BUSY VOTERS, AGENDA CONTROL, AND THE POWER OF INFORMATION

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The correspondence between individual preferences and electoral outcomes is often affected by the existence of information asymmetries among electoral participants and the presence of individuals or groups who exercise some form of agenda control. While the effects of agenda control in political decision making are widely recognized, the effects of information asymmetries are not as well understood. Since information asymmetries are fundamental characteristics of most elections, a deep understanding of the correspondence between individual preferences and electoral outcomes requires a serious consideration of the "effects" of information. I develop a generalizable agenda control model that takes as given the observation that most voters are not naturally inclined to invest in political information. The model allows me to provide a dynamic description of how voters and political elites can adapt to the information problems that characterize political decision making. It also allows me to demonstrate the effect of these adaptations on electoral outcomes.

I develop a spatial election model that demonstrates the effect of information asymmetries (the fact that some electoral participants have more accurate information than others) on electoral outcomes. The original motivation for the development of this model came from the debate about the use of the initiative and referendum in the determination of public policy.[1] My intent is to advance this debate by identifying conditions under which voters are able to use these electoral institutions in order to enhance the "majority will" and conditions under which these institutions are likely to serve as effective policy-influencing tools for well-organized minority interests that obtain agenda control. In developing the model, I introduce assumptions that follow quite naturally from a study of these institutions (costly ballot access, the existence of credible endorsements, the assumption that voters know more about the status quo than a newly proposed alternative, and the assumption that voters are uncertain about the agenda-setter's preferences). In addition, the wide use of the initiative and referendum provides many opportunities for empirical tests of the model's predictions.

I define the *direct legislation environment* to be a one-shot interaction where a completely informed monopoly agenda-setter proposes one "alternative" to an existing status quo. Incompletely informed voters (direct legislators) choose one of two actions, *vote for the status quo* or *vote for the alternative*. Majority (or supermajority) rule determines a policy outcome. Both the agenda-setter and the voters have preferences over outcomes.

The binary nature of the choice offered to voters in direct legislation environments ensures that the electoral outcome is the "stated preference" of a majority of voters. However, when voters possess incomplete information about the content of the electoral alternatives, and are therefore uncertain about the relationship between their preferences and possible electoral outcomes, the relationship between the majority's "underlying preferences" and the majority's "stated preferences" may no longer be straightforward or obvious. For instance, when voters possess incomplete information, they may cast a different vote than they would have cast if they had possessed better (or complete) information. When information affects voting behavior in this way, the electoral outcome may not be same as the outcome that a better informed electorate would have chosen. Since voters are rarely, if ever, completely informed, I think that it is important to consider the use of different information conditions when approaching the study of elections.

I use the model to identify the effects of information asymmetries and communication opportunities on the correspondence between individual policy preferences and electoral outcomes in the direct legislation environment. I show conditions under which monopoly agenda control and *any* degree of voter uncertainty force direct legislation voters into having to choose between the status quo and the agenda-setter's most preferred policy. (This also implies that there exist preference profiles for which *any* policy can be reached in one vote.) Under these conditions, neither the status quo nor the setter's most preferred policy need be closely related to the median voter's (or any other voter's) preferences. I also show that the electoral winner between these two alternatives need not be the outcome that a completely informed electorate would choose.

While the lack of dependence between electoral outcomes and voter preferences, identified herein, may trouble students and supporters of democratic institutions, there is a way that a majority of voters can more effectively influence direct legislation outcomes. One of my objectives is to demonstrate that the observation, "Most voters are not naturally inclined to invest in information about politics," does not necessarily lead to the conclusion that voters are completely uninformed or that such voters will behave differently than they would have if they had more accurate information. I show conditions under which the presence of groups or individuals who are willing to undertake costly actions in an attempt to influence electoral outcomes provide incompletely informed voters with low-cost information cues. These cues allow voters to make more accurate inferences about the electoral alternatives, which increases the likelihood that they cast the same vote they would have cast if they had acquired more accurate information. In other words, I show how both self-interested voters and political elites can adapt to the information problems that characterize political decision making. Voters can adapt by using certain types of low-cost information cues to make more accurate inferences. If the agenda-setter's actions affect (do not affect) the content of the cues that will be available to voters, then the agenda-setter can adapt by giving a greater (lesser) consideration to voter preferences when choosing to take an action.

The design of the model is sufficiently generalizable to allow the results to address controversies associated with other decision-making institutions. For example, this model can provide greater insight into the actions of Denzau and Mackay's (1983) gatekeeper (a committee or an individual who has the opportunity to present a bill to a legislative body under a "closed rule") and Niskanen's (1971) bureaucrat (an individual within a bureaucratic agency who possesses better information than legislative counterparts and can offer all-or-nothing packages of bureaucratic services). I also believe that the communication apparatus incorporated into this model can be transferred to a wider range of decision-making models than I discussed.

Next, I discuss the foundations of this spatial model and establish preliminary results. I then derive electoral equilibria that allow me to demonstrate how information asymmetries and communication opportunities affect player strategies and electoral outcomes. A concluding section summarizes the findings.

FOUNDATIONS OF THE MODEL

To study the effect of information on the correspondence between individual policy preferences and electoral outcomes, I develop a model whose predominant features are *monopoly agenda control, incompletely informed voters, and communication opportunities*. Before embarking on the model's development, I briefly review the origins of the model's predominant features.

The Relation of This Model to Previous Work

The effect of introducing a monopoly agenda-setter to a spatial election model was first detailed in the "setter model" of Romer and Rosenthal (1978, 1979). Romer–Rosenthal is a complete information model where voters know the exact location of the status quo, the alternative proposed by the agenda-setter, and the agenda-setter's preferences. The agenda-setter has the opportunity to make one take-it-or-leave-it offer to the voters. In equilibrium, the setter makes an offer that maximizes setter payoff subject to the constraint that the median voter prefer the offer to the preexisting status quo. The Romer–Rosenthal model demonstrates how the presence of a monopoly agenda-setter can produce a difference between the median voter's most preferred policy outcome and the electoral outcome.[2]

The decision makers in my model are an electorate of incompletely informed voters. It is especially true in large electorates that voters who consider their opportunity costs may discover that they have little incentive to acquire detailed information (Downs 1957; Popkin 1991; Popkin et al. 1976). However, uninformed voters do not necessarily cast different votes than they would have cast if they had possessed better (or complete) information. McKelvey and Ordeshook's (1985, 1986) spatial two-candidate incomplete information models provide examples of how incompletely informed voters can use low-cost information sources to cast the same votes they would have cast if they were completely informed.[3]

The development of an incomplete information agenda control model may bring to mind the models of Denzau and Mackay (1983) and Banks (1990). In the former, the setter has incomplete information about voter preferences, and the voters are completely informed. Denzau and Mackay find equilibria for a number of different behavioral assumptions. Banks's model is more closely related to the model I am developing for it seeks to analyze the effects of voter uncertainty. A comparison of the fundamental assumptions underlying the Romer–Rosenthal, Denzau–Mackay, Banks, and my own model are presented in Table 1.

While Banks's assumptions provide the foundation for a reasonable model of some decision-making institutions, they are not as useful for the analysis of many others, like ballot initiatives or referenda. For instance, my model assumes that voters know more about the status quo than about the alternative; Banks assumes the opposite. The assumption that voters know more about the status quo is better suited for models of voting on constitutions, zoning ordinances, or taxation rules (to name a few). In these circumstances, voters must choose between status quo policies, (whose effects they might be able to observe) and alternative policies (whose effects cannot be observed until they are implemented). My model also assumes that voters can be uncertain about the agenda-setter's preferences; Banks assumes that voters know the agenda-setter's preferences. Banks's assumption requires that voters know exactly what trade-offs a setter is willing to make under any possible circumstance. The assumption that voters are uncertain about the agenda-setters preferences is much less restrictive and thus more broadly applicable to the study of political decision making. A third difference between the models is the assumptions made about communication between the agenda-setter and the voters. Signaling opportunities exist in both models, but the structure and generalizability of

TABLE 1.

Comparison of Fundamental Setter Model Assumptions

CHARACTERISTIC	ROMER AND ROSENTHAL 1978	DENZAU AND MACKAY 1983	BANKS 1990	LUPIA
Single-shot game	Yes	Yes	Yes	Yes
Single-peaked voter preferences	Yes	Yes	Yes	Yes
Perfectly informed setter	Yes	No	Yes	Yes
Voters always know				
Location of status quo	Yes	Yes	No	Yes
Setter's Preferences	Yes	Yes	Yes	No
Location of Alternative	Yes	Yes	Yes	No

the interactions are very different. Banks's voters make inferences about the status quo from the setter's choice of alternative. My voters draw information from beliefs about the setter's preferences, the observation that an election takes place, and the presence of credible endorsements. The communication opportunities in my model are more dynamic and thus more appropriate for the class of examples I am interested in.

Definition of the Model

I model the *direct legislation environment* as a one-period, multistage game of incomplete information. The object of the game is to choose one policy from a finite continuum of possible policy alternatives. One completely informed monopoly agenda-setter (*the setter*) can propose one alternative to a common knowledge status quo. The setter's willingness to propose an alternative may be affected by the cost of contesting the election. If the setter decides that proposing an alternative is not worthwhile, the game ends and the status quo is the outcome. If the setter decides to propose an alternative, voters must vote for either the status quo (about which they are completely informed) or the setter's proposed alternative (about which they possess incomplete information). Some of the setter's actions may provide additional information to voters about the alternative. All players have policy preferences, and majority (or supermajority) rule determines the outcome of the election.

In order to identify the effects of information in the direct legislation environment, I solve for equilibria in three substantively relevant game types and one control case. In the control case, the setter and the voters do not communicate. In the other game types, distinct forms of communication are available. Since the only difference between a game type and the control case is the presence of a specific form of communication, a comparison of equilibrium behavior in the control case to equilibrium behavior in the game types allows me to identify the effect of these communication opportunities on voting behavior and electoral outcomes. All players know the game type (what communication opportunities will be available) with certainty when it is their turn to choose a strategy. While the substantive motivation for each game type is provided later, the game types are briefly listed here to facilitate a compact description of the model.

Control case. No information is transmitted between potential information providers and voters.

Costly entry. Voters observe setter's decision to pay a price to contest the election.

Endorsement. Voters observe a perfectly reliable endorsement.

Learn setter's ideal point. Voters learn the setter's ideal point.

Consider the policy space [0, 1].[4] There exists a common knowledge status quo $SQ \in [0, 1]$. It is common knowledge that the game is being played by $n + 1$ players. n of the players ($N = \{1, \ldots, n\}$, where $n > 1$) are called voters and one other player is called the setter.

Each player's preferences over the policy space can be distinguished by the location of his or her ideal point. The setter's ideal point, $X \in [0, 1]$, is drawn from the cumulative distribution function F, which has density f. Each voter's ideal point, $T_i \in [0, 1]$, is drawn from the cumulative distribution function G, which has density g. All players know their own ideal points and the distribution from which any other player's ideal point is drawn. For example, the distribution F represents the prior beliefs that voters have about the setter's ideal point.[5] In short, no voter knows any other voter's ideal point, whether voters know the setter's ideal point is modeled as a variable, and the setter has complete information.[6]

After player ideal points are determined, the setter chooses a strategy. The setter's strategy, $s(X)$, has two components. The first strategic decision is whether to contest the election. In this model, the decision to contest the election is nontrivial because the setter who decides to contest will face a nonnegative, common knowledge *cost of entry*, $K \in \Re^+$. I define the *setter's entry decision* as $s_1(X) \in \{0, 1\}$, which equals 1 if the setter decides to contest the election, 0 otherwise. If the setter decides not to contest the election, the game ends and SQ is the outcome. Otherwise, the setter enters and chooses the second component of the strategy (a location for [the exact

TABLE 2.

Comparison of Endorsement Content

GAME TYPE	CONTENT	VALUE: $M_2(S_2)$ =
Control case	no endorsement	0
Costly entry	no endorsement	0
Endorsement	s_2 is to the left of SQ	−1
	s_2 is the same as SQ	0
	s_2 is to the right of SQ	1
Learn setter's ideal point	setter's ideal point	$X \in [0, 1]$

content of] the "alternative to the status quo")—$s_2(X) \in [0, 1]$.[7]

The setter's strategy set is $S_0 = \{s|$ where s: $[0, 1] \rightarrow \{0, 1\} \times [0, 1]\}$, where the particular strategy chosen by the setter takes the form: $s(X) = (s_1(X), s_2(X))$. For notational simplicity, I denote $s(X)$ as s, $s_1(X)$ as s_1, and $s_2(X)$ as s_2. It follows that when an election is held it is of the form: SQ versus s_2.

After the setter moves, the voters choose a strategy (cast a vote). All actions taken, and all information obtained, by voters are assumed to be costless to them. A voter's strategy is a binary decision, $v_i = \{-1, 1\}$, where $v_i = -1$ represents a vote for SQ and $v_i = 1$ represents a vote for s_2.

In each game type, voters can condition their choice of strategy on a piece of information provided to them about the setter's strategy. Voters observe the message $M(s, X) = (M_1(s_1), M_2(s_2))$. The value of the message is revealed to voters after the setter chooses a strategy but before the voters vote. The first component of the message allows voters to observe whether or not the election is being contested. For all game types, $M_1(s_1) = s_1$; that is, the voters directly observe whether the setter enters or not.

The second component of the message allows voters to observe an *endorsement*. The motivation for introducing the endorsement comes from the fact that voters (collective decision makers in general) may not have an incentive to acquire costly political information. These decision makers may have a greater incentive to use reliable low-cost information cues if they are available. Examples of such cues are the use of brand names in the purchase of consumer goods, induced party loyalty in legislatures (Huber 1990), the advice or statements of opinion leaders (Berelson, Lazarsfeld, and McPhee 1954), partisan identification (Campbell et al. 1960), "biased" information providers (Calvert 1985), particular events that take place during a campaign (Popkin 1991), and "the past" (Fiorina 1981). The "endorsement" provides voters with information about the location of s_2. In the model, it is common knowledge that the endorser possesses complete information and is a perfectly reliable source of information. The content of the endorsement in each game type is specified in Table 2 (the substantive motivation for each is provided later in the text).[8]

The particular strategy chosen by voter i takes the form $v_i(T_i\, M)$. The voter's strategy sets depend on the game type and are as follows.

Game Type	*Voter Strategy*
Control case S_i:	$= \{v_i|$ where v_i: $[0, 1] \times \{0, 1\} \rightarrow \{-1, 1\}\}$
Costly entry S_i:	$= \{v_i|$ where v_i: $[0, 1] \times \{0, 1\} \rightarrow \{-1, 1\}\}$
Endorsement S_i:	$= \{v_i|$ where v_i: $[0, 1] \times \{0, 1\} \times \{-1, 0, 1\} \rightarrow \{-1, 1\}\}$
Learn setter's ideal point S_i:	$= \{v_i|$ where v_i: $[0, 1] \times \{0, 1\} \times [0, 1] \rightarrow \{-1, 1\}\}$

When an election is held, the winning outcome is determined by majority rule.[9] The outcome function is, for any $s \in \{1\} \times [0, 1]$, and $v_i \in \{-1, 1\}$,

$$o(s, v_1, \ldots, v_n) = s_2 \text{ if } \sum_{i=1}^{n} v_i > 0, \text{ and}$$

$$= SQ \text{ if } \sum_{i=1}^{n} v_i \leq 0.$$

The outcome determines the payoffs to all players.[10]

I examine the case where all players have symmetric and single-peaked utility functions.[11] I define the *voter utility function* as: $U_i(x, T_i) = -(x - T_i)$. For voters, utility is solely a function of the distance between the location of the winning policy and their ideal point. I define the *setter policy utility function* to be $U_0(x, X) = -(x - X)$. The setter's policy utility is not affected by winning or losing the election except for the influence that the electoral outcome has on the position of the winning policy. Since the setter's incentives are also affected by the cost of entry, I define the setter's *utility function* as the setter's policy utility minus the cost of contesting the election: $\phi_0(s, v_1, \ldots, v_n|X, T_1, \ldots, T_n) = U_0(x, X) - [K \times s_1]$.

The Definition of Equilibrium Strategies

The equilibrium concept is constructed by starting with the Bayes–Nash concept and incorporating the assumptions of the model. (The formal statement and derivation are included as Appendix A.) I first incorporate the assumption that voters always vote as if they are the pivotal voter.[12] This strategy is weakly dominant with respect to the strategies of other voters. The incorporation of this assumption transforms the equilibrium concept into a variant of the *sequential equilibrium* concept of Kreps and Wilson (1982). I also incorporate the assumption, (essentially the same made by Kreps and Wilson) that voter beliefs are consistent. In short, players in this model choose strategies to maximize expected utility. These strategies are chosen with respect to the information and strategies of the other players. In equilibrium, each player's strategy is the best response possible to the chosen strategies of others, given his or her information.

I now present two lemmas that help to characterize the setter's equilibrium strategies throughout the rest of the paper. Lemma 1 is an incentive compatibility condition that establishes that the setter contests an election if and only if the benefit from contesting the election is greater than the cost. Lemma 2 establishes an equilibrium location strategy for the setter. The proof of Lemma 2 is included as Appendix B.[13]

LEMMA 1. *The setter contests an election if and only if the benefit from contesting the election is greater than the cost.*

LEMMA 2. *A weakly dominant location strategy for the setter is $s_2 = X$.*

Lemma 2 shows that if voters are uncertain about the location of the alternative when it is time for them to vote, then a dominant strategy for the setter is to choose the (setter's) ideal point. In fact, the setter can, in equilibrium, choose any point for which $f > 0$; however, the ideal point provides the highest utility when s_2 is the electoral outcome. It follows that there exist profiles of voter preferences and beliefs that will enable *any policy in the space to be reached in a single vote.*

Contrast this finding to the agenda-setter's equilibrium location strategy in the (complete information) Romer–Rosenthal model, where the presence of completely informed voters forces the setter to propose an alternative that a majority of voters prefers to *SQ* in order to obtain a new outcome. This comparison shows how agenda-setter expectations about the level of voter information can affect the content of the electoral alternatives and suggests that the effects of information are not limited to changes in voting behavior or electoral outcomes. For notational convenience in describing equilibria, I will, henceforth, refer to the cumulative distribution function of alternatives as $F(X)$, and the corresponding density function as $f(X)$.

Evaluating the Effects of Information

Before proceeding, I would like to reintroduce the question that motivated this analysis: How does information affect electoral outcomes in the direct legislation environment? In many spatial models, the median voter's ideal point is used as a benchmark by which the correspondence between majority preferences and electoral outcomes is "measured." The generalizability of this model causes any description of the relationship between direct legislation outcomes and the median voter's ideal point to be relatively verbose. Therefore, I employ a surrogate benchmark called the complete information majority preferred alternative (CIMPA). The CIMPA is the outcome, among the (one or two) alternatives offered to voters in the direct legislation environment, that ex post provides a higher level of utility to the median voter.[14] When the setter contests an election, the CIMPA is either s_2 or *SQ*. (When voters are uncertain about s_2 then, by Lemma 2, the CIMPA is either *X* or *SQ*.) When the election is not contested, *SQ* is the only alternative and is, by definition, the CIMPA. Notice also that the "complete information *minority-preferred* alternative" is the direct legislation outcome if and only if a set of decisive voters makes the following ex post–mistaken inference:

$$\int_0^1 U_i(X, T_i)\, dF\,(X|M(s, X)) > U_i(SQ, T_i) > U_i(X, T_i);$$

that is, the *expected* utility of the setter's proposal is greater than the *known* utility from *SQ*, while, in fact, the *known* utility from *SQ* is greater than the *actual* utility a voter will receive from the true alternative. Throughout the analysis, our ability to describe the likelihood that voters make ex post mistaken inferences allows us to determine the likelihood that the CIMPA is the direct legislation outcome.

IDENTIFYING THE POWER OF INFORMATION

I now use different versions of the model to examine the effects of information asymmetries and communication opportunities on voting behavior, the setter's strategy, and electoral outcomes. To identify these effects, I first introduce a control case, a direct legislation environment where the transmission of information is not a factor and the actual interaction between the setter and the voters is negligible. All other game types will differ from the control case *only* in that specific types of communication are introduced.

In the control case the setter does not have to pay in order to contest the election, and there is no endorsement. Voters do not observe s_2 but do have prior beliefs about where it is likely to be located, $f(X)$.[15] In the control case equilibrium (the formal statement and proof of this equilibrium is included in Appendix C), the setter enters and chooses the personal ideal point as the location of s_2, while all voters condition their strategy exclusively on their prior information. The electoral outcome is determined by which of *SQ* and s_2 provide a greater expected utility to the median voter. Notice that this outcome depends only on voters' prior beliefs and *is not dependent* on the setter's actual choice of s_2.[16] Also, voters are more likely to make ex post mistaken inferences and the CIMPA is less likely to be the direct legislation outcome in the control case than in any of the other game types I introduce (holding other factors constant). Another interesting implication of this equilibrium is that the farther away *SQ* is from the median voter's ideal point, the more likely it is to lose, regardless of the actual location of s_2.

The usefulness of introducing the control case will now be revealed by comparing it to two game types that differ from it only in that a specific form of communication is introduced. The particular forms of communication I introduce are the "observation of costly setter actions" and the "existence of perfectly reliable endorsements." If it is true that any voter can observe that an election is being held, can usually observe that a campaign is being run, and is sometimes supplied with endorsements, then the low-cost information cues that costly setter action and endorsements can provide allow me to develop a useful and relevant characterization of the voting behavior of those who do not take the time to obtain political information.

In addition, the two forms of communication I introduce are collectively exhaustive of how voters in this type of model can update their prior beliefs about the alternative. These forms of communication are descendants of the many examples in the economics literature that pertain to signaling.[17] All related models of direct legislation that choose to include the important role of information will have to utilize some combination or permutation of these two information types.

The Effect of Costly Action by an Agenda-Setter

I now examine the effect of both costly setter action and the information it provides on electoral outcomes. In many public decision-making institutions, a significant effort is required to get a particular alternative considered by a decision-making body. In California, for instance, the average successful initiative proponent spent $755,000 to qualify for the November 1988 ballot (Price 1988). In that same year, as I note elsewhere, proponents and opponents of five insurance reform initiatives spent over $82 million during the campaign season (Lupia 1991). Notice that only those individuals and groups most affected by a particular issue should expect to receive a positive return from expending the resources necessary to propose and support an alternative to *SQ*. Similarly, the finite length of legislative sessions suggests that marketlike forces may determine which alternatives are brought to a vote. The fact that a particular bill is presented to any legislative committee suggests that some expenditure of resources (effort) was engaged in by the bill's sponsor(s). Knowledge about the magnitude of this expenditure could provide a signal to an incompletely informed legislator (voter) about how much the bill differs from *SQ*.

In the *costly entry* game type, the setter must decide whether or not to spend K (> 0 and common knowledge) in order to contest the election. As before, voters do not directly observe s_2 but do have beliefs about it. Because the setter need not contest the election, the fact that the setter does so conveys information to the voters. The information provided to voters by this action is that the setter believes that he or she can recover (at least) the cost of contesting the election.[18] (Notice that the *only* difference between this game type and the control case is in the value of K.) For $K > 0$, the fact that the setter contests the election, along with the voters' knowledge of the setter's single-peaked utility function, implies that s_2 is not within a well-specified neighborhood of *SQ*, since electoral outcomes near *SQ* will not provide enough extra utility to make a setter's contesting the election a profitable endeavor.

Let $\epsilon(K)$ (hereafter ϵ) be a distance on the policy continuum that is an increasing function of K.[19] ϵ determines the range of alternatives within which it will never be profitable for the setter to contest an election. Since K and the shape of the setter's utility function is known, the correspondence between K and ϵ is common knowledge, and so is the distance from *SQ* within which it is impossible for the setter to recover the cost of contesting the election. Lemma 3 shows that for setters whose ideal points are located within the "range of unprofitable alternatives" $[SQ - \epsilon, SQ + \epsilon]$, there exist no policies which, given the cost of contesting the election K, will provide the setter with a higher level of utility than costlessly accepting *SQ*.

LEMMA 3. *If the setter's ideal point is located in the range of unprofitable alternatives, the setter should not contest the election.*

When $K > 0$ and the setter contests the election, voters know that $X \notin [SQ - \epsilon, SQ + \epsilon]$, and the voters' updated beliefs will have no support on this range. When the setter enters, voters observe the message (1, 0) and use Bayes Rule to incorporate this information into their beliefs about the location of s_2. This updating leads to a revised distribution of setter ideal points $F(X|(1, 0))$, which is related to $F(X)$ in the following way:

$$f(X|(1,0)) = \begin{cases} 0 & \text{if } X \in [SQ-\epsilon, SQ+\epsilon] \\ f(X) \times \dfrac{1}{1-F(SQ+\epsilon)+F(SQ-\epsilon)} & \text{if } X \in [0, SQ-\epsilon), (SQ+\epsilon, 1]. \end{cases}$$

A voter given a single opportunity to guess the exact location of s_2 before and after observing "costly setter entry" would more likely guess correctly after the observation. The increased likelihood is due to the fact that there are fewer possible responses after the updating, and the responses that are eliminated by the updating would have all been incorrect guesses. Therefore, I claim that after observing costly setter entry, voters can make more accurate inferences about the location of s_2.

Besides allowing voters to update their beliefs in the manner just described, the size and location of the "range of unprofitable alternatives" will determine the number of voters that are members of one of two mutually exclusive and collectively exhaustive subsets of the electorate. The members of the first subset are called *centrist voters* $\{i|T_i \in [SQ - \frac{\epsilon}{2}, SQ + \frac{\epsilon}{2}]\}$ and the members of the second subset are called *noncentrist voters* $\{i|T_i \notin [SQ - \frac{\epsilon}{2}, SQ + \frac{\epsilon}{2}]\}$. The setter (being completely informed) knows the exact number of voters in each subset. Lemma 4 tells us that *centrist voters* can infer from the setter's entry, and the

TABLE 3.

Behavior and Outcomes from Experiments Based on the Model

TYPE OF DIRECT LEGISLATION ENVIRONMENT	CONTROL CASE	COSTLY ENTRY	COMPLETE INFORMATION
consistent votes (ex post)/total votes	164/246 (67)	212/289 (73)	233/246 (95)
CIMPA was the electoral outcome	22/40 (55)	69/80 (86)	37/40 (92.5)

Note: Percentages are in parentheses. CIMPA stands for Complete Information Majority Preferred Alternative.

common knowledge, that s_2 will provide them with lower utility than will *SQ*; that is, a voter who has an ideal point that is sufficiently close to *SQ* knows that anyone who pays a large amount in an attempt to defeat *SQ* must be proposing an alternative that is relatively far from his ideal point.

LEMMA 4. *"Vote for the status quo" is a dominant strategy for all centrist voters.*

In the equilibrium of the costly entry game type (the formal statement and proof of this equilibrium is included in Appendix C), the setter enters and chooses the personal ideal point as the location of s_2 if and only if the ideal point is not located within the range of unprofitable alternatives *and* updated beliefs will lead to a majority of voters to vote for s_2. Otherwise, she does not contest the election.[20] Centrist voters vote for *SQ* (and never make ex post mistaken inferences). Noncentrist voters maximize expected utility, where the expectation is conditional on their ideal point and their updated beliefs about s_2. From a computational perspective, it is interesting to note that s_2 is the electoral outcome only if the number of noncentrist voters who expect to receive a higher level of utility from s_2 than *SQ* make up a *majority of all voters*.

We can form several testable hypotheses about the effect of information asymmetries and signaling on the relationship between voter preferences and electoral outcomes by comparing the costly entry and control case equilibria. First, both centrist and noncentrist voters can use their observation of the agenda-setter's entry decision to make more accurate inferences about the location of s_2. Second, the introduction of this type of information should result in a greater (relative to the control case) likelihood that the CIMPA is the direct legislation outcome.[21]

I have elsewhere used a series of laboratory experiments to test whether the introduction of costly-entry-type information would (1) affect the probability that incompletely informed voters cast votes that were consistent with the votes they should have cast if they were "completely informed income maximizers" and/or (2) change the probability that the CIMPA was the direct legislation outcome (Lupia n.d.[a]). Some of these experiments were based on the control case and costly entry game types. In other experiments, all players were *completely informed*. Table 3 shows that the introduction of costly entry increased both of the aforementioned probabilities in these experiments. (Compare the control case experiments to the costly entry experiments.)

The effect of the type of information introduced in this game type has important substantive implications. To the extent that we are able to project the concept of costly entry on to a broader concept of "voter observations and beliefs about agenda-setter effort," we can use this model to better understand how voters can use commonly available, low-cost information cues in order to make decisions that are more likely to lead to the outcomes that would be chosen if the electorate had acquired more accurate information.

The Effect of Credible Endorsements

I now examine the effect of perfectly credible endorsements on voting behavior and electoral outcomes. The endorsement, $M_2(s_2) \in \{-1, 0, 1\}$, represents a costlessly verifiable, truthful opinion expressed by some individual or organization about the relative merits of *SQ* and s_2. In this model, it is assumed that voters know that the endorser possesses complete information and is a perfectly reliable source of information. The endorsement allows us to characterize the effect that the statements of well-known individuals, trusted friends, political parties, and opinion leaders have on individual-level voting behavior. The endorsement, as modeled here, is similar to the endorsement concept introduced by McKelvey and Ordeshook (1985). (In the description of this game type, $K = 0$ is assumed. Therefore, the only difference between this game type and the control case is the availability of the endorsement.)[22]

The content of the endorsement is either "s_2 is to the left of *SQ*," $M_2(s_2) = -1$; "s_2 is the same as *SQ*," $M_2(s_2) = 0$; or "s_2 is to the right of *SQ*," $M_2(s_2) = 1$. Since it is common knowledge that a perfectly credible endorsement will be provided, the setter knows that the choice of s determines which of three messages, $M(s, X) \in \{(1, -1), (1, 0), (1, 1)\}$, will be sent to voters. Voters use Bayes Rule to incorporate this information into their beliefs about the location of X. This updating leads to a revised distribution of setter ideal points, $F[X|(1, 1)]$ or $F[X|(1, -1)]$, which is related to prior beliefs $F(X)$ as follows:

If $M(s, X) = (1, 1)$, then

$$f(X|(1, 1)) = 0 \in [0, SQ)$$

$$= f(X) \times \frac{1}{1 - F(SQ)} \in (SQ, 1]$$

If $M(s, X) = (1, -1)$, then

$$f(X|(1, -1)) = F(X) \times \frac{1}{F(SQ)} \in [0, SQ)$$

$$= 0 \in (SQ, 1]$$

$$\text{and } F(X|(1, 0)) = SQ.$$

The updating in the game type allows all voters to make more accurate inferences about the location of s_2.

Besides allowing voters to update their beliefs in the manner just described, the endorsement serves to divide the electorate into two mutually exclusive and collectively exhaustive subsets. Let the voters whose ideal points are located in the range where $f(X|(1, 1)) = 0$ or $f(X|(1, -1)) = 0$ be called *opposite voters* ($\{i|T_i \in [0, SQ)$, if $M_2(s_2) = 1\}$, $\{i|T_i \in (SQ, 1]$, if $M_2(s_2) = -1\}$). Let all other voters be known as *nonopposite* voters. The setter, being completely informed, knows the exact number of voters in each subset. Lemma 5 tells us that *opposite voters* can infer from the endorsement and the common knowledge that X will provide them will lower utility than will SQ. For instance, a voter who knows that SQ is to the right of his or her ideal point, and whom an endorsement tells that s_2 is to the right of SQ, then the voter knows that SQ will provide higher utility than the realization of s_2.

LEMMA 5. *"Vote for the status quo" is a dominant strategy for all opposite voters.*

In the equilibrium of the *endorsement* game type (the formal statement and proof of this equilibrium is included in Appendix C), the setter always enters and chooses the personal ideal point as the location of s_2. Opposite voters vote for SQ and never make ex post mistaken inferences. Nonopposite voters maximize expected utility, where the expectation is conditional on their ideal points and their beliefs about s_2—which themselves are conditional on the endorsement. In general, all voters can use the endorsement to make more accurate inferences, which results in a greater likelihood (relative to the control case) that the CIMPA is the electoral outcome. From a computational perspective, s_2 is the electoral outcome only if the number of nonopposite voters whose updated expected level of utility from s_2 is higher than the certain level of utility that SQ provides make up a *majority of all voters*. In addition, if the setter's ideal point is on the opposite side of SQ from the median voter's ideal point, then the presence of a credible endorser prevents the setter from obtaining an outcome preferred to SQ.

When credible endorsements are available, the model suggests that the ability to answer questions about issue specifics is not a necessary condition for casting an "informed" vote. I have elsewhere attempted an empirical verification of this suggestion (Lupia 1991). In November 1988, I conducted an exit poll that was designed to elicit a measurement of what insurance reform voters in California knew about issue specifics, the "underlying" policy preferences of prominent endorsing groups, and the explicit preferences of the prominent endorsing groups over the alternatives that qualified for the ballot. One finding from the analysis of the poll is that respondents who possessed information about endorsers but could not answer questions about issue specifics cast votes very similar to those respondents who had both similar, relevant, personal characteristics and possessed enough information to answer issue-specific questions. This finding supports my model's claim that voters can use endorsements to make more accurate inferences (i.e., the types of inferences that "informed" respondents make) and increase the likelihood that they cast the same vote they would have cast if they had possessed better, or complete, information.

The effect of introducing costly setter action and perfectly credible endorsements suggest that the voters' access to simple and publicly available sources of information can help direct legislation voters make ex post more accurate inferences. The fact that we observe political elites making efforts to provide these types of cues suggests that these actors recognize and adapt to the information problems that are inherent in political decision making. If obtaining these forms of information requires less effort than obtaining information about the true location of an alternative, then the comparative statics suggest that when credible endorsements are available, a voter can cast an "informed" vote while possessing what might appear to be very limited information.

The Effect of Learning the Setter's Ideal Point

Finally, I consider the case where voters learn the location of the setter's ideal point. I include this game type to show that the setter's equilibrium location strategy, $s_2 = X$, holds even when voters are completely informed about the agenda-setter's preferences. In this game type, the perfectly reliable endorsement tells voters the location of the setter's ideal point, X, as opposed to the directional information it provided in the previous game type. That voters know X and do not observe s_2 when it is time for them to vote yields a game that is similar to the *one seller and sophisticated buyer* model of Milgrom and Roberts (1986).

In the equilibrium to the *learn setter's ideal point* game type, (the formal statement and proof of this equilibrium is included in Appendix C), the setter always enters and chooses $s_2 = X$. Voters never make ex post mistaken inferences because their knowledge of X allows them to infer precisely where s_2 will be. The electoral result is the setter's ideal point only when the median voter prefers X to SQ. In addition, the CIMPA is always the electoral outcome.

The analysis of this game type is interesting since it provides an example of how even the smallest degree of voter uncertainty about the location of the alternative does not provide the setter with a sufficient incentive to consider voter preferences when making a location decision; that is, unless voters have full information in the direct legislation environment, the setter should choose his or her ideal point as the alternative to SQ. Intuition suggests that the voter's location strategy may be more responsive to voter preferences if either repeated play or increased electoral competition provided voters with opportunities to punish setters who propose "extreme" alternatives. The accuracy of this suggestion should be evaluated in future research.

CONCLUSION

This spatial model allows us to obtain a better understanding of the effect that different types of information have on political behavior and electoral outcomes. I use the model to provide a relatively dynamic description of how voters can use information cues to make more accurate inferences about electoral alternatives. More accurate voter inferences increase the probability that an incompletely informed voter casts the same vote he or she would have cast with better or complete information. When information cues increase the likelihood that incompletely informed voters emulate the behavior of informed voters, the probability that the complete information majority preferred alternative (CIMPA) is the direct legislation outcome increases.

I also use the model to show conditions under which information and communication opportunities affect the strategies of a monopoly agenda-setter. The most noteworthy characteristic of agenda-setter behavior in the model is that the agenda-setter should offer the personal ideal point as an alternative to the status quo when knowing that voters will be uncertain about the location (content) of the alternative. The fact that the content-determining component of the setter's strategy can be totally unresponsive to voter preferences demonstrates that the effects of political information are not necessarily limited to voter behavior or electoral outcomes. A comparison of setter behavior under different information conditions shows how the information that political elites have about the sources and content of election-day voter information might affect their preelection decisions about how to choose issues or frame campaign messages.

I now suggest two ways to enhance the applicability of this research and provide one piece of advice for those who wish for better informed voters. One direction for future research is to incorporate competition among political elites into this type of model. The presence of incompletely informed voters generates the potential effectiveness of information cues. If political elites expect cues to have an effect on voting behavior, we should not be surprised when they incorporate the provision of information cues into their electoral strategies. I expect that competition among potential agenda controllers and competition among information providers will affect the type and content of information available to voters. If competition affects information and information affects voting behavior, then research that incorporates both information and competition promises to teach us a great deal about political decision making.

I also believe that incorporating the notion of credibility into the study of political decision making is important. In most studies of politics, the role of information cues is ignored. In this model, information cues are perfectly credible. In reality, there exist many types of information cues; and they are often not perfectly credible. Those who have the resources to provide political information sometimes have an incentive to mislead voters. This possibility suggests that the credibility of the information provider could determine how certain types of information affect strategies and electoral outcomes. Credibility is a dynamic phenomenon and a complete description of its effects requires a distinct analysis. In a model related to the present one I feature credibility as a fundamental (and continuous) parameter for the analysis of elections; I find conditions under which an uninformed voter can use aspects of interaction with a possibly unreliable information provider to increase the likelihood of making the same decision the voter would have made if completely informed; and I show that the central results, derived herein, are robust to the introduction of credibility as a parameter (Lupia n.d.[b]).

I close by restating that my original motivation for the development of this model came from the debate about the use of the initiative and referendum in the determination of public policy. One of the criticisms of these institutions is that voters are not informed enough to make complex policy decisions. While educating voters about the intricacies of policy is one way to quell this type of criticism, I assert that many voters would not volunteer for such an education, since they have other things they want to do. Therefore, suppose that we can identify a class of situations where the existence of credible cues would help voters make more accurate inferences and that anticipation of the availability of these cues gives political elites greater incentives to be responsive to voter preferences. Then, those who want "more informed outcomes" might be better off ensuring that credible cues are provided to individuals who have an interest in electoral outcomes, the capacity for simple reasoning, and other things to do.

APPENDIX A: DERIVATION OF THE EQUILIBRIUM CONCEPT

I define the equilibrium by stating the Bayes–Nash equilibrium for this game and then incorporating the assumptions of this model into the Bayes–Nash statement. Let $\bar{M}$ denote the message space which is {0, 1} times the space defined in Table 2.

$\forall (k, j) \in \bar{M}$, let $A(k, j) = \{X: s_1 = k, \text{ and } M_2(s_2) = j\}$ be the set of all setter types that send message $M(s, X) = (k, j)$.

In a Bayes–Nash equilibrium, $\forall X \in [0, 1]$, the setter chooses $s \in \{0, 1\} \times [0, 1]$ to maximize

$$\phi_0(s, v_1, \ldots, v_n | X, T_1, \ldots, T_n),$$

and each voter $i \in N$ and $T_i \in [0, 1]$ chooses $v_i(T_i)$ to maximize

$$\int U_i[o(s_2, v_i(T_i, M(s, X)), v_{-i}(T_{-i}, M(s, X))), T_i]$$
$$dF(X)\, dG(T_{-i}).$$

The first difference between our equilibrium concept and Bayes–Nash is that we assume that voters always vote as if they are the pivotal voters (i.e., they adopt strategies that are weakly dominant with respect to the strategies of other voters); that is, $v_i^* \in S_i$ is weakly dominant if

$$\forall v_i \in S_i, v_{-i} \in S_{-i}, s \in S_0, T_i \in [0, 1], \text{ and } T_{-i} \in [0, 1]^{n-1}$$

$$\int U_i[o(s_2, v_i(T_i, M(s, X)), v_{-i}(T_{-i}, M(s, X))), T_i]$$
$$\geq \int U_i[o(s_2, v_i(T_i, M(s, X)), v_{-i}(T_{-i}, M(s, X))), T_i],$$

with strict inequality for some T_i, T_{-i}, v_{-i}, and s. If v_i^* is dominant, it must be the case that

$$\int U_i(o(s_2, v_i(T_i, M(s, X)), v_{-i}(T_{-i}, M(s, X))), T_i)$$
$$dF(X) \geq \int U_i(o(s_2, v_i(T_i, M(s, X)),$$
$$v_{-i}(T_{-i}, M(s, X))), T_i)\, dF(X),$$

with sometimes strict inequality, which implies

$$\sum_{(j,k)\in M} \int_{A(j,k)} U_i(o(s_2, v_i(T_i, j, k), v_{-i}(T_{-i}, j, k)),$$
$$T_i)\, dF(X) \geq \sum_{(j,k)\in \bar{M}} \int_{A(j,k)} U_i(o(s_2, v_i(T_i, j, k), v_{-i}$$
$$(T_{-i}, j, k)), T_i)\, dF(X).$$

Note that for all $v_{-i} \in S_{-i}$ and $T_{-i} \in [0, 1]^{n-1}$, i can only affect the outcome of the election if

$$\sum_{i' \in (N-i)} v_{i'}(T_{i'}, (j, k)) \in \{0, 1\}.$$

In this case

$$o(s, v_i(T_i, M(j, k), v_{-i}(T_i, M(j, k))))$$
$$= \begin{cases} s_2 & \text{if } v_i = 1 \\ SQ & \text{if } v_i = -1. \end{cases}$$

Hence

$$v_i =$$
$$1 \text{ if } \int_{A(j,k)} U_i(s_2, T_i)\, dF(X) > \int_{A(j,k)} U_i(SQ), T_i)\, dF(X)$$
$$-1 \text{ if } \int_{A(j,k)} U_i(s_2, T_i)\, dF(X) \leq \int_{A(j,k)} U_i(SQ, T_i)\, dF(X)$$

is a dominant strategy for voter i. But v_i can be rewritten as

$$v_i = \begin{cases} 1 & \text{if } \int_{A(j,k)} U_i(s, T_i)\, dF(X) > U_i(SQ, T_i) \int_{A(j,k)} dF(X) \\ -1 & \text{if } \int_{A(j,k)} U_i(s, T_i)\, dF(X) \leq U_i(SQ, T_i) \int_{A(j,k)} dF(X) \end{cases}$$

$$v_i = \begin{cases} 1 & \text{if } \int_0^1 U_i(s, T_i)\, dF(X|j, k) > U_i(SQ, T_i) \\ -1 & \text{if } \int_0^1 U_i(s, T_i)\, dF(X|j, k) \leq U_i(SQ, T_i), \end{cases}$$

where

$$f(X|k, j)) = \begin{cases} \dfrac{f(x)}{pr(k, j)} & \text{if } x \in A(k, j) \\ 0 & \text{otherwise.} \end{cases}$$

I can therefore restate the equilibrium concept for the direct legislation model (which is now more similar to the sequential equilibrium concept of Kreps and Wilson 1982 than Bayes–Nash) as a set of strategies $s \in S_0$, $v_i \in S_i$, and voter beliefs $f(X|k, j)$, such that for each $(k, j) \in \bar{M}$,

SETTER $\forall X$, $s = (s_1, s_2)$ satisfies $\max_{s \in \{0,1\} \times [0,1]}$

$$[U_0(o(s_2, v_1(T_1, M(s, X)), \ldots,$$
$$v_n(T_n, M(s, X)), X)) - (K \times s_1)].$$

VOTERS $\forall T_i$, $(i \in N)$, and $\forall (k, j) \in \bar{M}$, $v_i(T_i, k, j)$ satisfies

$$v_i = 1 \text{ if } \int_0^1 U_i(s_2, T_i)\, dF(X|k, j) > U_i(SQ, T_i)$$

$v_i = -1$ otherwise.

BELIEFS $\forall (k, j) \in \bar{M} : f(X|k, j) = \begin{cases} \dfrac{f(x)}{pr(k, j)} & \text{if } x \in A(k, j) \\ 0 & \text{otherwise,} \end{cases}$

where

$$pr(k, j) = \int_{A(k,j)} F(x)\, dx.$$

If we assume that the setter is completely informed, we can redefine and simplify the setter's optimization problem in the following manner. In a Bayes–Nash equilibrium, $\forall X \in [0, 1]$, the setter chooses $s \in \{0, 1\} \times [0, 1]$ to maximize

$$U_0(o(s_2, v_1(T_1, M(s, X)), \ldots, v_n(T_n, M(s, X)), X)) - (K \times s_1).$$

Now, $\forall M(s, X) \in \bar{M}$ and $s \in S_0$, let

$$C(SQ, M(s, X)) = \{|T_i|: U_i(s_2, T_i)\, dF\, (X|M(s, X)) \leq U_i(SQ, T_i)\},$$

and

$$C(s_2, M(s, X)) = N - C(SQ, M(s, X)).$$

$C[SQ, M(s, X)]$ is a count of the number of voters who receive expected utility from the SQ that is greater than or equal to the expected utility from the lottery of setter types sending message $M(s, X)$. $C[s_2, M(s, X)]$ is a count of the number of voters who receive higher expected utility from the lottery of setter types sending message $M(s, X)$ than from SQ. I can, for any $X \in [0, 1]$, redefine the setter's optimization problem as follows. *Choose* $s = (s_1, s_2)$ *to maximize*

$$\Phi_0(s, M(s, X)|X) = \begin{cases} U_0(SQ, X) - (K \times s_1) & \text{if } C(SQ, M(s, X)) \geq \dfrac{N}{2} \\ U_0(s_2, X) - (K \times s_1) & \text{if } C(SQ, M(s, X)) < \dfrac{N}{2}. \end{cases}$$

Thus, the equilibrium concept I have used is defined as a set of strategies, $s \in S_0$, $v_i \in S_i$, and voter beliefs, $f(X|k, j)$, such that for each $(k, j) \in \bar{M}$

SETTER $\forall X$, $s = (s_1, s_2)$ satisfies $\max_{s \in \{0,1\} \times [0,1]}$

$$\Phi_0(s, M(s, X)|X) = \begin{cases} U_0(SQ, X) - (K \times s_1) & \text{if } C(SQ, M(s, X)) \geq \dfrac{N}{2} \\ U_0(s_2, X) - (K \times s_1) & \text{if } C(SQ, M(s, X)) < \dfrac{N}{2}. \end{cases}$$

VOTERS $\forall T_i$, $(i \in N)$, and $\forall (k, j) \in \bar{M}$, $v_i(T_i, k, j)$ satisfies

$$v_i = 1 \text{ if } \int_0^1 U_i(s_2, T_i)\, dF\, (X|k, j) > U_i(SQ, T_i)$$

$v_i = -1$ otherwise.

BELIEFS $\forall (k, j) \in \bar{M} : f(X|k, j)$

$$= \begin{cases} \dfrac{f(x)}{pr(k, j)} & \text{if } x \in A(k, j) \\ 0 & \text{otherwise,} \end{cases}$$

where

$$pr(k, j) = \int_{A(k,j)} F(x)\, dx.$$

APPENDIX B: PROOF OF LEMMA 2

Proof. The setter's choice of strategy relays a message to voters. Voters condition their choice on the message $M(s, X) = (s_1, M_2(s_2))$. I now establish the dominance of the strategy $s_2 = X$ for the four game types I introduce.

1. From the definition of the control case and Lemma 1, the setter sends only one type of message, $M(s, X) = (1, 0)$. (The setter always [costlessly] enters and there is no endorsement.) In this case, where $K = 0$, the setter chooses s to maximize

$$\Phi_0(s, M(s, X)|X) = \Phi_0((1, s_2), (1, 0)|X) = \begin{cases} U_0(SQ, X) & \text{if } C(SQ, 1, 0) \geq \dfrac{N}{2} \\ U_0(s_2, X) & \text{if } C(SQ, 1, 0) < \dfrac{N}{2} \end{cases}$$

If $C(SQ, 1, 0) \geq N/2$, then $\Phi_0((1, s_2), (1, 0)|X) = U_0(SQ, X)$, independent of s_2. If $C(SQ, 1, 0) < N/2$, then $\Phi_0((1, s_2), (1, 0)|X)$ is maximized when $s_2 = X$. Therefore, since U_0 is maximized at $s_2 = X$ independent of the value of $C(SQ, 1, 0)$, this strategy is weakly dominant for the setter in the control case game.

2. In the *costly entry* case, the setter can send one of two messages, $M(s, X) \in \{(0, 0), (1, 0)\}$. (The setter either enters or does not. There is no endorsement.) If $M(s, X) = (1, 0)$, then $\Phi_0((1, s_2), (1, 0)|X)$ is maximized by $s_2 = X$, as was shown in the control case section of this proof. Note that the value of $\Phi_0((0, s_2), (0, 0)|X)$, the setter's utility when the election is not contested, is not affected by s_2: $\Phi_0((0, s_2), (0, 0)|X) = U_0(SQ, X) - (K \times 0)$. Therefore, $s_2 = X$ is weakly dominant for the setter in the costly entry case.

3. From the definition of the *endorsement* game type and Lemma 1, the setter can send one of three messages, $M(s, X) \in \{(1, -1), (1, 0), (1, 1)\}$. (The setter always [costlessly] enters and there is an endorsement.) The setter chooses s to maximize (where $K = 0$)

$$\Phi_0(s, M(s, X)|X) = \begin{cases} \Phi_0((1, s_2), (1, 1)|X) & \text{if } SQ < s_2 \\ \Phi_0((1, s_2), (1, 0)|X) & \text{if } SQ = s_2 \\ \Phi_0((1, s_2), (1, -1)|X) & \text{if } s_2 < SQ, \end{cases}$$

where

$$\Phi_0[(1, s_2), (1, 1)|X] = \begin{cases} U_0(SQ, X) & \text{if } C(SQ, 1, 1) \geq \frac{N}{2} \\ U_0(s_2, X) & \text{if } C(SQ, 1, 1) < \frac{N}{2} \end{cases}$$

$$\Phi_0[(1, s_2), (1, 0)|X] = U_0(SQ, X)$$

$$\Phi_0[(1, s_2), (1, -1)|X] = \begin{cases} U_0(SQ, X) & \text{if } C(SQ, 1, 1) \geq \frac{N}{2} \\ U_0(s_2, X) & \text{if } C(SQ, 1, -1) < \frac{N}{2}. \end{cases}$$

If $X = SQ$, then the proof is obvious. If $X \neq SQ$, then it remains to show that $s_2 = X$ is weakly dominant. Consider the following two subcases:

a. $s_2' \neq X$ and $s_2 = X$, where $s' = (s_1, s_2')$ and $s = (s_1, X)$, and $M(s', X) = M(s, X)$. If $s_2' \neq X$ then $U_0(X, X) > U_0(s_2', X)$ which implies $\Phi_0(s, M(s, X)|X) \geq \Phi_0(s', M(s_0', X)|X)$. (I.e., since $M_2(s_2 = X) = M_2(s_2 \neq X)$, voters cannot differentiate amongst the setter types that would send each message.) Thus, $s_2 = X$ is a weakly dominant setter location strategy in the endorsement game type when $M_2(s_2) = M_2(s_2)$.
b. $s_2 \neq X$ and $M_2(s_2) \neq M_2(X)$. Thus, $s_2 \neq SQ$. Let $s_2'(X) = (s_2 + SQ)/2$. $M_2(s_2) \neq M_2(X)$ implies that X and s_2 are on opposite sides of SQ. Thus, any $s_2'(X)$ that is closer to SQ provides a higher level of utility to the setter: $U_0[s_2'(X), X] > U_0(s_2, X)$. Hence, changing from s_2 to $s_2'(X)$ gives the setter a higher level of utility. Thus, s_2 cannot be an equilibrium partial strategy.

From Case A and Case B, I have established that $s_2 = X$ is a weakly dominant location strategy for the setter in the "Endorsement" game type.

4. In the *learn setter's ideal point* game type, the definition of the endorsement changes. $M_2(s_2) = X$ is the endorsement; $\bar{M} = \{0, 1\} \times [0, 1]$ is the message space; and $K = 0$.[23] Then, I can define the setter's objective function for this game type as

$$\Phi_0'(s, M(s, X)|X) = \begin{cases} U_0(SQ, X) & \text{if } C[SQ, M(s, X)] \geq \frac{N}{2} \\ U_0(s_2, X) & \text{if } C[SQ, M(s, X)] < \frac{N}{2}. \end{cases}$$

The setter of type X can send one of two messages in this game type, $M' \in \{(0, X), (1, X)\}$. The setter's chooses s to maximize $\Phi_0'(s, M(s, X)|X)$, where

$$\Phi_0'[(0, s_2), (0, X)|X] = U_0(SQ, X).$$

$$\Phi_0'[(1, s_2), (1, X)|X] = \begin{cases} U_0(SQ, X) & \text{if } C(SQ, 1, X) \geq \frac{N}{2} \\ U_0(s_2, X) & \text{if } C(SQ, 1, X) < \frac{N}{2}. \end{cases}$$

Note, first, that the value of $\Phi_0'((0, s_2), (0, X)|X)$ is not affected by the setter's choice of s_2. If $M(s, X) = (1, X)$, then $\Phi_0((1, X)|X)$ is maximized by $s_2 = X$, as was shown in control case section of this proof. (The only difference between this objective function and that objective function is a constant.) Thus, $s_2 = X$ is a weakly dominant location strategy for the learn setter's ideal point game type.

APPENDIX C: FORMAL STATEMENT OF EQUILIBRIA

Control Case

PROPOSITION. *The equilibrium for the control case is*

$\forall\ X \in [0, 1]: s = (1, X)$

$\forall\ T_i \in [0, 1]: v_i(T_i, M(s, X))$

$$= \begin{cases} 1 \ \textit{if} \int_0^1 [U_i(X, T_i)f(X|M(s, X))] > U_i(SQ, T_i) \ \textit{and}\ M_1(s_1) = 1 \\ -1 \ \ \textit{otherwise.} \end{cases}$$

Beliefs can be characterized by $f(X|M(s, X)) = f(X)$.

Proof. The setter's equilibrium entry strategy is proven by Lemma 1. The setter's location strategy is proven by Lemma 2.

Costly Entry Game Type

PROPOSITION. *The equilibrium for the costly entry game type is*

$\forall\ X \in [SQ - \epsilon, SQ + \epsilon]: s_1 = 0$

$\forall\ X \in [0, SQ - \epsilon), (SQ + \epsilon, 1]: s_1$

$$= \begin{cases} 1 & \textit{if } C(SQ, M(s, X)) < \frac{N}{2} \\ 0 & \textit{otherwise} \end{cases}$$

$\forall\ X \in [0, 1]: s_2 = X$

$\forall\ T_i \in [0, SQ - \frac{\epsilon}{2}), (SQ + \frac{\epsilon}{2}, 1]:$

$v_i(T_i, M(s, X)) =$

$$1 \quad if \int_0^1 [U_i(X, T_i) f(X|1, 0))] > U_i(SQ, T_i) \text{ and } M_1(s_1)$$

$$= 1 - 1 \quad otherwise$$

Beliefs can be characterized by $f(X|(1, 0))$ or $f(X|(0, 0)) = SQ$, depending on the value of s_1.

Proof. The setter's equilibrium entry strategy is proven by Lemma 1 and Lemma 3. The setter's location strategy is proven by Lemma 2. Centrist voter equilibrium strategies can be characterized by Lemma 4.

Endorsement Game Type

PROPOSITION. *The equilibrium for the endorsement game type is*

$$\forall\ X \in [0, 1]: s_1 = 1$$

$$\forall\ X \in [0, 1]: s_2 = X$$

$$\forall\ T_i \in [0, SQ): v_i[T_i, M(s, X)] =$$

$$\begin{cases} 1 \text{ if } M_2(s_2) = -1 \text{ and } \int_0^1 [U_i(X, T_i) f(X|(1, -1))] \\ \qquad > U_i(SQ, T_i) \text{ and } M_1(s_1) = 1 \\ -1 \text{ otherwise} \end{cases}$$

$$\forall\ T_i \in (SQ, 1]: v_i[T_i, M(s, X)] =$$

$$\begin{cases} 1 \text{ if } M_2(s_2) = 1 \text{ and } \int_0^1 [U_i(X, T_i) f(X|(1, 1))] \\ \qquad > U_i(SQ, T_i) \text{ and } M_1(s_1) = 1 \\ -1 \text{ otherwise.} \end{cases}$$

Beliefs can be characterized by $f(X|(1, -1))$ or $f(X|(1, 1))$, depending on the value of $M_2(s_2)$.

Proof. The setter's equilibrium entry strategy is proven by Lemma 1. The setter's location strategy is proven by Lemma 2. The opposite voter equilibrium strategies can be characterized by Lemma 5.

Learn Setter's Ideal Point Game Type

Let $\bar{M} = \{0, 1\} \times [0, 1]$ be the message space. $M_2(s_2) = X$ is the endorsement, which reveals the setter's ideal point to voters (cf. Milgrom and Roberts 1986, prop. 1).

PROPOSITION. *The equilibrium for the "Learn Setter's Ideal Point" game type is:*

$$\forall\ X \in [0, 1]: s_1 = 1 \text{ if } C(SQ, M(s, X)) < \frac{N}{2}$$

$$\forall\ X \in [0, 1]: s_1 = 0 \text{ otherwise}$$

$$\forall\ X \in [0, 1]: s_2 = X$$

$$\forall\ T_i \in [0, 1]: v_i[T_i, M(s, X)]$$

$$= \begin{cases} 1 & \text{if } U_i(X, T_i) > U_i(SQ, T_i) \text{ and } M_1(s_1) = 1 \\ -1 & \text{if } U_i(X, T_i) < U_i(SQ, T_i). \end{cases}$$

Beliefs can be characterized by X.

Proof. The setter's equilibrium entry strategy is proven by Lemma 1. The setter's location strategy is proven by Lemma 2.

Notes

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1. The distinction between these two election types is that referenda originate from within the government and ballot initiatives originate from outside the government. The United State is one of the few democracies that does not use the initiative or referendum to determine national level policy, but their use is extensive at the state and local level. Recent important—but largely atheoretical—contributions to this debate include those of Magleby (1984) and Cronin (1989).

2. The setter model has been examined under different assumptions about the nature of incomplete information. In Romer and Rosenthal 1979, the setter model is examined under conditions of uncertain turnout. In Morton 1988, voters condition their actions in the present period on anticipated setter actions in future periods. Rosenthal (1990) discusses other elaborations of the "setter model."

3. The idea that the presence of low-cost information cues can influence policy outcomes is powerfully made by McCubbins and Schwartz (1984). They argue that Congress can efficiently narrow the divergence between legislative goals and bureaucratic actions by designing institutions that provide interested parties with incentives to obtain information (referred to as "fire alarms") about the correspondence between legislative goals and bureaucratic activities.

4. For simplicity, the one-dimensional case is discussed. Since there are, at most, two electoral alternatives in this model, the extension of the model to higher levels of dimensionality (making standard assumptions about voter preferences) is straightforward.

5. This representation of setter preferences allows a general representation of player prior beliefs. For example, when F is uniformly distributed, voters will assume that all possible setter ideal points can be drawn with equal probability. Alternatively, when F has all of its mass on one point, the voter's priors are completely informative.

6. A simple way to relax the assumption that the setter is completely informed is to allow N to be either infinite (or large and finite, a good approximation) and let the setter's information about the voter ideal points be the distribution G. A derivation of the model using the latter assumption is available upon request.

7. For notational convenience, I denote $s_2(X) = SQ$, when $s_1(X) = 0$ (i.e., the setter chooses to accept SQ).

8. Also, since $F(X)$ and $[0, 1]$ are continuous, $SQ = s_2$ occurs with near zero probability. If this event does occur, it follows trivially that SQ is the direct legislation outcome.

9. Supermajorities follow straightforwardly by changing the values of v_i. None of my results depend on the use of simple majority rule.

10. I have assumed that the SQ wins ties. This assumption is consistent with the tie-breaking rule used in many of direct legislation environments. Changing this assumption does not

alter the power of the results that follow, but it will influence boundary conditions in straightforward ways.

11. This restriction is made for notational and expositional simplicity. The assumptions of symmetry and linearity are not necessary for the proofs of any of my lemmas or propositions.

12. This assumption is common to most spatial election models.

13. The proofs of other lemmas follow straightforwardly from the assumptions of the model and are available upon request.

14. This statement seems to depend on the nonexistence of a preference profile that will sustain an enforceable system of side payments. In the one-dimensional case, the CIMPA always exists (and, in fact, is always the core or in the core).

15. In this game type, voters always receive the same message $M(s, X) = (1, 0)$, because (from Lemmas 1 and 2) we know that when $K = 0$, contesting the election is a weakly dominant strategy for the setter and there is no endorsement.

16. Except for "opposite" and "centrist" voters, the strategies of voters can be fully characterized using a single cut-point. (This concept is used in Alesina and Rosenthal 1989.) A proof of the uniqueness of the cut-point in this model is available upon request.

17. Spence 1973 is the seminal article on signaling; Milgrom and Roberts 1986 is also directly relevant.

18. By introducing the costly entry concept, I am not attempting to make any statement about the welfare properties associated with altering the magnitude of the barriers to ballot access. I introduce costly entry, since it is a type of information that is, to some extent, observable and is sometimes (as is the case with intense legislative wrangling or initiative campaign expenditures) widely publicized.

19. $d\epsilon/dK$ and $d^2\epsilon/dK^2$ are positive; $\epsilon(0) = 0$.

20. This implies that either all setter types whose ideal points lie outside of the "range of unprofitable alternatives" choose to contest the election or none do.

21. In addition, the introduction of costly entry increases the probability that *SQ* is the direct legislation outcome by narrowing the likelihood that a setter will challenge it. This type of result has been produced in a direct-legislation-type experimental environment by Herzberg and Wilson (1990).

22. The characteristics of the equilibrium of a game type that included both costly entry and endorsements follow straightforwardly from the equilibria presented.

23. The information provided by voters by $K > 0$ in the previous game types is superfluous in this game type.

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