Candidate Motivation: A Synthesis of Alternative Theories

DONALD WITTMAN
University of California, Santa Cruz

A formal model of electoral behavior is developed under the assumption that candidates have policy preferences as well as an interest in winning per se. This model is shown to have an equilibrium in a k*-issue space when there are two candidates. The implications of this model are compared to the implications of the Downsian-type model where candidates are interested only in winning. Testable propositions are derived via the use of comparative statics. The results of recent studies are shown to coincide with the synthesis model but not the pure Downsian model.*

The theoretical model bridges the gap between formal theory and empirical research and unifies a variety of seemingly unrelated studies.

The predominant view in the formal literature on electoral equilibrium has been that candidates view policy as a means to winning. Hotelling (1929), Smithies (1941), Schumpeter (1950), Downs (1957), Kramer (1977), and the articles by Hinich (1977), Hinich and Ordeshook (1970), and Hinich, Ledyard, and Ordeshook (1972) all assume that candidates maximize votes or plurality.[1] On the other hand, the formal literature that assumes that candidates view winning as a means to policy is almost nonexistent and not highly developed.[2] The first objective of this article is to develop this latter approach and to compare its results to those of the Downsian-type model (where candidates are only interested in winning). The second objective is to synthesize the two approaches by presenting a formal model of electoral competition where the candidates value both policy and outcome per se. After all, in the real world candidates are both office oriented and issue oriented, and it is important to know what happens when candidates have these complex goals. The third objective is to develop empirical hypotheses. Almost all of the literature has been devoted to the important and fundamental question of the existence or nonexistence of an equilibrium. As a result, the research on formal models has been almost devoid of empirical content. The major empirical result has been that if an equilibrium exists, plurality maximizing candidates will be at the median voter's most preferred position.[3] In this article, I intend to counter this trend by deriving a series of hypotheses capable of being tested. A fourth objective is to integrate a large body of seemingly unrelated empirical literature based on relatively ad hoc hypotheses into a unified whole. The formal theory provides the intellectual glue by explaining the underlying relationships among the disarray of facts known about the political process. The final goal of this article is to integrate theory and empirical work. With few exceptions, nearly all the empirical literature considered here is almost completely divorced from earlier developments in the formal theory of candidate behavior. By showing the formal model's relevance to existing empirical studies and by suggesting new relationships to be tested, I hope to bridge the gap between the theory and the facts of candidate behavior. As will be shown, much of the empirical literature on political parties supports either the synthesis view or the view that candidates have only policy goals; relatively few results support the postulate that candidates view winning as their only goal.

Candidate Motivation

To have policy goals does not mean that the politician is ideologically dogmatic, unconcerned with winning, or values platform position as an end itself, but rather that candidates, like voters, are interested in policy implementation. To be more precise, a candidate maximizes the following: [the probability of winning] times [the utility received from the policies implemented if elected]

[1]Numerous other authors could be included in this list.

[2]Work in this genre includes Rothenberg (1965), Lau and Frey (1971), Wittman (1973, 1977), and Bental and Ben-Zion (1975).

[3]There are N dimensional analogs. If the candidates are *vote* (in contrast to plurality) maximizers they will not have identical positions (Hinich and Ordeshook 1970). Some results just show existence of an equilibrium (Hinich, Ledyard, and Ordeshook 1972). Of course, if the assumptions (in their work and the paper here) do not hold, an equilibrium may not exist. In such cases nothing can be said if the candidates present their platforms simultaneously.

plus [the probability that the opposition wins] times [the utility received from the policies implemented by the opposition if elected].

In almost all areas of economic analysis winning is not the goal but the means. For example, in the legal sector a lawyer may negotiate a guilty plea for a client if this increases the client's expected utility. In this situation a guaranteed loss (i.e., the guilty plea) is presumably preferable to the possibility of winning in a trial, as a guilty verdict in a trial is likely to result in a more severe punishment than a negotiated guilty plea. In other words, the lawyer does not maximize the probability of an innocent verdict, but rather minimizes the expected sentence. In the economic sector, firms maximize profits, not sales. While businesses may expend considerable effort in promoting sales (the analog of votes), such effort is still the means to profit and not the end. As a third example, voters vote for the candidate whose policies will yield the highest expected utility. Certainly it would be strange to assume that all the voters are interested in policy but that the candidates are not, especially when many government policies are public goods (or bads) consumed by all.

It is unrealistic to believe that incumbents who are prevented by law from reelection act as if they are maximizing the probability of being reelected, or that office holders do not take advantage of the less than perfectly working political market.[4] Furthermore, while one candidate must be the winner, this does not imply that the winning set of policies was the unique strategy (given available information) which was most likely to win. Thus, given two positions with similar probabilities of winning, we can expect the candidate to choose the position closest to his or her most preferred position. More generally, we can expect a tradeoff between desirability of the platform (from the candidate's point of view) and probability of the platform position winning. Compromising on policy is thus not a sign that the candidate is only interested in winning; rather it is perfectly consistent with expected policy maximization.

From still another point of view, elections can be seen as a two-stage process. A candidate first wins the party's primary and then represents the party's platform in the election. From this viewpoint, even if a candidate were only interested in winning, that candidate would have to be committed to a position that the voters in the party wanted. Thus, even if he or she were only interested in winning the general election, the candidate would have to take a stand that maximized the expected utility of the party's median voter.[5]

A slight variation, which is especially useful for analyzing parliamentary systems, is to assume that candidates maximize expected mandates. Under this assumption, each candidate maximizes [plurality] times [the utility that the candidate receives from implementing his/her position] plus [100 minus the candidate's own plurality] times [the utility that the candidate receives when the other candidate's position is implemented]. Here the actual policy outcome of the political process is viewed as a weighted average of the political positions taken by the candidates (the weights being the percentage of votes for each candidate). Even in nonparliamentary systems a strong mandate increases the winner's effectiveness in promoting his or her own policies (especially so when the other candidate's policies are similar). As will be shown later, this substitution of plurality for probability in the maximization of expected policy implementation has no effect on the mathematical properties of the model.

Schlesinger (1975) has argued that political parties have both policy and winning as goals. While I have argued that winning should be viewed as an instrumental variable, as will be shown, the essential results are the same whether the candidate is interested solely in expected policy maximization or in both expected policy and in winning per se. Thus, the compromise synthesis view does not blur the analytic clarity of the expected policy-maximization model. On the other hand, the results of the synthesis model differ greatly from the model that assumes that candidates or parties are interested solely in winning. This asymmetry should not be surprising. Candidates who are interested only in policy implementation must still consider the effect of certain policy positions on the candidate's chance of winning the election. In contrast, a candidate who is concerned only with winning has interest in policy only to the extent that the policy promotes winning.

Verbal Derivation and Empirical Relevance

The Relationship between Candidate Positions and Voter Preferences

Theory. Insight into the two approaches to candidate behavior can be gained by first assuming that the candidates receive no utility from winning

[4] In this article it is assumed that candidates must keep their promises if elected. However, cheating on one's promises is not inconsistent with policy maximization if the short-run gains outweigh the long-run costs in being less credible.

[5] See Coleman (1971a, b), Aranson, and Ordeshook (1972), Brams (1978), and Aldrich (1980) for formal modeling of the nomination process.

per se and then assuming that they receive only utility from winning. In this section I will keep mathematical notation to a minimum. Let Mx (a k-dimensional vector) be candidate X's preferred position and My be candidate Y's preferred position. For convenience we will assume that X's preferred position is politically to the left of Y's preferred position (that is, for each issue i, $Mx_i < My_i$). Let x be X's choice of policy position and y be Y's choice of policy position. We assume that each candidate always has a positive probability of winning. That is, $P(x,y)$, the probability that X wins, is greater than 0 but less than 1. $P(x,y)$ is twice differentiable in x and y.

PROPOSITION 1: *If candidates maximize expected policy outcome, then on one or more issues both policy positions may be to the left (right) of that point* (M*) *that maximizes their probability of winning.*[6]

Proof: Consider the case where Y prefers y to x and X prefers x to y (that is, each side prefers its position to the opposition's) and $x_i < M^*_i < Mx_i < My_i, y_i$ (that is, both candidates preferred position on issue i is to the right of the maximal winning position, but X's actual policy position on i is to the left). By moving right on issue i, X not only increases his or her probability of winning, but also utility and will keep on moving right beyond the maximal winning position. At the maximal winning position the decreased probability of winning (this decrease is 0 at the maximum) is traded for increased utility by moving right beyond the maximal winning position. Clearly, Y will not benefit by then moving left beyond his or her maximal winning position, for then his or her probability of winning will be decreased and his or her utility when winning reduced.[7] Thus, if candidates maximize expected policy outcome, they may both be consistently to one side of the maximum winning position.

By contrast, if candidates are interested solely in winning the election, they would both choose the maximal winning position (only by a fluke would they both be to one side of the maximal winning position). If candidates had both policy implementation and winning as a goal, again both candidate's policy positions might be to one side of the majority winning position (only not so far away as might be if they valued only policy implementation).

Empirical Results. Before looking at the empirical literature, a few caveats are in order. Translating theory into empirical work is always a tricky task. For example, for lack of a better measure the preferred position of the median voter is treated as the position that maximizes expected plurality (or probability of winning). Some might argue that this is inappropriate. The problem is exacerbated by referring to previously published empirical work, which, unfortunately, has a more oblique relationship to the theory than it would have if it were set up specifically to test the hypotheses derived in this article. Although these caveats are appropriate for any particular citation, the overall thrust of this previous empirical research is more immune because a variety of methodological approaches has yielded similar types of empirical conclusions.

There is some empirical evidence to substantiate the theory that candidates maximize expected policy outcome, thereby disconfirming the theory that candidates are only interested in winning per se. Page (1978) compared Nixon's and Humphrey's policy statements on very specific issues with the results of voter surveys on the same topics. "Both . . . opposed the popular move of increasing the bombing of North Vietnam" (p. 47). "Both candidates resisted the popular demand for a Medicare plan which would cover the whole population . . . [and] both braved public opposition to the 10% income tax surcharge of 1968" (p. 49).[8]

Persistent Differences

Theory. The hallmark of the Downsian model is that both parties will choose identical positions coinciding with the median voter.[9] In this section, I will demonstrate that when candidates have policy preferences, the parties will have different policy positions.

PROPOSITION 2: *If candidates maximize expected policy outcome and candidate X's preferred position is not identical to candidate Y's preferred position (that is,* Mx *is not equal to* My*),*

[6] M_i^* may change depending upon the choices for x_j and y_j. The inherent logic is best understood however if we consider M^* fixed.

[7] We assume a Cournot-Nash equilibrium. The more technical assumptions are presented in *Formal Theory,* in order to keep technical clutter out of this section.

[8] Of course, when the candidates have policy preferences, it is possible for one candidate to have his most preferred position to the left and the other to have her most preferred position to the right of the expected majority position. With many issues, it is possible that even candidates who are only interested in winning may not choose the majority position on each issue if the minority feels strongly on a particular issue. Since these were important issues in the 1968 election, this possibility is not likely.

[9] The generalization of this result to situations of imperfect information can be obtained from the author.

then the candidates will choose different policy positions.

Proof: If $x = y$ are not equal to Mx, then X can always improve his or her utility by choosing Mx, as there is a finite possibility of $x = Mx$ winning the election. This position is preferred by X to a 100-percent chance of position y winning. Of course, there may be an intermediate position x' that brings higher expected utility to X than position Mx or position y.

Both propositions 1 and 2 suggest that candidates with policy preferences are not as responsive to the interests of the voters as candidates who are interested only in winning.

Empirical Results. There is considerable empirical evidence to show that the candidates have consistent and significant differences on policy issues with each other, contrary to the standard results of the plurality maximizing model. Ginsburg (1976) showed persistent differences between the major political parties in the U.S. from 1844 to 1968. Page's (1978) analysis of campaign texts and transcripts from 1932 onward showed clearly detectable differences between the policy stands of the Republican and Democratic candidates. These differences were parallel to those of their party identifiers and activists. Hibbs (1977), in a cross-national study, showed that countries ruled by left-wing governments tend to have lower unemployment and higher inflation than countries ruled by right-wing governments. Furthermore, in a time-series analysis of England and the United States Hibbs showed that the Labor and Democratic parties are associated with lower unemployment than the Conservative and Republican parties.[10] Corroboration of these results is found in Tufte (1978), who shows that as measured by party platforms and by statements of presidents and their top economic advisors, Republican ideology places higher priority on low inflation and Democratic ideology on low unemployment.[11]

Further evidence against the Downsian model is based on data from Survey Research Center (SRC) surveys that asked sampled respondents to locate themselves and the candidates on a seven-point scale for various issues. I make use of this data as reported in Aldrich and McKelvey (1977).[12] The sample average of the voters' positions is an estimate of the population mean (and the population median if the distribution is symmetric, and the expected median if probability of voting is a function of the square of the distance from each voter's preferred position). In the same way, the respondents' location of the candidates' positions can be treated as independent estimates of the true (mean) location of each candidate. By knowing the standard deviation of the average[13] we can calculate how far the estimated mean location of the candidate is from the estimated mean location of the voters. If the difference is large, then we can reject the hypothesis that the positions of the candidate and the mean voter are identical, which would be the case if the candidate were interested only in winning. With the exception of one candidate's position on two issues, for each of the fourteen issues in the 1968 and 1972 presidential campaigns reported by Aldrich and McKelvey the hypothesis that the position of the candidate was identical to the mean position of the voters was rejected at the .01 level of significance.[14]

The Effect of Voter Bias

In preceding sections I compared the equilibrium outcome when the candidates were interested only in policy to the equilibrium outcome when the candidates had winning as their only goal. In this and the following sections I use a much more powerful method of generating empirical hypotheses—comparative statics, the derivation of *changes* in the equilibrium resulting from changes in the inputs into the political process (the candidates' motivation remaining the same). When the comparative static results differ between the winning per se and policy-preference models, an empirical test can be performed to differentiate between the two theories. When the comparative static results are the same for both theories, an empirical test can be performed to test these two theories against a host of other theories regarding political behavior.

To make the results as accessible as possible I assume that the other candidate's policy position is fixed. This changes the analysis from a two-

[10]See Payne (1979) for an attack on Hibbs's methodology and Hibbs (1979) for a defense of his approach. In a recent article Beck (1982) also shows that the party has an effect on unemployment but only half as large as the effect found by Hibbs. The "missing" half is attributed to Beck's administration variable (the particular office holder).

[11]See Frey and Schneider (1978) who show that a political ideology variable improves the predictive power of macroeconomic models. See Keech (1980) for a review of political business-cycle models.

[12]The purpose of their article was to test a voting model, not to prove cleavage. The same data were used by Page (1978) to demonstrate party cleavage, however the relevant variables were not reported in his paper. I perform a different test than he undertook.

[13]Note that Aldrich and McKelvey (1977) reported the standard deviation of the observations, not the average.

[14]On the other side, candidates with policy preferences may or may not have significant differences with the voters.

person game to a one-person game so diagrams can be used and heuristic insight gained.[15]

Theory. The first question to be investigated is the effect of bias on the equilibrium positions of the candidates. Bias is preference for or against the candidate irrespective of the candidate's present policy position. Thus, if most of the voters were registered Democrats, we would expect that the Democratic candidate would have a greater than 50 percent chance of winning the election, even if both candidates took identical positions. An increase in bias in favor of candidate X can be seen as an upward shift in the probability of X winning the election (Figure 1). Bias can also be represented mathematically. Let the probability that X wins = $P(x,y) = 1/2 + B + Sp(x,y)$. $-1/2 < B < 1/2$. If $B > 0$, then the bias is in favor of X.[16]

PROPOSITION 3a: *If X is solely interested in winning, a change in bias* (B) *will have no effect on X's policy position.*

Proof: Looking at Figure 1, we can see that a change in bias will change the height of the function, but will not change the point where the peak takes place.

PROPOSITION 3b: *If X maximizes expected policy implementation, an increase in bias* (B) *in X's favor will result in a move of X towards* Mx *(if* x *does not equal* Mx*).*

Proof: A more rigorous proof is left to the formal theory section. Here the "proof" is more intuitive. Assume that there is an increased bias in favor of X. At any position X now has a greater probability of winning than before. In maximizing expected policy implementation, X trades off some added probability of winning for a more desirable policy position. That is, since it becomes more important that X's position gives greater utility when X does win, candidate X moves closer to his or her preferred position and away from the position that yields him or her maximum probability of winning. An increased bias in favor of candidate X is an increased bias against candidate Y. The analysis being symmetric, an increase in bias against Y will result in Y moving away from his or her most-preferred position and closer to the position that yields him or her maximum probability of winning.

If X and Y are not only interested in policy implementation but also are interested in winning per se, then we have a synthesis of the two approaches. A weighted average of these two goals suggests that the net effect of bias is some kind of weighted average of the effect of bias on each model separately. Since the effect of bias in the Downsian model is zero, the weighted effect of bias in the two models is unambiguous and in the same direction as the effect of bias in the pure expected-policy-implementation model.

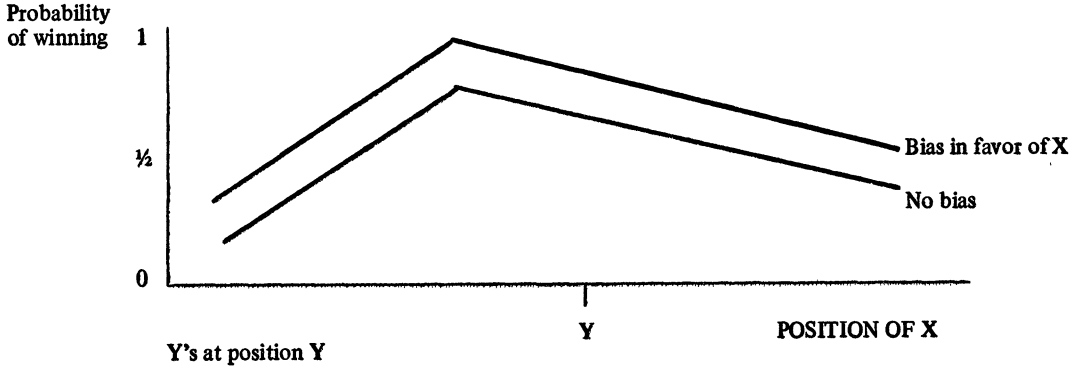
Empirical Results. Reasons for bias include the following: advantages due to incumbency per se (e.g., the incumbent may have seniority on important committees), coattail effect, larger party registration, success on another issue, charges of corruption (decrease in favorable bias), or general popularity. We will now look at the empirical work that has investigated the effects of some of these sources of bias.

Incumbency: Numerous authors have documented the power of incumbency per se, for example, Mayhew (1971, 1974), Tufte (1973), Kostroski (1973), Ferejohn (1977), Fiorina (1974, 1977), Mann and Wolfinger (1980), and Abramowitz (1980). The bias in favor of the incumbent means that when the median voter is between the preferred positions of the candidates, the incum-

[15]Formal mathematical proofs are found in later sections.

[16]S will be defined in the next section. For now assume that $S = 1$.

Figure 1. Probability of X Winning under Differing Degrees of Bias



bent (who has policy preferences) will tend to choose positions farther away from the median voter than the challenger.

This result was found by Achen (1978) in his study of the 1958 congressional election. Winning Republican incumbents were always less representative (farther from the median voter on a centrism measure) as a group than the Democrats they defeated. They were also less representative than Republican challengers in other districts. Winning Democratic incumbents were slightly less representative than their Republican challengers (on nonsocial welfare issues) and also farther away from their median voters than winning nonincumbent Democrats.

Coattails' effects: The coattails' effect is another source of bias. During a presidential election year, a popular presidential candidate will tend to help the other candidates in the same party (perhaps by increasing the number of people in the party actually voting). Thus, presidential coattails will increase the bias in favor of those candidates in the same party and decrease the bias in favor of candidates in the other party. Once again, the resulting bias will create movement in policy positions of policy maximizing candidates but not of Downsian candidates.

Support for the policy maximizing model is found in Kuklinski (1978, p. 175):

> For Democratic senators running in 1972, who undoubtedly felt greater uncertainty given the prediction of a Nixon landslide, the correlation of constituency opinion and roll-call behavior is 68. For Republicans running in 1972 the correlation is .50, substantially less. . . . Democratic Senators, then, had greater reason than Republican Senators to buffer themselves from the 1972 presidential election, and did so by voting more closely in line with their constituencies' wishes.

Registration: Another form of bias is party registration. Candidates in the party with the greater registration figures would take advantage of this bias in their favor, while candidates in the minority party would have to give the voters a better deal in order to make up for the bias.[17] As a result, the candidates in the minority party would have to compromise more with their preferred position than the candidates in the majority party.[18] In turn, this would lead to the majority party getting a lower percentage of the vote than its percentage of *party* registration.

Looking at all forty-three California congressional districts, the percentage of the vote share of the party with a majority registration minus the percentage of the registration of the party with a majority registration is negative as predicted. The difference (−.06) is 3.5 standard deviations from 0, making the results significant at more than the .01 level. Thus we have indirect evidence of the greater willingness of the minority party to woo voters.

General popularity: Some studies have not accounted for the actual source of the bias, but rather have noted an exogenous increase in popularity or expectations about winning the election.[19]

Sullivan and Uslaner (1978) found that in marginal congressional districts the candidate closest to the constituency mean won in 70 percent of the elections, while in nonmarginal districts the candidate farthest away from the constituency mean won in 63 percent of the elections.[20] They also looked at nonmarginal districts where the incumbent was running (thereby combining reasons considered here and previously). In nonmarginal districts the incumbent was closer than the challenger in only one-third of the districts (yet the incumbent won 95 percent of the time). These results are predicted by the policy maximizing model. In nonmarginal districts the leading candidate can afford to take advantage of the strong bias in the candidate's favor by promoting policies farther away from the median voter than the challenger.

These results are not restricted to American politics. To quote from Robertson (1976, p. 206): "As the Conservative expected vote goes up, they [the Conservatives] take a more extreme position on private enterprise. . . . However, to stress the virtues of *laissez-faire* depresses their swing (ability to get the vote of the marginal voter)."

Thus, a variety of empirical tests employing some measure of bias have corroborated the pure

---

[17]Of course, parties and candidates must consider long-run effects of their policies. This prevents them from going too far afield, even if they have a temporary overwhelming advantage.

[18]A likely reason for the majority party compromising less on its preferred position is that its preferred position is likely to be closer to the preferred positions of a majority of voters (thus the reason for it being the majority party).

[19]Note that we have jointly dependent variables. The closer the candidate is to a majority of voters, the more popular the candidate is, but the more popular, the farther away the candidate will move from the majority position. The studies referred to have tried to consider only the exogenous increase in popularity. To the degree that the popularity is endogenous, the effect of bias will be mitigated. Therefore, finding that more popular candidates take less popular stands is a very strong empirical result.

[20]Their measure of marginality meant that in nonmarginal districts the candidate with the favored marginality almost always won.

policy maximizing model and the synthesis model, but have contradicted the pure vote-maximization model.

The Effect of Increased Elasticity of Response

In this section we investigate the effect of increased voter sensitivity (denoted by S in the equation $P(x,y) = 1/2 + B + Sp(x,y)$; $S > 0$) and the related concept of elasticity of response with respect to a change in candidate position (the percent change in probability of winning with respect to a percent change in candidate position; $[\partial P(x,y)/\partial x]^*[x/P]$).[21] The larger voter sensitivity is, the greater the elasticity of response to a change in candidate position.[22] In a diagram, increased sensitivity can be shown as a greater slope at any given point (unless the point has slope zero). Increased sensitivity can arise from the voters being more informed about the candidate's positions (either because certain issues are more salient or because the office is more important) or from the fact that the electoral district is more competitive. As a result, a slight change in a candidate's political position may have a dramatic effect on the probability of winning. In contrast, for "safe" electoral districts, a change in the incumbent's (or challenger's) policy position will have a negligible effect on the probability that the incumbent will win.

Theory. We will now investigate the effect of increased voter sensitivity on the candidates' positions.

PROPOSITION 4a: *If candidates are interested only in winning, then an increase in voter sensitivity will have no effect on the candidates' positions.*

Proof: As can be seen in Figure 2, sensitivity does not change the position that maximizes the probability of X winning, as the position of the peak does not change, only its steepness. Thus, neither candidate will move, as each is already at the position that maximizes the probability of winning.[23]

PROPOSITION 4b: *If candidates are interested in policy implementation, then a decrease in voter sensitivity will result in the candidates moving closer to their preferred positions and farther away from the position that maximizes their probability of winning.*

Proof: We first consider the polar extreme of zero elasticity. If the voters were totally insensitive to the candidates' policy positions (that is, probability of winning was not affected by the candidates' positions), then each candidate would always choose his or her most-preferred position. When the voters respond to policy position, each candidate must compromise position by trading off preferred policy for an increased probability of winning. The more sensitive the voters are to a policy change, the more costly any move away from the maximal winning position to the candidate's preferred position. Therefore, increased sensitivity will result in the candidates moving closer to the maximal winning position.

Again, the synthesis view has basically the same results as the pure policy-implementation model and is contrary to the pure Downsian model. The synthesis model is a weighted average of the effects of the policy-implementation model and the winning per se model. Since increased sensitivity has no effect under the assumptions of the latter model, the effect of sensitivity in the synthesis model is in the same direction as the pure policy-implementation model.

Empirical Results. Issue salience: According to the theory, issues which are most salient to the voters (that is, issues about which the voters are most informed and concerned) should draw the candidates towards the median position. Kuklinski and Elling (1977) looked at voting on referenda in California, roll-call votes on related issues by state legislators (the winning candidates), saliency of the issue (relative voting on the particular referendum issue versus other referenda), and competitiveness of the district (measured by the legislator's percent victory in the previous election). Kuklinski and Elling found that those issues that had the highest saliency resulted in the highest congruence between legislative behavior and district voting. Thus, for issues of contemporary liberalism the saliency was 0.94 (very high), and the measure of legislative represen-

[21] We assume that voters are not perverse. That is, they are not less likely to vote for the candidate when the candidate moves closer to their preferences. The analysis can best be understood if we assume that $p(x,y) = 0$ when $x = y$.

[22] See proposition 7 in the following section for the proof.

[23] If we view the problem somewhat differently, increased sensitivity may lead to movement by candidates who are only interested in winning. A relatively inelastic curve means that the curve is flatter, and therefore it may be more difficult to tell where the highest point is. Consequently, the candidates may disagree concerning where the position of maximum probability of winning is. With increased elasticity, the peak is more discernible, and the candidates are more likely to agree on where the peak is. Therefore, increased elasticity will tend to result in the candidates moving closer to each other. Note that both candidates may move left, both move right, or the left candidate moves right and the right candidate moves left.

tativeness (congruence of behavior with district's voting on relevant referenda) was 0.38. For taxation, the numbers were 0.91 and 0.1, while for governmental administration (the least salient issue), the numbers were respectively 0.78 and 0.02.[24]

Behavior of incumbents over time: Related to the issue of salience is the fact that voters are more informed (that is, more sensitive) about the recent behavior of the incumbent than the incumbent's behavior in the more distant past. Consequently, incumbents with policy goals will diverge less and less from the median voter as the election date becomes closer. No such pattern will be exhibited by candidates who are only concerned with winning and therefore will always try to be as close to the median voter as possible no matter how distant the election.

Amacher and Boyes (1978) demonstrated this pattern in their empirical study of senatorial behavior. Using ratings given to Congress members by the *Conservative Coalition,* the authors looked at each senator's deviation from the mean rating of House members for that state. The senators were divided into three categories: group 1 (5 to 6 year horizon until the next election); group 2 (4 to 5 year horizon); and group 3 (1 to 2 year horizon). Group 1 deviated by 29.6 percent, group 2 by 25.0 percent, and group 3 by 19.3 percent as predicted. The differences between the deviation of group 1 and group 2, group 2 and group 3, and group 1 and group 3 were significant at the 0.10, 0.05, and 0.01 level, respectively. These results are extremely strong because the sample bias is in the other direction. Senators with a 5 to 6 year time horizon were elected at the same time as the representatives and are most likely to represent the present attitude of the voters. Yet as the study indicates, this group deviated the most.

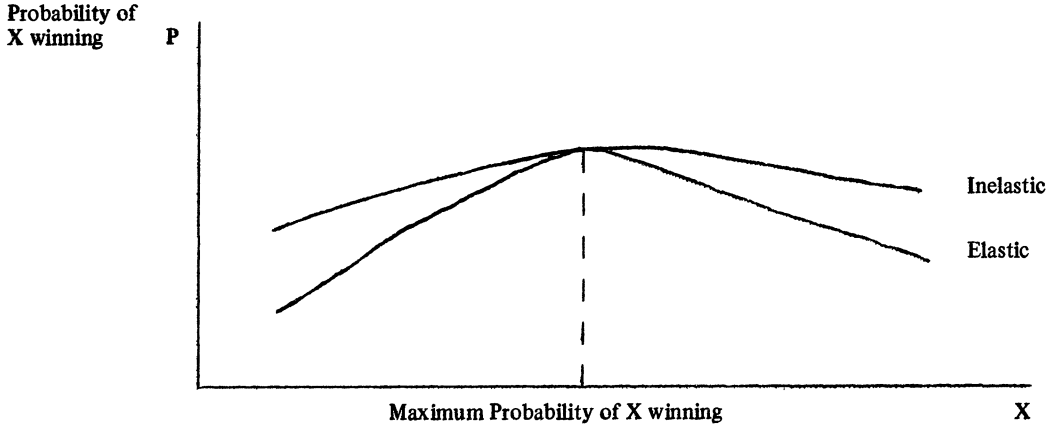
Work by Kuklinski (1978) also showed this pattern. During 1970, the correlation between roll-call votes of California senators and the preferences of their constituencies was 0.41 for those senators running for reelection in 1970 and only 0.18 for those senators whose terms were to end in either 1972 or 1974. Following the 1970 election, the correlation between roll-call votes and their constituencies' preferences dropped precipitously for senators elected in 1970 until the end of the study in 1973, when the correlation was 0.07. In contrast, the correlation between constituencies' preferences and roll-call votes of senators running in 1972 reaches a peak in 1972 of 0.57, in comparison to 0.15 and 0.25 in 1971 and 1973, respectively.[25]

Competitive districts: We now consider the effect of the degree of competitiveness in a district on the behavior of the candidates. A highly competitive district is one where the probability of a candidate winning is close to 50 percent, and therefore, a slight change in policy position may have an important effect on the outcome. That is, the outcome is very sensitive to the policy positions of the candidates. A major reason for a district being highly competitive is an equal number of people registered in both parties. As demonstrated earlier, the more sensitive the outcome is to a change in candidate position, the

[24]Kuklinski and Elling (1977, pp. 143-44).

[25]Elling's roll-call analysis (1976) indicated a movement towards more moderate positions in election years by both liberal and conservative members.

Figure 2. A Change in Elasticity (Slope at a Point) Will Not Affect the Position of Candidates Who Maximize the Probability of Winning



more responsive (to the voters) policy-oriented candidates will be. Thus, we would expect that policy-oriented candidates would be closer to the median voter in more competitive districts. This is not the case for plurality maximizing candidates who always choose the maximal winning position irrespective of the degree of competitiveness in the district.

The evidence in favor of the expected policy maximization model is very strong. Fiorina (1973) claims that the thesis (that more competitive districts result in a more moderated policy by the candidates) is so well accepted that it has become part of the "corpus of knowledge."[26]

Kuklinski (1977), in a study of the state of California legislative process, showed that close electoral margins simultaneously will make legislators less loyal to their parties and more responsive to the policy preferences of the constituents. He looked at taxation, an issue which is highly salient and where the lines of party cleavage are clearly drawn (budget proposals come from the governor's office). The marginal effect of district competitiveness on the effect of constituency opinion on roll-call behavior was 0.96. That is, the more competitive the district, the greater the effect constituency opinion had on legislative behavior. The marginal effect of district competitiveness on the effect of party on the legislator's roll-call behavior was -0.49. That is, the party position (which is a proxy for the legislator's preferred position) is compromised in more competitive districts.[27] Both of the coefficients are significant at the 0.01 level.

As a final example, Hansen's (1975) cross-section study showed that concurrence between citizens and leaders was significantly higher in communities with higher levels of participation and contested elections. Higher participation is a good proxy variable for voter awareness of the candidates' positions and consequently is a proxy for S.

Thus, a variety of tests employing some measure of sensitivity of the probability of winning with respect to a change in candidate position has produced results consistent with the pure policy maximizing model and the synthesis model but contrary to the pure Downsian model.

[26]An exception to the general result is found in Sullivan and Uslaner (1978), who found a negative correlation between district competitiveness and candidate closeness. This result is contrary to both theories. See Fiorina (1973) for an extensive bibliography of earlier research in this area.

[27]In this particular test, bias also enters in and influences the results in the same direction. Since the study only measures legislative behavior, Kuklinski has a measure of the winner's (but not the loser's) position. If there is a strong bias in favor of one party, then the district is less competitive. The bias in favor of the candidate will result in a move by the candidate away from the voters' median position (but the candidate is still likely to win). Thus the party's position is more compromised in more competitive districts. Bias does not influence the results in the previous discussions of issue salience and incumbents' behavior and is controlled for in some of the other tests considering the effect of competitive districts.

Formal Theory

In this section we will formally prove some of the less intuitive propositions. Let the probability that voter j ($j = 1$ to n) votes for candidate X be:

$$P^j(x,y) = 1/2 + B^j + Sp^j(x,y) \tag{1}$$

Let the probability that j votes for Y be $1 - p^j$. $0 < p^j < 1; -1/2 < B^j < 1/2; S > 0$. Where x and y are vectors of policy positions in k-space (for notational simplicity we will assume $k = 2$). p^j is strictly concave in x and convex in y and twice differentiable.[28]

We have uncertainty for two reasons. First, the candidates are not perfectly informed about the voters' preferences either on the issues or for certain personality characteristics of the candidates. Second, the voters are not perfectly informed about the candidates' positions. The candidate may have chosen x, but the voter may have thought that the candidate ran on platform z. The candidates must therefore make their choices based on probabilities rather than certainties.

$$\text{Let } P(x,y) = \sum_{j=1}^{n} \frac{P^j}{n} = 1/2 + \sum_{j=1}^{n} \frac{B^j}{n} + S \sum_{j=1}^{n} \frac{p^j(x,y)}{n} = 1/2 + B + Sp(x,y). \tag{2}$$

[28]One could also index S^j, but this would only add notational confusion.

$P(x,y)$ is concave in x because it is a sum of concave functions.

Let $U^x(z)$ be the utility that X derives when z (a k-dimensional) vector is implemented. (3)

U^x is a twice differentiable, concave function of z with a maximum at Mx (a point in k-space). Again the assumption of concavity is standard. Let $E_x \geqslant 0$ be the utility that X receives from winning per se. We assume that $Z^x = U^x(x) + E_x - U^x(y) > 0$. This assumption prevents the pathological situation from arising where X has chosen such an awful position that X prefers to lose. We assume that X maximizes weighted mandate

$$W^x(x,y) = P(x,y)\,[U^x(x) + E_x] + [1 - P(x,y)]\,[U^x(y)] \tag{4}$$

The weighted-mandate view suggests that the implementation is not just a function of who won, but rather by how much and how different the two candidate positions are. Other things being equal, the larger X's plurality, the closer the implemented policy will be to x. Other things being equal, the closer y is to x, the closer the implemented policy will be to x. For example, X will be more assured of reelection if X gains a large mandate. In general, a landslide will enable the winning party to pursue its policies more effectively, while a closeness between policy positions means that large compromises are not necessary. The analysis not only holds for parliamentary systems, but also for systems like that of the U.S., where a strong majority in Congress provides a much greater assurance of platform implementation.

Denoting the partials of W^x, P, and U^x with respect to x_i by W_i^x, P_i, U_i^x, the first order conditions are:

$$W_i^x = P_i\,[U^x(x) - U^x(y) + E_x] + U_i^x(x)P = 0 \text{ for } i = 1,2. \tag{5}$$

$U^x(x) - U^x(y) + E_x = Z^x$. Therefore, by the above equation $U_i^x(x) = -P_i Z^x P^{-1}$.

We first establish that W^x is locally concave (that is, we indeed have a maximum) by showing that if the first-order conditions are satisfied, then the related second-order conditions are negative definite. In order to look at the second-order conditions, we first derive W_{11}^x and W_{12}^x

$$W_{11}^x = P_{11}Z^x + U_{11}^x P + 2P_1 U_1^x = P_{11}Z^x + U_{11}^x P - 2\frac{P_j^2 Z^x}{p} < 0 \tag{6}$$

because $P_{11} < 0$ and $U_{11}^x \leqslant$ by assumption, and $P_1 V_1^x < 0$ by (5).

$$W_{12}^x = P_{12}Z^x + U_{12}^x P + P_1 U_2^x + P_2 U_1^x = P_{12}Z^x + U_{12}^x P - 2\frac{P_1 P_2 Z^x}{P} \tag{7}$$

since $U_i^x(x) = -P_i Z^x P^{-1}$.

We are now ready to look at the hessian of second-order conditions.

$$H = \begin{bmatrix} P_{11}Z^x + U_{11}^x P - 2\dfrac{P_1^2 Z^x}{P} & P_{12}Z^x + U_{12}^x P - 2\dfrac{P_1 P_2 Z^x}{P} \\ P_{12}Z^x + U_{12}^x P - 2\dfrac{P_1 P_2 Z^x}{P} & P_{22}Z^x + U_{22}^x P - 2\dfrac{P_2^2 Z^x}{P} \end{bmatrix} \tag{8}$$

H is negative definite. W_{11}^x and W_{22}^x (by analogy) are less than zero as each part is negative.

$$\begin{aligned} |H| = {} & [P_{11}P_{22} - P_{12}P_{12}]\,Z^x Z^x + [U_{11}^x U_{22}^x - U_{12}^x U_{12}^x]\,P^2 + \frac{4P_1^2 P_2^2 Z^x Z^x}{P^2} - \frac{4P_1^2 P_2^2 Z^x Z^x}{P^2} \\ & + P_{11}Z^x U_{22}^x P + P_{22}Z^x U_{11}^x P - 2P_{12}Z^x U_{12}^x P - \frac{2P_{11}Z^x P_2^2 Z^x}{P} - \frac{2P_{22}Z^x P_1^2 Z^x}{P} \\ & + \frac{4P_{12}Z^x P_1 P_2 Z^x}{P} - 2U_{11}^x P_2^2 Z^x - 2U_{22}^x P_1^2 Z^x + 4P_1 P_2 U_{12}^x Z^x. \end{aligned} \tag{9}$$

Since P is strictly concave, and U is concave in x, the first two terms are greater than 0. The next two terms cancel out. We will now show that the next three terms are greater than or equal to 0.

$$P_{11}U^x_{22} + P_{22}U^x_{11} - 2P_{12}U^x_{12} \geqslant P_{11}U^x_{22} + P_{22}U^x_{11} - 2[P_{11}P_{22}U^x_{11}U^x_{22}]^{1/2} \text{ by concavity.}$$

$$= [\,[P_{11}U^x_{22}]^{1/2} - [P_{22}U^x_{11}]^{1/2}\,]^2 \geqslant 0. \tag{10}$$

By a similar fashion we can show that the next set of three terms and the last set of three terms are greater than 0. Therefore, the two-by-two matrix is positive, and W^x is locally concave.[29]

For the following two propositions we will assume that the elasticity of P_j with respect to x_i is less than the elasticity of P_i with respect to x_i, and the elasticity of U_j with respect to x_i is less than the elasticity of U_i with respect to x_i. That is:

$$\left|\frac{\partial P_i}{\partial x_i}\frac{x_i}{P_i}\right| = \left|\frac{x_i P_{ii}}{P_i}\right| > \left|\frac{x_i P_{ij}}{P_j}\right| = \left|\frac{\partial P_j}{\partial x_i}\frac{x_i}{P_j}\right| \text{ for } i \neq j.$$

$$\left|\frac{\partial U^x_i}{\partial x_i}\frac{x_i}{U^x_i}\right| = \left|\frac{x_i U^x_{ii}}{U^x_i}\right| > \left|\frac{x_i U^x_{ij}}{U^x_j}\right| = \left|\frac{\partial U^x_j}{\partial x_i}\frac{x_i}{U^x_j}\right| \text{ for } i \neq j. \tag{11}$$

The logic behind this assumption can best be understood by first considering a stronger assumption: $U^x_{ij} = 0$. That is, the marginal utility that a candidate receives from issue i (say, tariff policy on felt hats) is unaffected by a change in position on issue j (the amount of money spent on flood control).[30] This is what we mean when we talk about separate issues in the campaign. The assumption that I make is not as strong. It is possible that a change in position on issue i affects X's marginal utility on position j, but this is less than the effect on X's marginal utility on position i. A similar logic holds for P.

PROPOSITION 5: *If X maximizes W^x, then an increase in B will result in a move of x towards Mx (assuming that $x \neq Mx$).*

In order to find the effect of an increase in B we take the total differential of the first-order conditions.

$$dW^x_1 = W^x_{11}dx_1 + W^x_{12}dx_2 + W^x_{1B}dB = 0.$$
$$dW^x_2 = W^x_{21}dx_1 + W^x_{22}dx_2 + W^x_{2B}dB = 0. \tag{12}$$

We already have all the parts except W^x_{1B} and W^x_{2B}.

$$W^x_{1B} = U^x_1 = -P_1 Z^x P^{-1}.$$
$$W^x_{2B} = U^x_2 = -P_2 Z^x P^{-1}. \tag{13}$$

We solve for dx_1 via Cramer's rule.

$$dx_1 = \left[\begin{array}{cc} P_1 Z^x P^{-1} & P_{12}Z^x + U^x_{12}P - 2P_1P_2Z^xP^{-1} \\ P_2 Z^x P^{-1} & P_{22}Z^x + U^x_{22}P - 2P^2_2 Z^x P^{-1} \end{array}\right] \Big/ |H| \tag{14}$$

Since we are only interested in the sign of dx_1, we multiply through by $\frac{|H|P}{Z^x}$, a positive number, and then multiply out the determinant.

[29] It is clear that the same logic carries over to $k > 2$.

[30] Of course, total utility is affected.

$$|H|P\frac{dx_1}{Z^x} = P_1P_{22}Z^x + P_1U_{22}^xP - \frac{2P_2^2Z^xP_1}{P} - P_2P_{12}Z^x - P_2U_{12}^xP + \frac{2P_2^2Z^xP_1}{P} \tag{15}$$

The third and sixth terms cancel out. The absolute value of the first term is larger than the absolute value of the fourth (that is, the sign of the first term determines the sign of the first and fourth terms).

Dividing the first and fourth terms by $\frac{P_1P_2}{Z^x}$ and taking absolute values, we get

$$\frac{|P_{22}|}{|P_2|} \geqslant \frac{|P_{12}|}{|P_1|} \text{ by assumption concerning elasticity of } P_i. \tag{16}$$

A similar argument shows that the second term has a greater absolute value than the fifth term. Therefore, in order to determine whether dx_1 is positive or negative, all we need to know is the sign of the first two terms. Since P_{22} is negative, and U_{22}^x is negative, the sign of dx_1 is opposite to the sign of P_1. Looking back at the first-order conditions, in order for the equation to be satisfied, U_1^x and P_1 must be of opposite signs. Therefore, if $U_1^x < 0$ [that is, $x_1 > M_{x_1}$], then $P_1 > 0$ and $dx_1 < 0$ [that is, $x_1 \to M_{x_1}$]; if $U_1^x > 0$ [that is, $x_1 < M_x$], then $P_1 < 0$ and $dx_1 > 0$ [that is, $x_1 \to M_{x_1}$].

PROPISITION 6: *If X maximizes W^x, then an increase in S will result in a move of x away from* Mx *(assuming that* $x \neq Mx$*).*[31]

In order to find the effect of an increase in S, we again take the total differential:

$$dW_1^x = W_{11}^x dx_1 + W_{12}^x dx_2 + W_{1S}^x dS = 0$$

$$dW_2^x = W_{21}^x dx_1 + W_{22}^x dx_2 + W_{2S}^x dS = 0 \tag{17}$$

We next determine W_{1s}^x making use of 2, 5, and in particular for the last two equalities we make use of the fact that $P_1 = sp_1$.

$$W_{1S}^x = p_1Z^x + U_1^xp = p_1Z^x - \frac{P_1Z^xp}{P} = p_1Z^x\left[\frac{P - Sp}{P}\right] = \frac{P_1Z^x}{S}\left[\frac{1/2 + B}{P}\right] \tag{18}$$

$$W_{2s}^x = \frac{P_2Z^x}{S}\left[\frac{1/2 + B}{P}\right].$$

We note that:

$$W_{1s}^x = -W_{1B}^x\left[\frac{1/2 + B}{S}\right] \text{ and } W_{2s}^x = -W_{2B}^x\left[\frac{1/2 + B}{S}\right]. \tag{19}$$

The terms in the brackets are identical and greater than 0. Therefore, the effect of an increase in S on x_i is in the opposite direction of the effect of an increase in B on x_i.

If $x_1 > M_{x_1}$, then $P_1 > 0$ and $dx_1 > 0$; if $x_1 < M_{x_1}$, then $P_1 < 0$ and $dx_1 < 0$.
In both cases x moves away from M_{x_1}. (20)

Assuming for convenience that $x_i > 0$, let the elasticity of P with respect to x_i be ϵ_i.

PROPOSITION 7: *An increase in S will result in an increase in* $|\epsilon_i|$.

$$\epsilon_i = \frac{\partial P}{\partial x_i}\frac{x_i}{P} = \frac{P_ix_i}{P} = \frac{Sp_ix_i}{1/2 + B + Sp} \tag{21}$$

[31] One could consider the possibility of different levels of sensitivity (s^i) for different issues. The same type of results would again hold.

$$\frac{\partial \epsilon_i}{\partial S} = \frac{p_i x_i}{P} - \frac{S p_i x_i p}{P^2} = \frac{p_i x_i}{P}\left[\frac{P - Sp}{P}\right] = \frac{p_i x_i}{P}\left[\frac{1/2 + B}{P}\right] > 0 \tag{22}$$

for $p_i > 0$ and < 0 for $p_i < 0$.

Extensions

Two-Candidate Equilibrium Model

In the previous section we assumed that the other candidate's position was given. This enabled us to greatly simplify the exposition. We now extend our analysis and demonstrate the existence of a Cournot equilibrium when neither candidate's position is fixed. X will maximize expected utility, W^x, and Y will maximize expected utility, W^y.

$$W^x = P(x,y)\,[U^x(x) + E_x] + [1 - P(x,y)]\,U^x(y)$$

$$W^y = P(x,y)U^y(x) + [1 - P(x,y)]\,[U^y(y) + E_y]^{32} \tag{23}$$

In order to demonstrate the existence of an equilibrium we make use of a theorem by Debreu (1952) that states that a noncooperative equilibrium exists if each player's utility function is a quasiconcave function of the player's own control variables. We prove quasiconcavity by making use of the following theorem from Diewert et al. (1981):

W^x is quasiconcave in x if for every vector V such that $V^t V = 1$, $\sum_{j=1}^{R} V_i W^x_{x_i} = 0$ implies $V^t H V < 0$

where t is transpose and H is the hessian of second-order partials.[33]

Looking at the first two issues:

$$W^x_{x_1} = P_{x_1} Z^x + U^x_{x_1} P. \text{ Equivalently, } U^x_{x_1} = \frac{W^x_{x_1} - P_{x_1} Z^x}{P}$$

$$W^x_{x_2} = P_{x_2} Z^x + U^x_{x_2} P. \text{ Equivalently, } U^x_{x_2} = \frac{W^x_{x_2} - P_{x_2} Z^x}{P}. \tag{24}$$

Let $V_1 W^x_{x_1} + V_2 W^x_{x_2} = 0$. Then W^x is quasiconcave if the following expression is less than zero.

$$V^t H V = V_1^2 W^x_{x_1 x_1} + 2V_1 V_2 W^x_{x_1 x_2} + V_2^2 W^x_{x_2 x_2} \tag{25}$$

$$= V_1^2[P_{x_1 x_1} Z^x + U^x_{x_1 x_1} P] + V_2^2[P_{x_2 x_2} Z^x + U^x_{x_2 x_2} P] + 2V_1 V_2[P_{x_1 x_2} Z^x + U^x_{x_1 x_2} P]$$

$$+ 2V_1^2 P_{x_1} U^x_{x_1} + 2V_2^2 P_{x_2} U^x_{x_2} + 2V_1 V_2 P_{x_1} U^x_{x_2} + 2V_1 V_2 P_{x_2} U^x_{x_1}. \tag{26}$$

The sum of the first three terms is negative since P is strictly concave in x, and U is concave. We therefore turn our attention to the last four terms and rearrange them as follows:

$$2V_1[V_1 P_{x_1} U^x_{x_1} + V_2 P_{x_1} U^x_{x_2}] + 2V_2[V_2 P_{x_2} U^x_{x_2} + V_1 P_{x_2} U^x_{x_1}]. \tag{27}$$

We make use of equation (24) and substitute for $U^x_{x_1}$ and $U^x_{x_2}$.

$$= 2V_1 P^{-1}[V_1 P_{x_1}[W^x_{x_1} - P_{x_1} Z^x] + V_2 P_{x_1}[W^x_{x_2} - P_{x_2} Z^x]]$$

[32] In order to rule out the pathological situation that Y prefers X to win, we will assume that $Z^y = U^y(x) - E_y - U^y(y) < 0$.

[33] Here we will use the notation W_{x_i} instead of W_i to denote $\frac{\partial W}{\partial x_i}$ in order to distinguish from W_{y_i}.

$$+ 2V_2P^{-1}[V_2P_{x_1}[W^x_{x_2} - P_{x_2}Z^x] + V_1P_{x_2}[W^x_{x_1} - P_{x_1}Z^x]]. \quad (28)$$

Given that $V_1W^x_{x_1} + V_2W^x_{x_2} = 0$,

$$V_1P^{-1}[V_1P_{x_1}[W^x_{x_1}] + V_2P_{x_1}[W^x_{x_2}]] = 0 \text{ and} \quad (29)$$

$$V_2P^{-1}[V_2P_{x_2}[W^x_{x_2}] + V_1P_{x_2}[W^x_{x_1}]] = 0.$$

Therefore, equation (28) =

$$-2Z^xP^{-1}[V_1P_{x_1} + V_2P_{x_2}]^2 < 0. \quad (30)$$

Thus, W^x is a quasiconcave function of x. A similar proof shows W^y to be a quasiconcave function of y.

We can therefore apply the following theorem by Debreu (1952): A noncooperative equilibrium exists if W^x is quasiconcave in x, continuous in y and defined on a continuous and compact set, and W^y is quasiconcave in y, continuous in x and defined on a continuous and compact set.[34]

Therefore, an equilibrium exists in the two-candidate k-issue election game.

[34] Continuity and compactness are readily satisfied with some mild assumptions on the choice set. Comparative game statics for the two-person model can be obtained from the author.

Disequilibrium Model

Kramer (1977) presented a disequilibrium model of the political process. In this model, the incumbent presents the same platform position that produced victory in the previous election, while the opposition is free to choose any position. Voters vote with certainty for the closest candidate. Kramer assumed that the opposition candidate maximizes the number of votes received in the present election. He demonstrated that, over time, the path of positions converged towards a subset of the pareto optimal set.

What happens if the candidates have policy preferences? The opposition (say *Y*) will then choose that *winning* platform closest to Y's most preferred position (*My*). The next time X will be the opposition and choose that winning position closest to *Mx*. Once again the candidates will diverge away from each other toward their own most preferred positions (Wittman 1977; Petry 1980). We can also account for bias. Assume that some of the voters will vote for X, even if x is farther away than y is from the voter's most preferred position. We may want to put a boundary on this bias: for example, Voter i will vote for x if $|x - Mi| - |y - Mi| < Bi$, where $|\ |$ is the distance in euclidean space. If $Bi > 0$ (that is, the bias is in favor of X), then X will be able to choose a position closer to *Mx* and still win the election. Y will have to compromise more and will have to choose a y farther away from Y's own most preferred position in order to win. We can also create the analog to sensitivity by creating thick indifference curves. The thicker the indifference curves, the less sensitive the voters. The less sensitive the voters, the more likely the candidate will be able to choose a position close to his or her own most preferred position and still win. Again, the synthesis model produces results similar to the policy-preference model and different from the pure vote-maximization model. The synthesis model allows a trade-off *within* the set of winning positions between closeness to the candidate's most preferred position and number of votes. Thus, all of the results based on equilibrium when there is uncertainty carry over to the disequilibrium model with certainty.

Conclusion

The analysis of electoral equilibrium presented here is different from the Downsian approach. Candidates have been assumed to be interested in policy as well as in winning per se. This approach has been shown to yield interesting insights into the electoral process. These insights, in contrast to the implications of the pure Downsian model, appear to be consistent with recent empirical research on candidate behavior.

Unlike much of the research on political equilibrium, this article has made use of comparative statics. The comparative statics analysis has provided numerous empirical propositions regarding the role of information and voter bias. The technology of comparative game statics

should be useful for providing answers to a variety of other questions in the political arena.

References

Abramowitz, A. 1980. A comparison of voting for U.S. senator and representatives in 1978. *American Political Science Review* 74:633-40.

Achen, C. 1978. Measuring representation. *American Journal of Political Science* 72:3.

Aldrich, J. 1980. A dynamic model of presidential nomination campaign. *American Political Science Review* 74:651-69.

_____ and McKelvey, R. 1977. A method of scaling with applications to the 1968 and 1972 presidential elections. *American Political Science Review* 71: 111-30.

Amacher, R., and Boyes, W. 1978. Cycles in senatorial voting behavior: implications for the optimal frequency of elections. *Public Choice* 33:1-78.

Aranson, P., and Ordeshook, P. 1972. Spatial strategies for sequential election. In *Probability models of collective decision making,* eds. R. Niemi and H. Weisberg. Columbus, Ohio: Merrill.

Beck, N. 1982. Parties, administrations, and American macroeconomic outcomes. *American Political Science Review* 76:83-93.

Bental, B., and Ben Zion, U. 1975. Political contributions and policy—some extensions. *Public Choice* 30:1-13.

Brams, S. 1978. *The presidential elections game.* New Haven, Conn.: Yale University Press.

Coleman, J. S. 1971a. Internal processes governing party positions in elections. *Public Choice* 11:35-60.

_____ 1972b. The positions of political parties in elections. In *Probability models of collective decision making,* eds. R. Niemi and H. Weisberg. Columbus, Ohio: Merrill.

Debreu, G. 1952. Existence of a social equilibrium. *Proceedings of the National Academy of Sciences.*

Diewert, W. E.; Avriel, M.; and Zang, I. 1981. Nine kinds of quasiconcavity and concavity. *Journal of Economic Theory* 25:397-420.

Downs, A. 1957. *An economic theory of democracy.* New York: Harper.

Elling, R. 1976. Patterned temporal ideological instability in the United States senate: of time and electoral responsiveness. Unpublished.

Ferejohn, J. 1977. On the decline of competition in congressional elections. *American Political Science Review* 71:166-76.

Fiorina, M. 1977. The case of the vanishing marginals: the bureaucracy did it. *American Political Science Review* 71:177-81.

_____ 1974. *Representatives, roll calls, and constituencies.* Lexington, Mass.: D.C. Heath.

_____ 1973. Electoral margins, constituency influence and policy moderation: a critical assessment. *American Politics* 4:479-98.

Frey, B. S., and Schneider, F. 1978. An empirical study of politico-economic interaction in the U.S. *Review of Economics and Statistics* 60:174-83.

Ginsburg, B. 1976. Elections and public policy. *American Political Science Review* 70:41-49.

Hansen, S. 1975. Participation, political structure and consequence. *American Political Science Review* 69: 1181-99.

Hibbs, D. 1979. Inflation, unemployment and left-wing political parties: a reanalysis. *American Political Science Review* 73:185-90.

_____ 1977. Political parties and macroeconomic policy. *American Political Science Review* 71: 1767-87.

Hinich, M. J. 1977. Equilibrium in spatial voting. *Journal of Economic Theory* 16:208-19.

_____ and Ordeshook, P. 1970. Plurality maximization vs. vote maximization: a spatial analysis with variable participation. *American Political Science Review* 64:772-91.

_____; Ledyard, J. D.; and Ordeshook, P. 1972. Nonvoting and the existence of equilibrium under majority rule. *Journal of Economic Theory* 4: 144-53.

Hotelling, H. 1929. Stability in competition. *The Economic Journal* 39:41-57.

Keech, W. 1980. Elections and macroeconomic policy optimization. *American Journal of Political Science* 24:345-67.

Kostroski, W. 1973. Party and incumbency in post-war senate elections: trends, patterns and models. *American Political Science Review* 67:1213-234.

Kramer, G. 1977. A dynamical model of political equilibrium. *Journal of Economic Theory* 16: 310-34.

Kuklinski, J. 1977. District competitiveness and legislative roll-call behavior: a reassessment of the marginality hypothesis. *American Journal of Political Science* 21:627-738.

_____ 1978. Representativeness and elections: a policy analysis. *American Political Science Review* 72: 165-77.

_____ and Elling, R. C. 1977. Representational role constituency opinion and legislative roll-call behavior. *American Journal of Political Science* 21: 135-47.

Lau, L., and Frey, B. 1971. Ideology, public approval and government behavior. *Public Choice* 10:20-40.

Mann, T., and Wolfinger, R. 1980. Candidates and parties in congressional elections. *American Political Science Review* 74:617-32.

Mayhew, D. 1971. *Congress, the electoral connection.* New Haven, Conn.: Yale University Press.

_____ 1974. Congressional elections: the case of the vanishing marginals. *Polity* 6:295-317.

Page, B. 1978. *Choice and echoes in presidential elections: rational man in electoral democracy.* Chicago: University of Chicago Press.

Payne, J. 1979. Inflation, unemployment, and left-wing political parties: a reanalysis. *American Political Science Review* 73:181-85.

Petry, F. 1980. Candidates with or without policy preferences. Paper presented at the Public Choice Society meeting, Florence, Italy.

Robertson, D. 1976. *A theory of party competition.* London: John Wiley and Sons.

Rothenberg, J. 1965. A model of economic and political decision making. In *The public economy of urban communities,* ed. J. Margolis. New York: AMS Press.

Schlesinger, J. 1975. The primary goals of political parties: a clarification of positive theory. *American Political Science Review* 69:840-49.

Schumpeter, J. A. 1950. *Capitalism, socialism, and democracy*. New York: Harper and Brothers.

Smithies, A. 1941. Optimum location in spatial competition. *The Journal of Political Economy* 49: 423-39.

Sullivan, J., and Uslaner, E. 1978. Congressional behavior and electoral marginality. *American Journal of Political Science* 22:536-53.

Tufte, E. 1978. *Political control of the economy*. Princeton, N.J.: Princeton University Press.

_____ 1973. The relationship between seats and votes in two-party systems. *American Political Science Review* 67:540-54.

Wittman, D. A. 1977. Candidates with policy preferences: a dynamic model. *Journal of Economic Theory* 14:180-89.

_____ 1973. Parties as utility maximizers. *American Political Science Review* 67:490-98.