, DC: U.S. Government Printing Office.

[21] U.S. Department of Commerce, 1981, *The National Income and Product Accounts of the United States, 1929-1976 Statistical Tables*, Washington, DC: U.S. Government Printing Office.

[22] U.S. Department of Commerce, 1982–1983, *The National Income and Product Accounts of the United States, 1929-1976 Statistical Tables*, Washington, DC: U.S. Government Printing Office.

[23] U.S. Department of Commerce, 1992, *National Income and Product Accounts of the United States, Volume 2, 1959-1988*, Washington, DC: U.S. Government Printing Office.