Fiscal Policy in American Presidential Elections: A Simulation

Alfred G. Cuzán, Charles M. Bundrick and Richard J. Heggen

SIMULATION 2009; 85; 5
DOI: 10.1177/0037549708099938

Fiscal Policy in American Presidential Elections: A Simulation

Alfred G. Cuzán
Professor of Political Science, Department of Government, The University of West Florida
acuzan@uwf.edu

Charles M. Bundrick
Professor Emeritus, Department of Mathematics and Statistics
University of West Florida
Pensacola, FL 32514 USA

Richard J. Heggen
Professor Emeritus, Department of Civil Engineering, The University of New Mexico

In this paper a simulation technique borrowed from civil engineering is applied to American presidential elections to explore the key relationship between federal spending and incumbent reelection, represented by the fiscal model. On the one hand, as Machiavelli would have understood, an expansionary fiscal policy militates against incumbent reelection but a cutback policy facilitates it. That is the 'demand' side of the model. There is also a 'supply' side: the longer the incumbents have occupied the White House, the more likely they are to implement fiscal expansion. We simulated 1,000 elections under conditions that replicated the values of the predictor variables of the fiscal model over the 1880–2004 and 1932–2004 periods of American history. The latter period deserves attention in its own right, because starting with the 1932 election, the federal share of gross domestic product broke out of the 2–3% range for the first time since World War One. This marked a qualitative change in the role of government in the United States of America. The simulated series allow patterns that are weakly detected in the historical data to emerge more clearly for observation and analysis. The results of the simulations not only confirm the empirical findings from the historical data, but suggest that the American political system is stable, maintaining alternation between political parties in the White House, a characteristic of democracies, and keeping fiscal policy within bounds of what the majority of the voters will support.

Keywords: fiscal model, presidential elections, democracy, two-party system

1. Introduction

Drawing on previous work, this paper updates and extends a simulation of American presidential elections in which federal spending policy takes pride of place [1, 2]. The first section presents a brief summary of the fiscal model. Next, it is tested with data across 32 presidential elections held since 1880. The model is then applied to 1,000 simulated elections to see what insights may be extracted. Finally, some conclusions about what the simulation suggests about the American presidential fiscal-electoral system are offered.

SIMULATION, Vol. 85, Issue 1, January 2009 5–15

DOI: 10.1177/0037549708099938

2. The Fiscal Model: Theory

We preface our presentation by acknowledging that ours is only one of many possible representations of presidential elections. Reviewing the performance of almost 50 models of presidential elections estimated over the 1948–2000 period, Bartels and Zaller observe that "no single specification is likely to capture adequately the inferential implications in the available data in situations like the one considered here, where theory and evidence are both relatively weak" [3]. For elaboration and responses to objections or criticisms of the fiscal model see [2, 4, 5]. Like all theoretical models of complex systems, it is an attempt "to *lose* information" [6]. Accordingly, at the outset we make a number of simplifying assumptions:

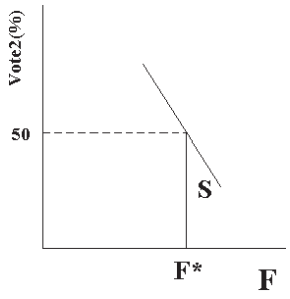

Figure 1. VOTE2 as a function of F (federal outlays/GDP)

1. *Ceteris paribus*, the outcome of the presidential election hinges on the incumbent party's fiscal policy.

2. There are only two parties, the incumbents and the opposition.

3. The election, victory or defeat for the incumbents, is decided by the popular vote, not the Electoral College. The incumbents win if they receive 50% plus 1 of the two-party vote; otherwise, they lose and the opposition assumes control of the federal budget.

These postulates may be regarded, not entirely without reason, as reductionist, unrealistic, or even counterintuitive. Against that reservation, though, we can do no better than to show, as we do presently, that the principal hypotheses derived from the model are not contradicted by the data on American presidential elections in well over a century. As W. R. Ashby says, "test by demonstration is always treated as the ultimate test, let plausibility say what it will.... The operational test is the last court of appeal" [6].

The pure fiscal model (that is, holding other electoral influences in abeyance for the moment) consists of three actors and two variables. The principals are (1) the incumbents, led by the president, who acts as the in-party's chief executive officer; (2) the opposition party; and (3) the electorate. As shown in Figure 1, the variables are F, the percent of gross domestic product (GDP) spent by the federal government, which is shown on the horizontal axis, and VOTE2, the share of the popular vote going to the president or his party's candidate, viewed along the vertical axis. A truncated support function or schedule (S) slopes down and to the right, summarizing the first of two key propositions embedded in the model: *ceteris paribus,* as the budget grows relative to the economy, the proportion of the electorate willing to renew the incumbents' lease on the White House falls. Unless otherwise noted, henceforth all allusions to increases or decreases in spending or the size of the budget need to be understood in this proportional sense, i.e. as changes in the ratio of spending to GDP.

Voters vary in their support for federal spending. In Figure 1, those located in the upper reaches of the support schedule, above the 50% plus 1 threshold, are willing to support less spending than those located well below it. In *The Second Treatise on Government*, John Locke [7] offers a rationale for a limited government, whereas in *The Social Contract* Jean Jacques Rousseau [8] envisions a more expansive role for the state. Henceforth, for convenience, we shall denote as Lockeans all voters whose spending limit has been crossed, and all others as Rousseauans. We employ these terms because they are theoretically defensible and generalizable to other times and contexts, but if the reader does not find them helpful, the more familiar 'conservative' and 'liberal' terminology may be substituted, instead. Note that only the 'middle' segment of the function is shown in Figure 1. A reader may wish to speculate what support incumbents would receive beyond either end of the interval shown, i.e. if government spent either a tiny fraction of the economy or the whole of it, or whether the function is linear or curvilinear. Niskanen [9] theorizes that the relation between spending and votes is shaped like an inverted U. That is, additional spending yields more votes to the incumbents, but only up to a point, beyond which the relation turns negative. Since he finds a negative relation between spending and votes, he concludes that government characteristically spends too much. As a practical matter, this difference is not significant. This is because, even if the relation were curvilinear, our assumption that presidents want to spend the most that is consistent with retaining control of the White House means that the budget will be set not where it maximizes votes, but where it yields enough for reelection. In other words, in both models the incumbents operate in the declining portion of Niskanen's function. These theoretical questions, however, are beyond the scope of this paper and will not be discussed further.

The negative relationship between spending and the in-party's share of the popular vote for president has an analogy with economics [10–16]. F is treated as the equivalent of a 'price' or 'fee' which Washington charges the economy for any given package of goods and services. *Ceteris paribus*, as this 'price' rises, more and more voters refuse to 'buy' another term from the governing party. Metaphorically, on Election Day the managers of the federal purse have their 'contract' up for renewal. The consent of the voters depends on the fiscal 'fee' being charged. If the amount exacted has risen since the last election, a smaller proportion of the votes are cast for the president or his party's candidate. If spending has grown beyond what a majority of the electorate is willing to support, denoted as F* in Figure 1, the incumbents are replaced. By default, fiscal policy falls in the hands of the opposition party. In this representation, then, the relationship between the electorate and the president is equivalent to an exchange, one in which fiscal policy is traded for terms in office. A presidential election is viewed as a retrospective-minded referendum on the in-party's spending record.

The other key assumption driving the fiscal model is that the goal of the incumbents is to maximize spending, subject to reelection. For the party occupying the White House, a larger budget, at least in absolute terms, is desirable for a number of reasons. A substantial share of federal outlays is a function of existing legislation, which may provide for automatic increases. Inertia dictates a certain amount of expenditure growth, at least in absolute terms. Absent shocks that would justify major changes, it takes fortitude to alter the budgetary momentum because interest groups that stand to lose with a change or reform in the law can usually rely on their allies in congress and like-minded members of the media to portray the president as mean-spirited or indifferent to the urgent needs of this or that disadvantaged group. More positively, budget growth allows the president to appease or reward supporters with larger budgets for their favorite programs or money to convert ideas into programs. Also, a president spends to reorder national priorities, bypass recalcitrant bureaucracies, accomplish some great enterprise on which to hang his legacy or, in the worst of cases, simply indulge his whims at taxpayers' expense. For a discussion of the real income derived from public office, see [17].

Even as they appreciate the advantages of a growing budget, however, the incumbents also desire to extend their tenure in office. This is analogous to Machiavelli's assumption that a prince wishes "to maintain himself in his state" [18]. Occasionally, a president may sacrifice reelection on a matter of principle, looking to history for vindication. It is assumed, though, that most chief executives (and, along with them, members of their party) derive utility from occupying the White House and, perhaps just as importantly, dread losing the next election. In a word, presidents are defeat-averse. Therefore, with an eye on reelection, they yield to bureaucrats, legislators, interest groups, and their own appetites, allowing the budget to expand, but only up to a point. That point is what they estimate is the maximum that can be spent compatible with reelection. In sum, the in-party's goal is to manage the biggest budget voters will 'buy'.

Thus, the fiscal model unites Downs' reelection-minded parties, Niskanen's budget-maximization principle, Brennan and Buchanan's fiscal Leviathan, and Riker's minimum-winning coalition strategy in the behavior of one actor, the president [9, 19–21]. However, in our view presidents do not maximize votes, or the probability of reelection, or revenues. Instead, they maximize spending, subject to a reelection constraint. They want to spend the most that is consistent with winning another term for themselves or their party. Hence, as shown in Figure 1, in a two-party system the budget expands until it reaches F*. This is the point where the support function S intersects the 50% plus 1 of the two-party vote, the margin required for victory. F* is the equilibrium level of expenditures. It is the most that government can spend without the president or his party's candidate losing the next election. At F* the size of the federal budget (again, relative to the economy) is equal to that to which a bare majority of the voters will consent. In the words of our exchange metaphor, it is the maximum fiscal fee that the incumbents can charge without their being evicted from 1600 Pennsylvania Avenue.

Since it splits the electorate in two, F* belongs to the median voter, as in other rational choice models [22]. At levels of F smaller than F*, there being more Rousseauans than Lockeans, the governing party can allow or promote additional spending, and still win another term. If the budget grows beyond F*, however, Rousseauans being in the minority, the incumbents are voted out. If the new president cuts spending back to or below F*, he is reelected; if not, his bid for reelection is rejected. The process continues in cyclical fashion until the budget is brought into compliance with what a majority of the voters will support.

Just as in economic theory the equilibrium price clears the market, solving the problem of how much of a particular commodity to produce, so in the model F* solves the budget problem, answering the question of how much the federal government should spend. At the equilibrium price, the quantity demanded by consumers and the quantity supplied by sellers are in balance or at rest. Similarly, at F* the relative size of the federal budget coincides with what just over half of the voters support. At F* the president and a bare majority of the electorate are in agreement as to how much Washington should spend. This point is stable. Deviations from F* are self-correcting, with presidents adjusting expenditures in response to election returns.

It goes without saying that F* is a theoretical point, one arrived at deductively, given the premises of the pure fiscal model (which we have already allowed is 'reductionist'). As a practical matter, the fiscal-electoral process is never quiescent or stagnant. If this representation is valid, F* is not so much a place of rest as a gravitational point, one to which the system would tend to converge. It is hypothesized that the American fiscal-electoral system strives for equilibrium, the steady state being bounded by a range of values consistent with its survival as a democracy. However, differences between voters and presidents over fiscal policy need to reach some critical magnitude for the latter to be displaced from the White House. What this critical value is will be specified in the next section.

As with the demand schedule, the support function is not static. It may shift forward, toward greater support or tolerance for expenditures on the part of the electorate, or backward, toward greater resistance to budgetary growth. This is shown in Figure 2. Assume the starting point to be F_1* in period t1. Assume, also, that in the next period the electorate, placing a higher value on federal goods and services, is now willing to support more spending. This is represented by a forward shift in the support function, from S_1 to S_2, where it intersects the 50% plus 1 threshold of victory at a higher value of F than was originally the case. This results in the reelection of the incumbents

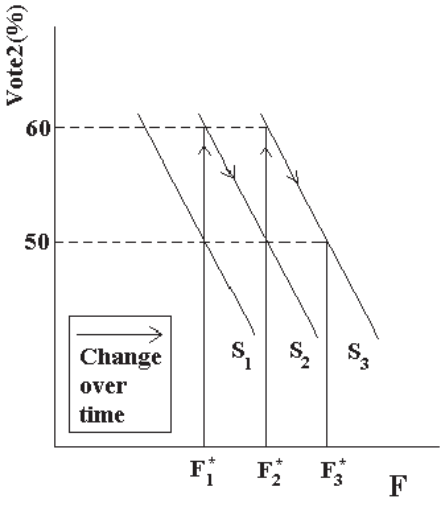

Figure 2. Shifting support for federal spending

with, say, 60% of the two-party vote. Flushed with what in the USA is a landslide victory, the incumbents implement an expansive expenditure program. As spending increases, VOTE2 falls, to 50% plus 1, at F_2*. This fiscal expansion may take place over one or more terms, depending on the audacity of the governing party. Thus, to say that the support function shifts forward, toward a higher level of F, is to say that a change in public opinion has occurred so that, at the time the incumbents win a landslide victory, but before spending has increased in response, a certain proportion of the electorate that was previously Lockean has become Rousseauan, willing to support a larger budget. However, once expenditures rise to accommodate the new demand, their desire for additional expenditures becoming satiated, the erstwhile Rousseauans turn Lockean again. The two categories of voters are once again in balance or at rest at a new equilibrium point, F_2*. With a different model, Erikson, Mackuen and Stimson [23] conjecture a similar homeostatic quality in the American political system, one where policies follow or anticipate changes in public opinion in a conservative or liberal direction; in turn, the electorate's mood responds to changes in policy, becoming less conservative or less liberal as government enacts additional laws of one or the other type, as the case may be.

If the process is repeated, either periodically, in big steps, or incrementally, with smaller, successive forward shifts in the support function, F* migrates toward higher levels over time. Conceivably, the process could occur in a reverse direction, with backward shifts in the support function causing F* to fall back, e.g. from F_3* to F_1*. This would be the case if public opinion had changed in a Lockean direction, toward less support for spending. Now a greater proportion of voters than previously will not consent to the incumbents remaining in the White House unless the budget is reduced. If that were not done, on Election Day, F would exceed F*, the in-party would be defeated, the opposition would take control, and if spending were not cut it, too, would be voted out, and so on until a new president, having figured out what was needed fiscally to emerge victorious, implemented the desired fiscal cutback. F*, then, is the outcome of a dynamic process.

With Figure 2 we demonstrate two things. Firstly, that forward shifts in the support function, toward higher levels of spending, whatever their ultimate causes, do not violate the assumption of a negative relationship between F and VOTE2. Secondly, that the model provides for a political process for converting shifts in voter attitudes toward spending into fiscal policy. On the one hand, presidents trade support above the 50% plus 1 of the vote minimum to stay in office for a larger federal budget. On the other hand, a defeat of the incumbents signals that a shift of fiscal policy into reverse gear is in order.

Recapitulating: The pure fiscal model consists of two primary actors, the electorate and the president or, if he is not running for reelection, his party's candidate, and a secondary player, the opposition party. The model is graphically represented with a fiscal-electoral map displaying a truncated continuous support function, the points showing the proportion of voters who consent to the federal government spending any given percent of GDP, denoted by F. Voters are distributed along this downward sloping schedule so that, with every increase in the federal budget relative to the economy, a progressively smaller proportion of them are willing to grant the in-party another term. In effect, as outlays grow, support for the president evaporates. Theoretically, the equilibrium budget size, denoted by F* in Figure 1, is located where the support function crosses the 50% plus 1 threshold needed for reelection. This is the maximum that the incumbents can spend and still keep their lease on the White House. Beyond F* they are defeated. Just short of it, they win another term. For their part, presidents are expenditure maximizers, subject only to one constraint: continuing occupancy of the White House for themselves or their party. They will increase spending, trading votes for a bigger budget but, being defeat-averse, they will approach F* gingerly. Nevertheless, with every additional victory the incumbents become bolder, so that the probability that fiscal policy will exceed what a majority of the electorate will consent to increases. The longer a party occupies the White House, the more likely fiscal policy will overshoot the mark. (Erikson, Mackuen and Stimson [23] also hypothesize that elected officials will overshoot the mark, feeding more liberal or conservative policies to the electorate than it originally asked for, which results in their defeat and a change of party in the government.) This will cost the in-party the next election. Their defeat is interpreted as a cautionary tale by the opposition. Upon taking office, the new president is motivated to trim the budget. If he does so, he is reelected. After one or two election victories, once again the incumbents begin to push the fiscal envelope, are

Table 1. Variable definitions and measurements

Variable	Definition and measurement
VOTE2	Percent of the two-party vote won by the incumbent party candidate, except that in the 1924 election Fair assigned 23% of the Lafayette vote to President Coolidge and the rest to the Democratic candidate [25]
ELECT	1 if VOTE2 > 50% (victory) –1 if VOTE2 < 50% (defeat)
FISCAL	Fiscal policy: expansionary (+1) or cutback (–1): 1 if F1 > 0 *and* F2 ≥ 0 –1 otherwise
F	(Federal Outlays/GDP*) × 100 * gross national product before 1964
F1	Arithmetic change in F between elections, dF/dt mathematically, where t is time as measured in elections
F2	Arithmetic change in F1 between elections, d^2F/dt^2 mathematically
GROWTH	The "growth rate of real per capita GDP in the first three quarters of the election year (annual rate)" [25]
ALLNEWS	The "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% at an annual rate" [25]. Unlike Fair, who zeroes out this variable in 1920, 1944, and 1948, we make no such adjustment to the data
TERMS	Number of consecutive TERMS the party occupying the White House has been in office at a given election
TERMSA	0 if TERMS = 1 1 if TERMS > 1
REIGN	A series of consecutive terms in office by the same party
PARTY	1 if the Democrats occupy the White House –1 if the Republicans are the incumbents

defeated, and the cycle completes another revolution. In this way, presidential election outcomes and federal fiscal policy are reciprocally related in a self-regulating system [24].

3. The Fiscal Model: Evidence

Figure 3 displays the empirical relationship between F, viewed along the vertical axis, and victory (white dots) or defeat (black dots) in the two-party vote for president (ignoring the Electoral College) across 32 presidential elections held since 1872. The height of the line connecting the dots, 'the F-line', tracks the ratio of federal outlays to GDP. At first glance, there appears to be no relationship between this ratio and election outcome. Incumbents are returned to the White House at any value of F (recall Figure 2). However, examining the *turns* of the F-line, a relationship emerges. Most of the time, clockwise turns, generally representing decreases or decelerations in the growth of spending, are associated with victory in the two-party vote for president. By contrast, counter-clockwise turns, generally describing increases in spending, coincide with defeat.

These turns in the F-line are quantified by the variable FISCAL. It is derived from the slope and curvature of the F-line over time. FISCAL takes two values, expansionary (+1) or cutback (–1). (See Table 1 for specification of this and all other variables included in the analyses presented in this paper.) Theoretically it could take the value of zero, representing a steady-state fiscal policy, but historically this has never happened (Table 2).

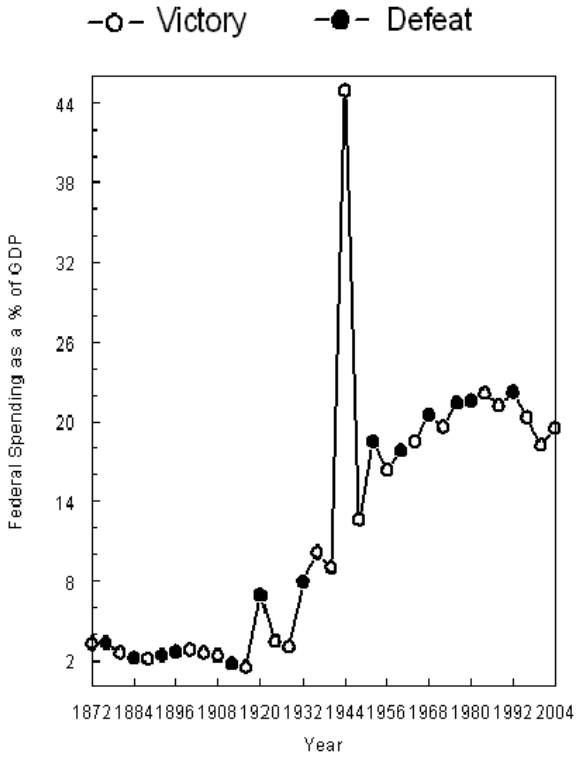

Figure 3. Elect by F, 1872–2004

Table 2. Data appendix

Year	FISCAL	TERMS	GROWTH	ALLNEWS	PARTY	VOTE2	ELECT
1880	–1	5	3.879	9	–1	50.22	1
1884	–1	6	1.589	2	–1	49.846	0
1888	–1	1	–5.553	3	1	50.414	1
1892	1	1	2.763	7	–1	48.268	0
1896	–1	1	–10.024	6	1	47.76	0
1900	–1	1	–1.425	7	–1	53.171	1
1904	–1	2	–2.421	5	–1	60.006	1
1908	–1	3	–6.281	8	–1	54.483	1
1912	–1	4	4.16	8	–1	54.71	0
1916	–1	1	2.229	3	1	51.682	1
1920	1	2	–11.463	5	1	36.119	0
1924	–1	1	–3.872	10	–1	58.244	1
1928	–1	2	4.623	7	–1	58.82	1
1932	1	3	–14.557	4	–1	40.841	0
1936	–1	1	11.677	9	1	62.458	1
1940	–1	2	3.611	8	1	54.999	1
1944	1	3	4.433	14	1	53.774	1
1948	–1	4	2.858	5	1	52.37	1
1952	1	5	0.84	6	1	44.595	0
1956	–1	1	–1.394	5	–1	57.764	1
1960	1	2	0.417	5	–1	49.913	0
1964	–1	1	5.109	10	1	61.344	1
1968	1	2	5.07	7	1	49.596	0
1972	–1	1	6.125	4	–1	61.789	1
1976	1	2	4.026	4	–1	48.948	0
1980	–1	1	–3.594	5	1	44.697	0
1984	1	1	5.568	8	–1	59.17	1
1988	–1	2	2.261	4	–1	53.902	1
1992	1	3	2.223	2	–1	46.545	0
1996	–1	1	2.712	4	1	54.736	1
2000	–1	2	1.603	7	1	50.265	1
2004	1	1	2.9	2	–1	51.24	1
mean	–0.31	2.13	0.62	6.03	–0.13	52.27	0.63
SD	0.96	1.39	5.54	2.71	1	6.07	0.49

Notes: In 1912, the incumbent Republicans split between the sitting president, Taft, and his predecessor, Theodore Roosevelt. Following Fair [25], we have combined the votes of the two candidates, but we still call the 1912 election a defeat. Since the models were estimated and the simulations done, Fair updated his data series, which accounts for slight discrepancies between what appears in this table and his website. They made for trivial differences in the model estimates displayed in Table 4.

In Table 3 we show the bivariate relationship between fiscal policy, measured by FISCAL, and ELECT, or election outcome, i.e. victory or defeat for the incumbents in the popular vote for president (again, ignoring the Electoral College). The table is broken down into two periods, 1880–2004 and 1932–2004. (Although they conform to the hypothesis, we omit the 1872 and 1876 elections from Table 3 because for the rest of the paper we use as controls the economic data series provided by Fair, which begins in 1880 [25].) As shown in Figure 3, in the latter period F broke out of the 2–3% range to which it had been confined in prior years (except in 1920, when the fiscal effects of World War One were still being felt) and so we expect a different dynamic to have been at work during that time. In both periods, the relationship is strong and statistically significant, with almost 80% of all cases behaving as expected.

As well as accounting for ELECT (victory or defeat in the popular vote), FISCAL also has an effect on the actual per cent of the two-party vote going to the incumbents. This is shown in Table 4, which displays several multiple regression Ordinary Least Squares (OLS) models. In the

Table 3(a). Victory or defeat in the popular vote for president by fiscal policy, 1880–2004

	FISCAL		
	Cutback	Expansionary	Total
Victory	17	3	20
Defeat	4	8	12
Total	21	11	32

Percent correctly predicted: 78%
ρ = 0.006 (Fisher's exact test).

Table 3(b). Victory or defeat in the popular vote for president by fiscal policy, 1932–2004

	FISCAL		
	Cutback	Expansionary	Total
Victory	9	3	12
Defeat	1	6	7
Total	10	9	19

Percent correctly predicted: 79%
ρ = 0.0198 (Fisher's exact test).

first model, VOTE2 is regressed on FISCAL. Note that the relationship is negative: a switch in fiscal policy from cutback to expansionary costs the incumbents 8% of the two-party vote. (FISCAL ranges from –1 (cut-back) to 1 (expansionary) (recall Table 1) so to estimate its effect on VOTE2 one multiplies its coefficient by two.) In the next column, the same model is estimated over the 1932–2004 period. Even as F multiplied sevenfold, from 3% to over 20% of GDP, here again fiscal expansion cost the incumbents six points in the two-party vote.

The next three columns show the modeling effects of controlling for two economic measures, GROWTH and ALLNEWS, tenure in the White House, and the incumbents' party. Note that we used two different variables for measuring tenure: TERMS in 1880–2004 and TERMSA in the 1932–2004 period. This is because the latter measure, used by Abramowitz in one of the better-performing presidential elections forecasting models, makes for a better model fit in the later period, although without disturbing the other coefficients (compare the two far-right columns in Table 4) [26]. Even after introducing the aforementioned controls, the penalty for an expansionary policy is still about 6% of the two-party vote. For a slightly different specification of the model, estimated over the 1916–2004 period, which was used to forecast the outcome of the 2004 presidential election, see [5].

Table 5 displays the relationship between the number of consecutive terms in the White House and fiscal policy over the 1932–2004 period, when, as we have seen, F broke out of the 2–3% range within which it had been confined, except during World War One. As expected, the longer the in-party has occupied the White House, the more likely it has been to implement fiscal expansion. The relationship is weak but in the expected direction. No such relation emerges over the entire data series. Finally, Table 6 shows that there is no statistically significant difference between the parties on fiscal policy. This is consistent with our assumption that incumbents have the same motivation (regardless of party). Ironically, the distribution (which, again, is not statistically significant) suggests that, if anything, it is Republicans who have implemented fiscal expansion more often. This runs contrary to conventional wisdom.

In this section we have shown that data on voting and spending over the last one and a quarter century are consistent with the hypotheses of the fiscal model. In general, voters appear to punish fiscal expansion. For their part, since 1932 incumbents display a general tendency to spend more the longer they have held on to the presidency.

4. The Fiscal Model: A Simulation

In this section we update and extend a simulation of the fiscal model of presidential elections performed previously [1, 2]. Prior examples of simulations of American presidential elections include Alesina and Rosenthal [27] and Erikson et al. [23]. Our purpose is to see what additional insights we can extract from the fiscal model by observing its operation over a long series of simulated 'elections'. We wish to find answers to the following questions: Does the relation between time in the White House and fiscal policy displayed in Table 5 hold? What would happen if the incumbents consistently pursued a cutback policy or, alternatively, an expansionary policy?

Our political simulation has its roots in the field of water resources systems engineering, a discipline in which the interactive complexities of the hydrologic process preclude simplistic, explicit deterministic solutions [28]. As in hydrology, the simulation of the fiscal model is designed to duplicate the historical statistical distribution of correlates and outcomes. The simulation is built in successive steps. At every step, each variable is estimated on the basis of one or more variables and an error term, the coefficients and the variance being derived from the respective historical period used to calibrate the simulation structure. The 'correct' sequence is not obvious. There is some arbitrariness involved in the process of construction. Following the theoretical model and the empirical findings presented in previous sections, we chose first to determine the spending policy of the incumbents. We did this by estimating the value of FISCAL from TERMS, plus a normalized error, the magnitude of which is drawn from the historical data. Next, we estimated GROWTH as a function of FISCAL, plus TERMS, plus a normalized error. Then ALLNEWS was made dependent on the values of FISCAL, TERMS, and GROWTH, plus a normalized error. As in the fiscal model, VOTE2 is the ultimate dependent variable, a function of the previous four variables plus a

Table 4. VOTE2 by FISCAL alone and FISCAL plus controls, 1880–2004 (standard error in parenthesis)

VARIABLE	1880–2004	1932–2004	1880–2004	1932–2004	1932–2004
FISCAL	–3.18 (0.99)	–3.02 (1.26)	–2.96 (0.57)	–3.00 (0.72)	–2.78 (0.56)
GROWTH	–	–	0.57 (0.10)	0.65 (0.13)	0.63 (0.10)
ALLNEWS	–	–	0.59 (0.21)	0.96 (0.26)	0.99 (0.21)
TERMS	–	–	–1.38 (0.39)	–0.82 (0.62)	–
TERMSA	–	–	–	–	–3.19 (1.06)
PARTY	–	–	–1.94 (0.55)	–3.02 (0.84)	–3.07 (0.63)
INTERCEPT	51.28 (0.99)	52.42 (1.26)	50.08 (1.60)	47.09 (2.21)	47.16 (1.45)
Standard Error of the Estimate (SEE)	5.32	5.46	3.01	2.44	1.99
In-Sample Call Ratio (%)*	81	79	88	84	95
Adj. R square	0.23	0.21	0.75	0.84	0.90
D.W.	2.31	2.58	2.17	2.32	1.93
1st order auto-corr.	–0.17	–0.37	–0.15	–0.19	0.002
N	32	19	32	19	19

* Call Ratio = percent of elections correctly predicted.

normalized error. The parameters of the simulation, then, were calculated in a step-by-step sequence leading up to a full model for estimating the outcomes of 1,000 simulated elections.

The model is of the general linear form:

$$x2 = C1 + fx3 + N(0, i)$$

$$x1 = C2 + dx2 + ex3 + N(0, h)$$

$$y = C3 + ax1 + bx2 + cx3 + N(0, g)$$

where constants C_1–C_3 and coefficients a–f are linearly fit utilizing OLS and g, h, and i are variances of zero-mean, normally-distributed error terms.

Specifically, the four-step model employing coefficients regressed from 1880–2004 data is as follows:

Step 1: FISCAL = –0.4286 + 0.0546 TERMS + N (0, 0.9566)

Step 2: GROWTH = 0.3000 – 0.3451 FISCAL + 0.1007 TERMS + N (0, 32.6348)

Step 3: ALLNEWS = 5.9309 + 0.1162 GROWTH – 0.1230 FISCAL – 0.0049 TERMS + N (0, 7.6222)

Step 4: VOTE2 = 50.1364 + 0.5910 ALLNEWS + 0.5662 GROWTH – 2.9512 FISCAL – 1.3820 TERMS – 1.9431 PARTY + N (0, 9.0966)

The simulated values for FISCAL, GROWTH, and ALLNEWS generated by this procedure were largely influenced by a random process replicating the spread of the historical data. In effect, it is as if the randomness built into the simulation procedure generated a 'sample' of observations fitting, as closely as possible, the historical data pattern. In Table 7 the historical and simulated means and variances of the variables making up the fiscal model are displayed. No statistically significant differences between the two sets are observable. Neither is there a statistically significant difference between the historical and simulated distributions of party reign, as shown in Table 8. (A party reign is a series of consecutive terms in the White House by presidents of the same party. For example, in 1944 Franklin D. Roosevelt was elected to the fourth of what turned out to be a five-term reign for the Democrats. This was the longest party reign in the 20th century and the second-longest since the present two-party system came into being in the 1860s). We conclude that our procedure for simulating the historical distribution of outcomes was successful.

Table 5. FISCAL by consecutive TERMS in the White House 1932–2004

FISCAL	TERMS					Total (N = 19)
	1	2	3	4	5	
–1	6	3	–	1	–	10
1	2	3	3	–	1	9

Somer's d = 0.33, ρ = 0.04 (FISCAL dependent); ρ = 0.1296 (Fisher's exact test).

Table 6. FISCAL by PARTY, 1932–2004

FISCAL	PARTY		Total (N = 19)
	Republicans (N = 9)	Democrats (N = 10)	
–1.00	3	7	10
1.00	6	3	9

Somer's d = 0.31, ρ = 0.15 (FISCAL dependent); ρ = 0.1789 (Fisher's exact test).

Table 7. Variable means and variances: simulated and historical (1880–2004)

	Simulation		History (1880–2004)	
Variable	Mean	Variance	Mean	Variance
FISCAL	–0.298	0.912	–0.313	0.931
GROWTH	0.667	31.906	0.622	30.652
ALLNEWS	6.090	7.972	6.031	7.322
PARTY	–0.206	0.959	–0.125	1.016
TERMS	2.268	1.0	2.125	1.919
VOTE2	52.21	38.33	52.27	36.86

Note: T-tests show that there are no statistically significant differences between the simulated and the historical variable means.

Table 8. Frequency of reign, simulated and historical

	Simulation		History (1880–2004)	
REIGN	Frequency	Per cent (%)	Frequency	Per cent (%)
1	94	25.5	4	28.57
2	91	24.7	5	35.71
3	80	21.7	2	14.29
4	55	14.9	1	7.1
5	29	7.9	1	7.1
6	16	4.3	1	7.1
7	1	0.3	0	0
8	2	0.5	0	0
Total	368	100	14	100
TERMS/ Reign	2.72		2.50	

Note: The difference between the simulated and historical distributions is not statistically significant.

Table 9. Effects of FISCAL on length of reign

	Simulating FISCAL = 1		Simulating FISCAL = –1	
REIGN	Frequency	Per cent (%)	Frequency	Per cent (%)
1	229	47.4	33	12.6
2	148	30.6	40	15.3
3	68	14.1	49	18.8
4	27	5.6	42	16.1
5	11	2.3	44	16.9
6	0		28	10.7
7	0		16	6.1
8	0		9	3.4
Total	483	100	261	100
TERMS/ Reign	1.85		3.83	

Note: The difference between the two simulated distributions is statistically significant (Fisher's exact test, $\rho = 0.00001$).

In Table 9 we compare two simulated distributions of party reigns generated by opposite fiscal policies. The distribution on the left is obtained by simulating an invariant policy of fiscal expansion. Term after term, FISCAL = 1. The distribution on the right results from repeatedly pursuing a cutback policy. FISCAL = −1 all the time. These policy opposites have radically different electoral consequences. Were the incumbents always to pursue the expansionary policy, almost half of them would be defeated after only one term. Nearly 80% of the reigns would be exhausted after three terms. The average party reign would be 1.85 terms (versus the historical 2.21). By contrast, almost 90% of incumbents consistently implementing a cutback policy would make it past the first term, and more than half of party reigns would exceed three terms. The average length of party reign would be 3.83 terms. This is twice the number of terms yielded by the expansionist policy and one to two additional terms compared to history. Thus, if incumbents were interested solely in maintaining themselves in office, presumably they would consistently implement a cutback policy. However, historically they have not behaved this way. Instead, they have pursued fiscal expansion about a third of the time, a policy that has cost them the White House in all but three cases (recall Table 3(a)). Why?

Perhaps it is because, as assumed in the fiscal model, the motivation of presidential incumbents is not to be reelected, *per se*, but to spend the most that is consistent with reelection. We saw in the previous section (recall Table 5) that since 1932 incumbents have become bolder with the budget the longer they have been in the White House. As shown in Table 10, the mean value of FISCAL in the 'terminal term,' goes up the longer the party reign. Whereas no consistent trend for any other variable is observed, FISCAL rises across reigns of increasing duration in both history and the simulation. Thus, it could very well be that in testing the electorate's fiscal limits, incumbents frequently exceed it. This could be by sheer accident or loss of control (i.e. mismanagement). Or, at least some of the time, the incumbents may come to believe that through exemplary political leadership they can shift the support function forward, toward higher levels of F. Considering that on average they will be back in the White House after two terms (mean of TERMS is 2.13, see Table 2), it may well be a gamble they think is worth taking.

Thus, there appears to be a tendency for fiscal policy to be restrained at first but to become expansionary with every additional term in office. Historically, starting with 1932, in the terminal term of a party reign the value of FISCAL has grown monotonically from the end of one party reign to the next, rapidly rising from presidents in the first, second, third, etc. term of a party reign and flattening out after that. But with so few reigns, and the fact that there was no four-term reign during this period, it would be easy to dismiss this trend as unreliable. With

Table 10. Mean terminal term by reign, simulated and historical

REIGN	VARIABLE	SIMULATION	HISTORY
1	FISCAL	0.07	–1.0
	GROWTH	–2.27	–3.59
	ALLNEWS	4.48	5
	VOTE2	45.73	44.7
2	FISCAL	0.65	0.5
	GROWTH	–1.92	2.78
	ALLNEWS	4.40	5.75
	VOTE2	43.95	49.69
3	FISCAL	0.67	1.0
	GROWTH	–2.36	–6.17
	ALLNEWS	3.85	3
	VOTE2	44.36	43.69
4[a]	FISCAL	0.73	N.A.
	GROWTH	–3.16	N.A.
	ALLNEWS	4.40	N.A.
	VOTE2	44.22	N.A.
5[b]	FISCAL	0.82	1.0
	GROWTH	–3.06	0.84
	ALLNEWS	4.36	6
	VOTE2	46.02	44.59

Notes: [a] There is no four-term reign in the 1932–2004 period; [b] There is only one five-term reign (1932–1952) in the 1932–2004 period.

more observations obtained with the simulation, however, the functional relationship between the two variables becomes smoother, the gaps being filled in and the wrinkles ironed out. What the relationship suggests is that in their first term in the White House incumbents put reelection first but, once in their second or third term, it is as if the hunger to spend outweighed the desire for reelection, particularly when it is not the president himself who faces the risk of being humiliated in defeat. Ironically, constitutionally prohibiting a president from serving more than two full consecutive terms may well have removed an incentive for spending restraint.

5. Conclusion: A Self-Regulating System?

Together, the empirical findings and the results of the simulations presented in this paper point to feedback behavior that is akin to those familiar to natural scientists, engineers, and social scientists [29, 30]. Abstracting from economic conditions, in Figure 4 we observe two circuits running from TERMS to VOTE2, one directly and the other through FISCAL. As in all self-regulating systems, both circuits are negative. The first circuit runs from TERMS to VOTE2. With every additional term in office, the likelihood of incumbent party defeat rises regardless of fiscal policy or economic conditions. There is progressive erosion in support for the incumbents no matter how well they behave fiscally or how healthy the economy is. The fiscal model includes a second feedback loop, this one running from TERMS to FISCAL and thence to VOTE2. The longer incumbents remain in office, the more likely the president is to switch to an expansionary fiscal policy. Absent a popular war (as in 1944), or exceptionally good economic growth (as in 1984), this decision almost invariably guarantees defeat. Therefore, time in the White House appears to work against reelection in two ways: firstly, by causing voter 'fatigue' with the incumbents; and secondly, by inducing the latter to increase spending, which in turn leads the electorate to vote them out. The former effect is well established in the literature [25, 26]. To the best of our knowledge, we are the first to identify the operation of the second feedback loop, going from TERMS to FISCAL and thence to electoral defeat.

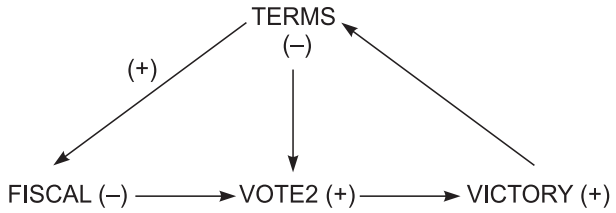

Figure 4. Feedback Loops in the Fiscal Model

The two feedback loops suggest a fiscal-electoral cycle. Again abstracting from economic conditions, assume that a president in the first term of his party's reign adopts a cutback policy. He is rewarded with reelection. In the second term, the president can stick to that policy or switch to an expansionary mode. Assume, for the moment, that the incumbents stay the fiscal course in the second and subsequent term. (This is the policy simulated in the far right-hand column of Table 9.) With every additional term in office, voters grow increasingly tired of them. The incumbents' margin of victory becomes progressively smaller, until they lose the next election. Since 1932, however, incumbents have not restrained their spending indefinitely. Rather, the longer they remain ensconced at the White House, the more likely they have been to turn toward fiscal expansion. This almost invariably results in their defeat, a new president is elected, and the cycle begins anew.

Both feedback loops militate against monopolization of the White House by either party. Their combined effect is to maintain a two-party system in which Democrats and Republicans take turns every two to three terms, splitting almost equally the time the office has been occupied since 1880. (The mean value of PARTY over the 1880–2004 period is –0.13, or very close to 0. In other words, the data series is almost equally divided between Republican (–1) and Democratic (+1) administrations.)

These processes preserve the stability of the two-party system, something observed throughout American history and, most importantly, alternation in office, without which the system would hardly qualify as a democracy [31, 32].

If the simulation is a valid representation of political reality, the American presidential fiscal-electoral system behaves intelligently [33, 34], seeking to maintain within limits what, following Ashby, may be regarded as its 'essential variables' [24]. One is a competitive two-party system. The other is the rate of spending growth, which keeps the federal budget from absorbing the entire economy. The system is stable and self-regulating.

6. References

[1] Cuzán, A. G., R. J. Heggen, and C. M. Bundrick. 2000. Fiscal policy, economic conditions, and terms in office: simulating presidential election outcomes. In *Proceedings of the World Congress of the Systems Sciences and ISSS International Society for the Systems Sciences*, 44th Annual Meeting, July 16–20, Toronto, Canada.

[2] Cuzán, A. G., R. J. Heggen, and C. M. Bundrick. 2003. *Voters and Presidents: A Fiscal Model,* Xlibris, Philadelphia.

[3] Bartels, L. M. and J. Zaller. 2001. Presidential Vote Models: A Recount. *PS: Political Science and Politics* XXXIV(1), 9–23.

[4] Cuzán, A. G. and C. M. Bundrick. 2004. Fiscal effects on presidential elections: a forecast for 2004. Presented at the Annual Meeting of the American Political Science Association.

[5] Cuzán, A. G. and C. M. Bundrick. 2005. Deconstructing the 2004 Presidential Election Forecasts: The Fiscal Model and the Campbell Collection Compared. *PS: Political Science and Politics* 38(April), 255–262.

[6] Ashby, W. R. 1970. Analysis of the system to be modeled. In R. W. Ashby et al., *The Process of Model Building in the Behavioral Sciences*, Ohio State University Press, Columbus, 94–114.

[7] Locke, J. 1980. *The Second Treatise of Government*. Hackett, Indianapolis.

[8] Rousseau, J. 1968. *The Social Contract*. New York, Penguin Books.

[9] Niskanen, W. A. 1975. Bureaucrats and politicians. *The Journal of Law and Economics*, XVIII(3), 617–643.

[10] Morris, W. T. 1970. On the Art of Modeling. In R. M. Stogdill (ed.), *The Process of Model-Building in the Behavioral Sciences*, Ohio State University Press, Columbus, 76–93.

[11] Black, D. 1950. The unity of political and economic science. *The Economic Journal*, LX, 506–514.

[12] Katzner, D. W. 1969. Political structure and system and the notion of logical completeness. *General Systems*, XIV, 169–171.

[13] Katzner, D.W. 1992. *The Walrasian vision of the microeconomy. An elementary exposition of the structure of modern general equilibrium theory*. University of Michigan Press, Ann Arbor.

[14] Pribram, K. 1953. Patterns of economic reasoning. *The American Economic Review*, XLIII, 243–258.

[15] Russett, C. E. 1966. *The concept of equilibrium in american social thought*. Yale University Press, New Haven.

[16] Sebba, G. 1953. The development of the concepts of mechanism and model in physical and economic thought. *The American Economic Review*, XLIII(May), 259–268.

[17] Hood, C. 1992. Looking after number one? Politicians, rewards and the economics of politics. *Political Studies*, XL(2), 207–226.

[18] Machiavelli, N. 1997. *The Prince*. Translated and edited by A. M. Codevilla, Yale University Press, New Haven.

[19] Downs, A. 1957. *An economic theory of democracy*. Harper, New York.

[20] Brennan, G. and J. M. Buchanan. 1980. *The power to tax. Analytical foundations of a fiscal constitution*. Cambridge University Press, Cambridge.

[21] Riker, W. H. 1962. *The theory of political coalitions*. Yale University Press, New Haven.

[22] Wittman, D. A. 1995. *The Myth of Democratic Failure. Why Political Institutions are Efficient*, University of Chicago Press, Chicago.

[23] Erikson, R. S., M. B. Mackuen, J. A. Stimson. 2002. *The Macro Polity*. Cambridge University Press, New York.

[24] Ashby, W. R. 1960. *Design for a Brain. The Origin of Adaptive Behavior*. John Wiley & Sons, New York.

[25] Fair, R. C. 2002. The effect of economic events on votes for president: 2000 update. Available: http://fairmodel.econ.yale.edu

[26] Abramowitz, A. I. 2004. When good forecasts go bad: the time-for-change model and the 2004 election. *PS: Political Science and Politics,* 37, 745–746.

[27] Alesina, A. and H. Rosenthal. 1995. *Partisan Politics, Divided Government, and the Economy*. Cambridge University Press, Cambridge.

[28] Mays, L. W. 1997. *Optimal Control of Hydrosystems*, M Dekker, New York.

[29] Richardson, G. P. 1991. *Feedback Thought in Social Science and Systems Theory*, University of Pennsylvania Press, Philadelphia.

[30] Easton, D. 1965. *A Systems Analysis of Political Life*, John Willey & Sons, Chicago.

[31] Sellers, C. 1965. The Equilibrium Cycle in Two-Party Politics. *The Public Opinion Quarterly*, 29(1), 16–38.

[32] Przeworski, A., M. E. Alvarez, J. A. Cheibub, and F. Limongi. 2000. *Democracy and Development; Political Institutions and Well-Being in the World, 1950–1990*, Cambridge University Press, New York.

[33] Shenhar, A. 1990. On System Properties and Systemhood. *International Journal of General Systems*, 18(2), 167–174.

[34] Ashby, W. R. 1981. What is an Intelligent Machine? In R. Conant, (ed.), *Mechanisms of Intelligence. Ashby's Writings on Cybernetics*, Intersystems Publications, Seaside, CA.

Alfred G. Cuzán *is Professor of Political Science at the University of West Florida. In 2004, together with J. Scott Armstrong (The Wharton School) and Randall J. Jones, Jr. (University of Central Oklahoma), he developed the Pollyvote, an application of the combination principle to presidential election forecasting.*

Richard J. Heggen*, Professor Emeritus of Civil Engineering, University of New Mexico, is currently on the faculty of the Institute for Water and Watersheds, Oregon State University, and was recently Visiting Professor, Institute of Engineering, Tribhuvan University, Kathmandu, Nepal.*

Charles M. Bundrick*, Professor Emeritus of Mathematics and Statistics, University of West Florida, is the author or co-author of numerous publications, including half a dozen on American presidential elections.*