When Do Elections Encourage Ideological Rigidity?[1]

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Abstract

Elected officials are commonly accused of being *ideologically rigid*, or failing to alter their positions in response to relevant policy information. We examine this phenomenon with a theory in which politicians have private information about their ideological leanings and expected policy consequences. The theory shows that under many circumstances the informational differences create a context in which elections induce ideological rigidity. Correspondingly, elections often fail to provide incentives for *information-based moderation*, in which both left- and right-leaning politicians become more likely to use policy information. These seemingly perverse incentives occur because politicians wish to signal that they share voters' leanings; indeed, the motivation to signal preference similarity can induce rigidity even when voters want politicians to be responsive to new information. We show that such incentives for rigidity are greater when voters have less information about policy and politicians' preferences, and discuss possible tests of these predictions.

Scholars and other observers of politics regularly disapprove of politicians who are *ideologically rigid* in the sense of being unwilling to reconsider their policy positions, regardless of policy-relevant information. For instance, scientists and ethicists have criticized President George W. Bush for using his Council on Bioethics merely to "give an ideologically rigid president the veneer of open-mindedness" (Mishra 2004). Morris Fiorina, describing recent politics more generally, has argued that the "real dividing line" in Washington is between ideologically rigid officials and ones like John McCain who are willing to go against their party when they believe doing so is in the public interest (Saunders 2004). Such a critique, while especially salient in an era of partisan polarization among elites, is not new to the American political scene. For example, in the late 1960s the *Wall Street Journal* condemned what it saw as an increase in ideological rigidity, and argued that policy makers should accept the potential fallibility of any given position (*Wall Street Journal* 1968).

Indeed, significant problems can arise when officials stick to particular positions regardless of policy information. Such behavior would seem to counter the premise of representative democracy, which is predicated upon the notion that politicians will have useful policy expertise, or more information than voters have. More specifically, voters may end up with policy outcomes they do not want. In other words, consistent with Fiorina's assessment, ideological rigidity may not advance voters' interests.[1]

Why might ideological rigidity occur? The political science literature suggests several factors that could contribute to it, including interest groups, parties, and candidates' personal preferences. Yet in contrast, the literature indicates that elections might well reduce the incentives for politicians to stick to particular positions regardless of policy information. A standard view of elections, which harks back to Downs (1957), is that they provide incentives for politicians to represent the position of the median voter. In the canonical rendition of this theory, voters and politicians have access to the same information. One natural question, then, is whether the intuition that politicians will do what the median wants can be simplistically applied to a world in which politicians have policy expertise. For example, one might expect that if the median desired an elected official to base her decisions on policy-relevant information, then she would do so. Ideological rigidity would occur only if voters wanted officials to ignore their information.

Perhaps because of the appeal of this logic, the literature has paid scant attention to the possibility that elections might induce more ideological rigidity than voters would like.[2] Previous research has little to say about whether elections promote ideological rigidity, let alone the conditions under which they might do so. Yet if elections do indeed promote rigidity, uncovering this relationship should improve our understanding of this behavior. Moreover, if such a relationship depends on electoral conditions, then clarifying these conditions should help us to predict variation in ideological rigidity across policy issues, elected officials, electoral systems, and over time.

We address this topic by developing a theory of how elections affect an official's incentives to use policy information. In the theory, voters recognize that the official may have ideological leanings that encourage him to make policy decisions they might not desire if fully informed. At the same time, voters know that the official has better policy information than they do. In this basic theory, we show how the incentives for ideological rigidity are influenced by factors including the leanings of the electorate, the preferences of the official, and the quality of the information that the official has. We also extend the theory to show how these incentives depend on voters' information about an official's preferences, about the policy knowledge that the official has, and the degree to which they observe consequences of the official's decision.

By analyzing ideological rigidity, we also examine the conditions under which elections induce an opposing behavior, information-based moderation, in which an official becomes more likely to take an opposing position if his policy information recommends doing so. More specifically, we say that *information-based moderation* occurs when at least some officials who prefer a left-leaning policy regardless of their information will follow their information it if it recommends a right-leaning policy, and at least some officials who prefer a right-leaning policy regardless of their information will follow it if it recommends a left-leaning policy. This concept differs from moderation in the canonical Downsian model, which does not incorporate private policy information and instead simply asks whether officials have electoral incentives to adopt certain positions. Information-based moderation, in contrast, depends crucially on whether officials have electoral incentives to change their policy positions in response to policy-relevant information.

Despite these differences, the two types of moderation bear some similarity. Like Downsian moderation, information-based moderation requires that a politician be willing to move in the direction of an opposing side. Furthermore, survey data indicate that voters in the center of the ideological distribution are more likely than others to want officials to use policy expertise. Self-identified moderates are significantly more likely than conservatives or liberals to want politicians to use their knowledge when it conflicts with public opinion, and moderates are the only group in which a majority favors decision making based on politicians' knowledge over mass opinion.[3] Thus, officials who base their decisions on available policy information will tend to represent the interests of centrist voters. Whether, and under what conditions, officials have an incentive to do this is the key issue our analysis addresses.

Related Literature

Two strands of literature concern whether elections encourage politicians to be ideologically rigid or engage in information-based moderation: research on politicians' role as a delegate versus trustee and research on candidate position-taking. The question of whether politicians should behave more like trustees or delegates has long be a focus of normative theory, and around the middle of the twentieth century positivist scholars began to examine the issue through surveys of legislators. This scholarship suggests substantial variation in whether legislators view themselves as trustees or delegates (e.g., Eulau et al. 1959), and relates the variation to legislative voting behavior (Kuklinski and Elling 1977). Unlike our analysis, however, these studies do not focus on how members' electoral incentives affect their willingness to use information.

Recent formal theories and experimental research provide insight into this question. For instance, Canes-Wrone, Herron, and Shotts (2001) develop a model that suggests incumbents often have electoral incentives to behave like trustees, i.e., by exercising policy leadership rather than pandering to public opinion. The theory presumes that voters and politicians have identical policy preferences. Yet in many circumstances, voters are concerned that elected officials do not share their policy preferences, and experimental work indicates that this voter concern may increase politicians' incentives to behave like delegates. For example, McGraw, Lodge, and Jones (2002) analyze how subjects respond to a legislator's speech on gun control, and find officials have strong incentives to follow public opinion. The study does not, however, presume the legislator has private information about gun control policy. The experiment in Sigelman and Sigelman (1986) does incorporate such informational asymmetry; subjects are told the president has received an intelligence briefing, and are asked to evaluate his decision over whether to use force. The results indicate that voters are willing to support politicians who behave as trustees in addition to those who behave like delegates; in particular, hawkish subjects supported a hawkish president who took a dovish or hawkish action. Yet because the experiment concerns citizens' reactions to presidents rather than presidents' reactions to citizens, it is not designed to examine whether elections encourage presidents to use their private policy information.

The scholarship that most closely addresses this general topic includes Maskin and Tirole

(2004) and Fox (*forthcoming*), which each examine optimal institutional design. Like our analysis, these papers develop formal theories in which politicians have policy expertise and private information about their preferences. Yet the structure of preferences in these models makes it impossible to distinguish circumstances in which elections induce a particular ideological leaning from circumstances in which information-based moderation is an incentive. In other words, the models preclude analyzing whether both left- and right-leaning politicians may become more likely to use their policy information under given circumstances. The preference and information structure in Downs and Rocke (1994) would ostensibly allow for such analysis, but Downs and Rocke simply assume an electoral incentive for information-based moderation; they do not examine whether politicians indeed have such an incentive. Thus in sum, research on politicians' role as a trustee does not tackle whether, and under what conditions, elections induce politicians to be ideologically rigid or instead to engage in information-based moderation.

Studies of candidate position-taking also do not tackle this question because they generally do not incorporate the possibility that politicians have private policy information. This scholarship does, however, offer a variety of findings on how voters' lack of information about their preferences may affect candidates' incentives. For instance, Duggan's (2000) model of repeated elections shows that electoral pressures from centrist voters induce candidates to move towards the median voter's position when voters' preferences can be arrayed on one dimension. In contrast, Chappell and Keech (1986) demonstrate through computer simulations that once voters' preferences are specified on two distinct policy dimensions, voter uncertainty about candidates' positions can decrease incentives for Downsian moderation. Alvarez (1997) supports this finding through survey evidence. Yet because none of these position-taking studies focus on asymmetries in policy information, they cannot address how this feature of representative government may influence politicians' policy incentives.

Modeling Issues

Preferences

A key tension in the model is that an official's preferences may diverge from those of voters. As in other models that assume officials have private information about their preferences and expected policy consequences, we presume that there are two states of the world and two policy choices, where the correct choice is the one that matches the state of the world (Downs and Rocke 1994; Maskin and Tirole 2004; Fox *forthcoming*). For instance, an anti-terrorist policy that curbs civil liberties may or may not be necessary to prevent large-scale terrorist attacks. The choice is whether to approve the policy. Preference divergence arises from the fact that the actors may place different weights on the two types of errors–a failure to approve a necessary policy versus mistakenly approving an unhelpful one. If the true state of the world were known, all actors would prefer the same policy choice–everyone would like to prevent large-scale terrorist attacks, and no one wants to curb civil liberties. In this sense the players have common interests. However, because some players are more concerned about minimizing the risks of terrorism and others are more concerned about the negative side effects, they may weigh the two types of errors differently and consequently have different preferences over what policy actions the official should take. The theory assumes a continuum of preferences in that there are a continuum of possible weights players can place on the two types of policy errors.

Information

Actors do not know the true state of the world–e.g., no one knows for certain whether a given anti-terrorist policy is necessary or whether a new drug should be approved. Voters know the prior probability that a proposed policy is good, and an elected official has an additional signal.

Although this signal is not perfect, it gives the official more information than the public has. As a result, it is possible that the official's information could indicate that a popular policy is not the one fully informed voters would want, and voters know this.

Yet since an official and voters may weigh possible policy errors differently, an official may wish to choose policies that run counter to what fully informed voters would want. This is why preference divergence creates a key tension in the model; voters cannot simply trust an official to use her policy expertise to advance their interests. Continuing with the example of anti-terrorist policy, there are two types of officials that a voter may worry about: a type who is too willing to curb civil liberties, and a type who is too reluctant to do so. The model allows for both types.

These informational assumptions relate to the concepts of ideological rigidity and information-based moderation. Consider the case where politicians must decide whether to allow a pesticide to be used for farming, and the politicians have a signal regarding the safety of the pesticide. Ideological rigidity occurs when an official will support a particular position regardless of the information, e.g., the official will legalize the pesticide regardless of the safety information or ban it regardless. Information-based moderation, in contrast, occurs if elections induce both left- and right-leaning politicians to become more likely to use their information. Continuing with the pesticide example, at least some officials who prefer to ban the pesticide regardless of the signal must be electorally induced to legalize it when the signal indicates that it is safe, and at least some officials who prefer to legalize it regardless of the signal must be induced to ban the pesticide when the signal indicates that it is unsafe.

This example highlights a notable distinction between information-based moderation and the canonical Downsian moderation. The latter entails a continuum of policies. In contrast, information-based moderation does not inherently require more than two policies; in a two-policy world, the behavior can occur when a politician becomes more willing to support either option on the basis of policy information. This feature of information-based moderation comports with recent scholarship on democratic deliberation, which argues that policy debates commonly involve a choice between supporting or opposing a particular option (Jackman and Sniderman 2006). Correspondingly, officials often act in institutional contexts that allow for two policy choices, e.g., roll call votes on which a legislator can vote yea or nay or court cases on which an elected judge can rule for the defendants or plaintiffs.

Electoral Competition

When deciding to re-elect or remove an incumbent, voters know the policy choice. In the main model voters have information about the success or failure of this policy. This assumption is altered in the extensions, where we examine how the results change if no policy feedback is available or if feedback occurs for only one of the policy options. From these and other alternative specifications, we develop testable predictions about how voters' policy information alters politicians' incentives for ideological rigidity.

The main version of the model also employs the standard assumption that the challenger and incumbent come from the same pool of potential candidates (e.g., Ferejohn 1986; Duggan 2000).[4] Notably, this assumption implies that if the electorate decides to replace the incumbent, the challenger could be either to the right or the left of her predecessor. In the extensions, we examine how allowing voters to have better information about the incumbent's and challenger's preferences alters the findings. This comparison suggests predictions about the how the incentives for ideological rigidity on a policy item will vary according to voters' knowledge of candidates' preferences; given that the strength of this signal differs significantly across issues, for individual issues over time, and across different types of electoral systems, this component of the theoretical analysis provides rich possibilities for testing.

The Model

The model has two time periods. In each there is one policy decision and the state of the world is $\omega \in \{A, B\}$. The periods are independent and the prior probability of A in each is $\pi \in (0, 1)$. At the beginning of a given period the elected official receives a private signal $s \in \{A, B\}$ about the state of the world, where the quality of the signal is $q = \Pr(s = \omega) \in \left(\frac{1}{2}, 1\right)$. Given this information, the official must choose a policy $x \in \{A, B\}$.[5]

There are three actors in the model: a voter, incumbent official, and challenger, all of whom are policy motivated and prefer $x = \omega$ over $x \neq \omega$. The actors can differ, however, in their degree of concern over each type of error (choosing $x = B$ when $\omega = A$ versus choosing $x = A$ when $\omega = B$). The relative importance that each actor places on choosing $x = B$ when $\omega = B$ is denoted by $\beta \in [0, 1]$, subscripted β_V for the voter, β_I for the incumbent, and β_C for the challenger. If the correct outcome occurs, i.e., $x = \omega$, then the actor receives zero utility. If $x = A$ when $\omega = B$ then the actor receives utility $-\beta$. On the other hand if $x = B$ when $\omega = A$ the actor receives utility $-(1-\beta)$. An actor's total utility from the game is the sum of the utility in the two periods:

$$\begin{aligned} U &= -\beta \{\text{Total number of mistaken } A \text{ policy choices}\} \\ &\quad - (1-\beta) \{\text{Total number of mistaken } B \text{ policy choices}\}. \end{aligned}$$

The voter and official may have divergent preferences, and an official's β is her private information. Specifically $\beta_V \in [0, 1]$ is common knowledge, but β_I is a random draw from a uniform distribution $F : [0, 1] \rightarrow [0, 1]$. The challenger's β_C is also independently drawn from F. We specify an official's strategy as a function of her preference parameter and private signal about the state of the world. For the first period let the incumbent's strategy, which determines whether she chooses $x = A$ or $x = B$, be $\sigma^1(\beta_I, s) : [0, 1] \times \{A, B\} \rightarrow \{A, B\}$. Similarly, let $\sigma^2(\beta, s) : [0, 1] \times \{A, B\} \rightarrow \{A, B\}$ be the strategy for the second period official.

After the first period the voter must decide either to retain the incumbent or replace her. Before the election, the voter observes the true state of the world ω. Let the voter's strategy be $\nu = (\nu_{AA}, \nu_{AB}, \nu_{BA}, \nu_{BB})$, a vector that specifies the probability that he re-elects the incumbent in each of four information sets. Here $\nu_{AA} \in [0,1]$ is the probability that the voter re-elects the incumbent when $x = A$ and $\omega = A$. Similarly, the voter re-elects the incumbent with probability ν_{AB} when $x = A$ and $\omega = B$, ν_{BA} when $x = B$ and $\omega = A$, and ν_{BB} when $x = B$ and $\omega = B$.

The equilibrium concept employed is Perfect Bayesian. We specify voter beliefs in more detail below, but for now it is worth noting that we do not need to specify beliefs off the equilibrium path since each possible outcome occurs with strictly positive probability.

Policy Choice

The official's action in the second period depends on her preference parameter β and her beliefs about the probability that A is the state of the world. Let these beliefs, which are straightforward to calculate via Bayes's Rule, be denoted as $\theta^A(A) = \Pr(\omega = A | s = A) = \frac{\pi q}{\pi q + (1-\pi)(1-q)}$ and $\theta^A(B) = \Pr(\omega = A | s = B) = \frac{\pi(1-q)}{\pi(1-q) + (1-\pi)q}$. Given these beliefs, the second period private signal s, and the second period official's preferences β, we can characterize optimal second period behavior.

Proposition 1 (Second Period Policy Choice) *There exist cutpoints $\underline{\beta}^2$ and $\overline{\beta}^2$ such that:*

1. *If $\beta < \underline{\beta}^2$ then the official chooses $x = A$ regardless of s*
2. *If $\beta \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$ then the official chooses $x = s$*
3. *If $\beta > \overline{\beta}^2$ then the official chooses $x = B$ regardless of s*
4. $0 < \underline{\beta}^2 < \overline{\beta}^2 < 1$.

Proofs of all propositions are in the appendix. As shown in Figure 1, there are three types of officials, categorized according to their second period behavior: a *type A* official always chooses

$x = A$ regardless of the signal; a *type* R, or signal-responsive, official always chooses $x = s$; and a *type* B official always chooses $x = B$.

[Figure 1 about here]

It is worth emphasizing that an official's type depends not only on her preferences β but also the quality of her signal q and the ex-ante likelihood π that A is the correct policy, since the cutpoints $\underline{\beta}^2$ and $\overline{\beta}^2$ depend on q and π. Thus an official who is type B when the quality of her signal is low may be signal-responsive if q is high. At the same time, for a given q and π, type R officials are the only ones who are open to choosing either A or B in the second period on the basis of the policy information. Accordingly, in the model type R officials are more centrist than type A or B officials, and information-based moderation occurs when some type A and some type B officials are electorally induced to behave in the first period like a type R official. Conversely, elections promote ideological rigidity when some type R officials behave like a type A or B official.

Just as we can characterize officials as being type A, R, or B, we also can categorize a voter as one of these types depending on whether $\beta_V < \underline{\beta}^2$, $\beta_V \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$, or $\beta_V > \overline{\beta}^2$. A type A voter, for instance, wants to elect a type A official for the second period. Since all officials within a given category behave identically in the second period, the voter's expected utility from an official taking office depends upon his beliefs about the probability that the official falls into each of these three categories. Let $\phi_A = F(\underline{\beta}^2)$ be the probability that a randomly drawn official is type A, let $\phi_R = F(\overline{\beta}^2) - F(\underline{\beta}^2)$ be the probability that a randomly drawn official is type R, and let $\phi_B = 1 - F(\overline{\beta}^2)$ be the probability that the randomly drawn official is type B. These ϕ's are also relevant for the first period official's behavior, since she is policy motivated and cares about the action her replacement will take if she fails to win re-election.

The incumbent's probability of re-election depends on the voter's re-election strategy ν and the voter's beliefs about the state of the world. For an official who observes signal s let $r_A(s)$

denote the probability of re-election if she chooses policy A and let $r_B(s)$ denote her probability of winning if she chooses policy B.

$$r_A(s) = \nu_{AA}\theta^A(s) + \nu_{AB}\left(1 - \theta^A(s)\right) \quad (1)$$

$$r_B(s) = \nu_{BA}\theta^A(s) + \nu_{BB}\left(1 - \theta^A(s)\right) \quad (2)$$

We can now partially characterize first period policy behavior. The incumbent's decision depends not only on first period policy considerations but also second period ones, which are based on the probability that she will be re-elected as well as the behavior of her replacement if she is not. Specifically, for any voter behavior, the incumbent's policy choice can be characterized by cutpoints like the ones for second period behavior.

Proposition 2 (Incumbent's First Period Best Response to Voter Strategy) *For any voter strategy ν there exist cutpoints $\underline{\beta}^1$ and $\overline{\beta}^1$ such that in the first period:*

1. *If $\beta_I < \underline{\beta}^1$ then the official chooses $x = A$ regardless of s*
2. *If $\beta_I \in \left[\underline{\beta}^1, \overline{\beta}^1\right]$ then the official chooses $x = s$*
3. *If $\beta_I > \overline{\beta}^1$ then the official chooses $x = B$ regardless of s*
4. $0 \leq \underline{\beta}^1 < \overline{\beta}^1 \leq 1$, *and either* $0 < \underline{\beta}^1$ *or* $\overline{\beta}^1 < 1$.

Propositions 1 and 2 enable us to categorize possible effects that voter behavior may have on first period policy choices. One possibility, shown in Figure 2a, is that for both signals $s \in \{A, B\}$ the official has an electoral incentive to choose policy A, i.e., $r_A(s) > r_B(s)$.

[Figures 2a, 2b, and 2c about here]

In this case, $r_A(B) > r_B(B)$ implies that $\underline{\beta}^1 > \underline{\beta}^2$, i.e., some signal-responsive or type R officials, who prefer $x = B$ when $s = B$, instead choose $x = A$. Likewise, $r_A(A) > r_B(A)$ implies that

$\overline{\beta}^1 > \overline{\beta}^2$, i.e., some type B officials, who prefer $x = B$ even when $s = A$, are electorally induced to choose $x = A$. On the flip side, as shown in Figure 2b, if $r_A(s) < r_B(s)$ for both signals $s \in \{A, B\}$ then a first period official always has an incentive to choose $x = B$ so that $\underline{\beta}^1 < \underline{\beta}^2$ and $\overline{\beta}^1 < \overline{\beta}^2$.

Notably, in both Figures 2a and 2b, some officials have an electoral incentive to be more ideologically rigid than they otherwise would be; the figures accordingly highlight how elections can induce ideological rigidity. For instance, in Figure 2a officials in the range $\left(\underline{\beta}^2, \underline{\beta}^1\right)$ simply choose policy A regardless of the signal, even though these officials would prefer to follow the signal. These incentives for ideological rigidity are asymmetric in the sense that when some officials are induced to be ideologically rigid, others–depending on their preferences and the voter strategy–are induced to use their policy information. For example, in Figure 2a some right-leaning officials, specifically those in the interval $\left(\overline{\beta}^2, \overline{\beta}^1\right)$, are induced to follow their information when choosing the first period policy, whereas some left-leaning officials, specifically those in the interval $\left(\underline{\beta}^2, \underline{\beta}^1\right)$, are driven to be ideologically rigid. This asymmetry occurs because voters are not trying to induce ideological rigidity per se but rather are employing a voting rule that rewards officials for choosing a particular policy option.

There are two other possible effects of voter behavior on the first period policy decision. One, which would give the official incentives to go against her signal, is $r_A(A) < r_B(A)$ and $r_A(B) > r_B(B)$. However this pattern of electoral incentives never occurs in the model.

The final possibility, shown in Figure 2c, is $r_A(A) > r_B(A)$ but $r_A(B) < r_B(B)$ so that $\underline{\beta}^1 < \underline{\beta}^2$ but $\overline{\beta}^1 > \overline{\beta}^2$. In this case, officials always have electoral incentives to follow their signals when choosing first period policy. As a result, an official never has an incentive to be rigid and may engage in information-based moderation. In particular, type A officials in the region $\left(\underline{\beta}^1, \underline{\beta}^2\right)$ are electorally induced to moderate their behavior by choosing $x = B$ when $s = B$. Likewise, type B officials in the region $\left(\overline{\beta}^2, \overline{\beta}^1\right)$ moderate their behavior by choosing $x = A$ when $s = A$. It is worth noting that information-based moderation here is not complete – an incumbent with $\beta_I < \underline{\beta}^1$ or $\beta_I > \overline{\beta}^1$ does not behave like the more centrist, signal-responsive type but rather supports a particular policy regardless of her signal. Still, as in Duggan (2000), both liberal and conservative officials have incentives to alter their behavior and act like centrists. Of course, the moderation here is quite different from that in Duggan's model, which presumes politicians do not have private policy information and choose policy from a continuum. Moreover, information-based moderation does not encompass circumstances in which an official represents the position of a district that wants her to ignore her policy information; indeed, we would call this behavior ideologically rigid while recognizing that it is desired by voters.

As will soon become clear, however, the incentives for ideological rigidity are not limited to electorates that desire such rigidity.

Equilibrium

The equilibrium depends on the voter's type. To explain the equilibrium we begin with some intuition based on how the voter wants the official to behave. A type A voter wants her to choose $x = A$ regardless of her private information so it's natural to think that he will reward the official for choosing $x = A$ and punish her for choosing $x = B$. A type B voter wants her to choose $x = B$ regardless of her private information so it's natural to think he will reward her whenever she chooses $x = B$. A type R voter, in contrast, wants the official to be responsive to her private information, choosing $x = A$ when her private signal is $s = A$ and choosing $x = B$ when $s = B$. Thus, one might expect the type R voter to reward the incumbent for policy successes $(x = \omega)$ and punish her for policy failures $(x \neq \omega)$.

It turns out that this intuition is correct for type A and type B voters, but it often fails for type R voters. The reason the intuition fails is that the voter is not designing a mechanism with the goal of providing incentives for the incumbent to behave in a particular manner. Rather, he votes only based on his expectation of what policies an incumbent will enact in the future. Therefore, first period policy choice, and subsequent success or failure of the policy, only matters to the extent that it reveals information about the incumbent's type.

Voter beliefs about the incumbent's type are characterized in Lemma 4 in the appendix. The key feature of these beliefs is that a first period policy choice of $x = A$ means that the incumbent is likely to be type A and unlikely to be type B. A policy choice of $x = B$, in contrast, means that the incumbent is likely to be type B and unlikely to be type A.

What does this imply for a voter's re-election decision? Consider first a type A voter. From this voter's perspective, a type A official is better than a type R official, who is in turn better than a type B official. Thus if this voter observes $x = A$ he strictly prefers to re-elect the incumbent. It doesn't matter, at least for an extreme voter's re-election decision, whether the chosen policy succeeds or fails, i.e., whether $\omega = A$ or $\omega = B$ is revealed to be the true state of the world. The voter's beliefs about the incumbent's type are of course influenced by this outcome, but it is always the case that an incumbent who chooses $x = A$ is more likely than a replacement to be type A and less likely than a replacement to be type B. Thus if an incumbent chooses $x = A$, a type A voter wants to retain her in office. A type B voter has exactly the opposite preferences over the three types of officials, so he strictly prefers to remove an incumbent who chooses $x = A$.

Similarly, if the incumbent chooses $x = B$, either a type A voter or a type B voter will make his re-election decision solely based on this policy choice: a type A voter prefers to remove her and a type B voter prefers to retain her. In summary, we have the following proposition.

Proposition 3 (Equilibrium for Extreme Voters) *For any type A or type B voter there exists a unique equilibrium:*

1. *If $\beta_V < \underline{\beta}^2$ then the voter re-elects the official if and only if she chooses $x = A$, i.e.,*

$\nu_{AA} = \nu_{AB} = 1$ *and* $\nu_{BB} = \nu_{BA} = 0$

2. *If* $\beta_V > \overline{\beta}^2$ *then the voter re-elects the official if and only if she chooses* $x = B$*, i.e.,*

   $\nu_{AA} = \nu_{AB} = 0$ *and* $\nu_{BB} = \nu_{BA} = 1$.

What about a type R or moderate voter, i.e., one with $\beta_V \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$, who wants the incumbent to follow her signal when formulating policy? This voter faces a tradeoff, since he prefers a signal-responsive official over either a type A or a type B official. For example, if the incumbent chooses $x = A$ the voter learns that the incumbent is less likely to be type B than a new official; this is good news from the voter's perspective. However, the incumbent is also more likely to be type A than her replacement; this is bad news from a type R voter's perspective. And for at least some values of β_V in the type R voter region, the success or failure of the policy matters, since it affects the voter's beliefs about the incumbent's type.

Recall from Figure 2c that the key conditions for information-based moderation are $r_A(A) > r_B(A)$ and $r_A(B) < r_B(B)$, which imply that the incumbent has an electoral incentive to follow her signal. These conditions are most obviously satisfied if the voter's strategy is to re-elect the incumbent if and only if $x = \omega$, i.e, $\nu_{AA} = \nu_{BB} = 1$ and $\nu_{AB} = \nu_{BA} = 0$. This strategy rewards or punishes the incumbent based on the success or failure of her chosen policy, and the incumbent's probability of winning re-election when she takes a given action is simply her belief about the probability that that action matches the state of the world, i.e., $r_A(A) = \theta^A(A)$, $r_B(A) = 1 - \theta^A(A)$, $r_A(B) = \theta^A(B)$, and $r_B(B) = 1 - \theta^A(B)$. If $\theta^A(A) > 1 - \theta^A(A)$ and $\theta^A(B) < 1 - \theta^A(B)$, which holds whenever the incumbent's signal is sufficiently informative ($q > \max\{\pi, 1 - \pi\}$), the incumbent has an incentive to choose $x = A$ whenever $s = A$ and $x = B$ whenever $s = B$, i.e., there is an electoral incentive for information-based moderation.

It may seem that such strategies will inevitably arise in equilibrium so that a voter who wants the incumbent to follow her private signal will simply reward or punish her based on policy success or failure. However, the voter's concern over re-electing the wrong type of incumbent will often cause him not to use such strategies. Indeed for many types of moderate voters, with $\beta_V \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$, the voter sets $\nu_{AA} = \nu_{AB}$ and $\nu_{BB} = \nu_{BA}$ in equilibrium. In such cases the voter's election decision is based only on the incumbent's policy choice, and *not* the success or failure of this policy. Without outcome-based rewards and punishments there can be no electoral incentives for information-based moderation, and some types of officials will be induced to be ideologically rigid when choosing the first period policy.

The following proposition characterizes equilibria when the voter is type R.

Proposition 4 (Equilibria for Moderate Voters) *For any type R voter there exists an equilibrium, and all equilibria are one of the following five types, each of which occurs for some values of $\beta_V \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$:*

1. $\nu_{AA} = \nu_{AB} = 1, \nu_{BB} = \nu_{BA} = 0$
2. $\nu_{AA} = 1, \nu_{AB} \in (0,1), \nu_{BB} \in (0,1), \nu_{BA} = 0$
3. $\nu_{AA} = 1, \nu_{AB} = 0, \nu_{BB} = 1, \nu_{BA} = 0$
4. $\nu_{AA} \in (0,1), \nu_{AB} = 0, \nu_{BB} = 1, \nu_{BA} \in (0,1)$
5. $\nu_{AA} = \nu_{AB} = 0, \nu_{BB} = \nu_{BA} = 1.$

For some type R voters the equilibrium is the same as the equilibrium for a type A voter (part 1 of the proposition) or a type B voter (part 5 of the proposition). Thus even though the voter wants an official to use her information, she can have electoral incentives to be ideologically rigid.

There are also several additional equilibria (parts 2-4). In which of these equilibria does an incumbent have an electoral incentive to use her information? The obvious place for such an incentive is in part 3 of the proposition, where the incumbent is rewarded for choosing a policy that matches the state of the world. Information-based moderation can also occur for some of the equilibria in parts 2 and 4 of the proposition, depending on whether the voter's mixed strategy gives the incumbent a sufficient incentive to follow her signal.

Example 1 To illustrate the equilibria in Propositions 3 and 4, suppose that the prior probability that $\omega = A$ is $\pi = \frac{1}{2}$ and the quality of the official's signal is $q = \frac{3}{4}$. In this example, the cutpoints for second period official behavior are $\underline{\beta}^2 = 0.25$ and $\overline{\beta}^2 = 0.75$. Figure 3 shows how different types of voters want the incumbent to act: a voter to the left of 0.25 always prefers $x = A$, a voter to the right of 0.75 always prefers $x = B$, and voter in the region $[0.25, 0.75]$ prefers that the incumbent follow her signal, choosing $x = A$ when $s = A$ and $x = B$ when $s = B$.

In this example there is always a pure strategy equilibrium. There are also mixed strategy equilibria from Parts 2 and 4 of Proposition 4 but they only occur for an exceedingly narrow range of parameter values, $\beta_V \in (0.43, 0.44)$ and $\beta_V \in (0.56, 0.57)$ respectively.[6] Here we focus on the pure strategy equilibria, which are shown in Figure 3.

[Figure 3 about here]

A few features of the equilibria are worth noting. If the voter is type A or type B ($\beta_V < 0.25$ or $\beta_V > 0.75$) we know from Proposition 3 that the incumbent always has an electoral incentive to choose the voter's preferred policy. In other words, when the voters have ideologically rigid preferences incumbents are motivated to be responsive to these preferences.

What is more interesting is that for many R voter-types, who would like the official to choose A or B on the basis of the policy information she receives, equilibrium behavior is exactly the same as for a type A or type B voter. A moderate voter, $\beta_V \in [0.25, 0.75]$, prefers that the incumbent follow her signal, choosing $x = s$. Yet for most values of β_V within this range, elections induce some incumbents to be ideologically rigid.

Take a relatively pro-A moderate voter $\beta_V \in [0.25, 0.44]$, which corresponds to Part 1 of Proposition 4. Such a type R voter behaves exactly like a type A voter, rewarding the incumbent for choosing policy A and punishing her for choosing policy B, regardless of whether B turned out to be the correct policy choice. The reason the voter removes an official who chooses policy B is that this policy choice reveals information about the incumbent's type, i.e., that she is likely to be a type B official. As a result of this voter behavior, incumbents have an incentive to systematically favor policy $x = A$, as in Figure 2a. Consequently, elections induce ideological rigidity by some officials whose own preference is not to be ideologically rigid *and* who represent electorates that–given complete information–would want officials to respond to policy information. Specifically, officials in the region $\left(\underline{\beta}^2, \underline{\beta}^1\right)$ prefer to choose $x = B$ when $s = B$ but instead, due to electoral motivations, choose $x = A$.

Similarly, a relatively pro-B moderate voter $\beta_V \in [0.56, 0.75]$, which corresponds to part 5 of Proposition 4, removes an incumbent who chooses $x = A$ and re-elects an incumbent who chooses $x = B$, even if B turns out to be the wrong policy. As shown in Figure 2b, this electoral incentive causes type R incumbents in the region $\left(\overline{\beta}^1, \overline{\beta}^2\right)$ to be ideologically rigid by choosing policy B even when their information indicates that it is not the correct policy. Again, we have a situation where elections induce ideological rigidity, contrary to the interests of both officials and voters.

The most centrist type R voters $\beta_V \in (0.44, 0.56)$, which corresponds to part 3 of Proposition 4, reward policy success and punish policy failure, re-electing the incumbent if and only if her policy matches ω. These voters are roughly equally concerned about avoiding type A and type B incumbents, so in making their electoral decisions they focus instead on re-electing those most likely to use policy information. This is accomplished by re-electing the incumbent if and only if $x = \omega$ since type R incumbents are the ones that tend to choose policy that matches the state of the world. Thus $\beta_V \in (0.44, 0.56)$ is the only region of voter types for which we observe information-based moderation, as in Figure 2c, where elections give both left- and right-leaning officials an incentive to follow their signals.

The key point of this analysis involves moderate voters in the region $\beta_V \in [0.25, 0.75]$, who want the incumbent to use her private information. Notably, except for voters where $\beta_V \in (0.44, 0.56)$, this desire is not sufficient to ensure an electoral incentive for information-based moderation. Rather, the voter's concern over re-electing the wrong type of politician causes him to re-elect an incumbent simply based on the incumbent's policy choice and not on whether the choice actually turned out to be the correct one. Accordingly the incumbent, to signal her preference similarity, has an electoral incentive for ideological rigidity.

This rigidity is a form of what Canes-Wrone, Herron, and Shotts (2001) characterize as *pandering*, i.e., the official, to enhance her electoral prospects, takes an action that in her expert judgment does not promote voters' interests. The fact that the pandering is coincident with rigidity stands in contrast to the common notion that pandering is a form of moderation (e.g., Jacobs and Shapiro 2000). Indeed, the moderation that occurs in our model, information-based moderation, does not encompass pandering. Both behaviors concern an official whose reelection prospects depend upon moderate voters that want her to use her information. However, information-based moderation occurs when electoral pressures cause such an official to use her information, while pandering occurs when electoral pressures cause her to disregard it.

The pandering we observe also differs substantively from that in Canes-Wrone, Herron, and Shotts (2001). In that analysis, all actors are assumed to have exactly the same policy preferences. An official never panders to signal preference similarity, but instead to convince voters that she is skilled at gathering accurate policy information. Indeed, if voters shared her policy information, then the official in that model would have no incentives to pander. By contrast, as we detail in the following section, pandering can occur in our theory even when voters share an incumbent's policy information.

Extensions

We now briefly discuss several extensions of our model. We first show that our conclusions are robust to alternative technical assumptions. We then examine how the amount of information available to voters affects the prospects for ideological rigidity and information-based moderation.

Alternative Technical Assumptions

First, our model can be extended to a situation where the electorate consists of N voters, with preference parameters $\left(\beta_V^1, ..., \beta_V^N\right)$, voting under majority rule. From Lemma 6 in the appendix it is straightforward to show that the voter with the median β_V is decisive, so there is no loss in generality in solving the model with only a single representative voter.

Second, our model can be extended to a non-uniform distribution $F(\cdot)$ of official types. With a non-uniform distribution, equilibria like the ones in Propositions 3 and 4 always still exist. For certain parameter values there also exists an equilibrium in which the incumbent always follows her signal regardless of β_I, and any type of voter is always indifferent between re-electing or removing the incumbent. This additional equilibrium can only occur if the official's signal is extremely accurate, i.e., for q close to 1. Also, the distribution of official types must be exceedingly polarized; there must be a substantial probability that the challenger has $\beta_C < \underline{\beta}^2$ and also a substantial probability that $\beta_C > \overline{\beta}^2$. Thus despite the fact that the signal is highly accurate, it must be likely that the challenger will simply ignore the signal if elected. Moreover, the challenger distribution for such an equilibrium cannot simply be skewed in one direction, but rather must be sharply bimodal. If any of these conditions fails to hold then the only equilibria that can occur are the types characterized in Propositions 3 and 4, even allowing for a non-uniform F.

Alternative Assumptions about Voter Information

The voter in our model is imperfectly informed about two things – official's preferences and policy – so we examine different assumptions regarding voter information about each of these factors.

If the voter knows with certainty the incumbent's and challenger's preferences, β_I and β_C, the incumbent's policy choice is irrelevant for the voter's election decision. Thus the incumbent has no reason to use her policy action to signal that her preferences are in line with the voter, i.e., the incumbent does not have an electoral incentive to be ideologically rigid. In fact, even if only β_I, but not β_C, is known to the public, the voter's electoral decision is unaffected by the incumbent's actions in the first period, and thus the incumbent has no electoral reason to be ideologically rigid.

We now consider three ways that the voter's information about policy could differ from our main model. First we consider an extreme case, in which all information available to the official when she chooses policy is also available to the public. Specifically, assume that the voter observes the incumbent's private signal s. One might think that in such a model, a type R voter will always reward an incumbent who follows her signal. However, even though the voter has all of the information necessary to adopt this strategy, it is not necessarily adopted in equilibrium. Rather, type R voters who are on the left end of the type R voter region will behave just like type A voters, re-electing an incumbent if and only if she chooses $x = A$. It is optimal for voters to do this even though they know that $s = B$. This voter behavior is motivated by a concern over selecting an incumbent with the correct preferences; e.g., although a voter to the pro-A side of the type R voter region prefers a type R official over a type A or type B one, a type B official is far and away the worst type. The voter is consequently willing to re-elect an incumbent who is quite possibly her second-favorite type (A) to avoid getting stuck with her worst type (B). Thus even without *any* private policy information, elections may induce ideological rigidity.

It is worth highlighting, however, that the existence of private policy information increases the incentives for ideological rigidity and, correspondingly, decreases the incentives for information-based moderation. In general, an incumbent is more likely to use her policy information if voters share that information. For instance, in Example 1, the region of type R voters for which information-based moderation is an electoral incentive expands substantially, from $\beta_V \in (0.44, 0.56)$ to $\beta_V \in (0.38, 0.62)$, if voters observe s. Thus the incentives for politicians to use their policy information depend not only on the preferences of voters and officials, but also on the amount of policy information available to voters.[7]

We now extend the model in the other direction, by examining variants in which less information is available to voters. We first consider a model with no uncertainty resolution, i.e., the voter does not learn before the next election whether a policy has succeeded or failed. This type of assumption is particularly applicable to policy decisions with long-term consequences. Without uncertainty resolution, the voter must base the electoral decision solely on the incumbent's policy choice; i.e., rather than the strategies ν_{AA} and ν_{AB}, which can differ according to the policy outcome, the voter chooses a single ν_A as the probability of re-election when the incumbent chooses $x = A$. Similarly the voter chooses a single ν_B as the probability of re-election when $x = B$. If $\nu_A > \nu_B$ then the official always has an incentive to choose A, whereas if $\nu_A < \nu_B$ the official always has an incentive to choose B. If $\nu_A = \nu_B$ then elections have no effect on policy choice. In other words, without uncertainty resolution, elections always cause some types of incumbents to be ideologically rigid, and there is no possibility for information-based moderation. The incumbent focuses instead on trying to signal that her ideological preferences are ones the voter would like.

Finally, we consider a model with asymmetric uncertainty resolution, i.e., if $x = A$ the voter observes the success or failure of a policy before the next election but if $x = B$ the voter only observes the policy choice itself, and does not learn anything about whether the policy was in fact correct. This assumption is natural in situations where A represents taking action and B represents inaction. For example, if the President decides to go to war then voters can observe the success or failure of the war, and make inferences about whether going to war was in fact a good idea. In contrast, if the President does not go to war, voters may learn much less about whether war would have been a good idea. The general patterns of behavior in such a model are similar to Proposition 4, in the sense that not only extremist voters, but also many signal-responsive voter types, don't take into account the success or failure of a policy when making electoral decisions. In an asymmetric-resolution variant of Example 1, the range of voter types for which information-based moderation occurs, $\beta_V \in (0.49, 0.51)$, is smaller than the region for which moderation occurs under symmetric uncertainty resolution.

Comparing the variants of the model, we see that the incentives for an official to use her private information when making a policy decision depend on how much the public knows. Generally speaking, the better informed the voters are, the less likely it is that officials will be ideologically rigid and the more likely they will engage in information-based moderation.

Empirical Implications

Voters' Information about Politicians' Leanings

According to the theory, an incumbent–unless she is from the most moderate of districts–will be more ideologically rigid on an issue if voters do not know her preferences. When voters lack this knowledge, the incumbent can have strong incentives to use policy decisions to signal that her preferences are similar to those of the electorate. By contrast, if voters are informed about her predispositions, she has no incentive to use policy in this way; regardless of her actions, voters maintain a similar assessment of whether she is to the right or left of the challenger on that issue.

One could assess this prediction empirically by exploiting variation in citizens' knowledge of politicians' preferences across issues, for a given issue over time, or across electoral institutions. For instance, in a cross-issue analysis, one could compare legislative voting records for issues on which party provides a strong cue of a member's position versus issues on which parties are not well-known to be distinct from each other. Think of policy areas such as trade, where members are commonly forced to choose between legislation that is either pro- or anti-free trade, or abortion, where a vote is often construed as pro-life or pro-choice. If party labels do not strongly signal politicians' leanings, a legislator will have strong incentives to vote consistently with district inclinations regardless of her information about the details of the roll call items. Alternatively, when party labels reveal candidates' preferences on an issue, then a legislator can be less concerned that roll call votes could cause voters to conclude she does not share their preferences; she accordingly has more flexibility to vote against district inclinations if her information regarding the details of specific roll call items recommends doing so.

More specifically, one could analyze U.S. Senate roll call voting on a set of issues that vary in the degree to which party identification signals politicians' preferences. Voters' ability to differentiate parties on the issues could be assessed with established survey instruments that ask respondents to place the parties on various policy matters on a given scale. Voters' leanings could be obtained through existing or new state-level surveys, which are increasingly cost efficient due to web-based survey techniques. Given this information, one could assess whether Senators are more likely to vote consistently with state leanings—independent of the content of the legislation—as the electorate's ability to distinguish the parties diminishes.

Public opinion data for such a test is clearly easier to gather from a forward-looking perspective. However, it is worth pointing out that empirical analysis of previous legislative behavior is also possible. Consider, for instance, a comparison of Senate voting in the Reagan and

Bush 41 administrations on immigration, a policy on which the parties were not clearly distinguished at that time (e.g., Tichenor 1994), versus a policy that did clearly distinguish the parties such as government provision of health care. State-level preferences on these issues could be obtained via CBS-New York Times polls, which Erikson, Wright, and McIver (1994) find can be pooled to create well-constructed state samples.

As an alternative to cross-issue comparisons, one could analyze legislative voting over time on an issue that originally does not distinguish the parties but later does distinguish them. Research suggests that abortion, for instance, has these characteristics because the parties were not divided on the issue until the 1980s (e.g., Adams 1997).

Finally, one could assess the prediction outside of the legislative setting. Indeed, a quite different type of test would be to compare the decision making of state supreme court justices selected through partisan versus nonpartisan (retention) elections. According to the theory, judges selected through nonpartisan elections should be more ideologically rigid to district inclinations because these judges are more dependent on case decisions to signal their preferences. This expectation of the theory receives support from a recent conference paper by Caldarone, Canes-Wrone and Clark (2006), which finds that on abortion cases since the 1980s state supreme court justices in nonpartisan systems have been more likely than ones in partisan systems to rule consistently in line with state leanings on that issue. Notably, this finding contrasts with conventional wisdom about the effect of nonpartisan elections on policy decisions.

Of course, all of the tests we have discussed depend upon appropriate control variables. Because we are simply suggesting venues for testing, we do not delve into this level of detail. It is worth highlighting, however, that the theory itself suggests an important control for the analyses that compare various issues. Namely, the theory implies that citizens' knowledge about an issue should influence elected officials' incentives for ideological rigidity.

Voters' Policy Information

The theory indicates that incentives for rigidity to district leanings decline as voters acquire more policy information. For instance, in the baseline model, where the electorate does not share the politician's information but does learn whether the policy was successful, only politicians with quite moderate electorates lack incentives for rigidity. By comparison, if voters share politicians' policy information, incentives for rigidity are less prevalent. And conversely, if voters are not going to receive any information about a policy's success, incentives for rigidity are widespread.

The literature suggests that citizens' policy knowledge should vary across issues, for a given issue over time, and across localities. Variation across issues may occur because some are "easy" to understand readily while others are more "hard" or technical (Carmines and Stimson 1980). Policy makers may also have truly private or secret information, e.g., on foreign policy matters. Correspondingly, on a given issue over time, citizens can gain policy knowledge as secret information is revealed or as they become more familiar with the issue. Finally, voters' policy knowledge may vary across localities due to disparities in citizens' interest in the issue or local media coverage (Arnold 2004).

One could analyze legislative voting to assess our predictions regarding policy information. More specifically, legislators should be more rigid in their propensity to follow district leanings on an issue the lower is citizens' level of policy information. To measure policy information, one could use existing survey instruments that ask respondents to rank how closely they follow certain issues along with factual questions that assess actual knowledge.

These suggested empirical analyses are not meant to cover all possibilities for testing the theory. Nor is this the place to specify all details of implementation. Rather, we have sought to outline ways to test new hypotheses that the theory motivates. Additionally, for one of these hypotheses, we have reviewed preliminary evidence that supports the theory.

Conclusion

We have found that elections may provide strong incentives for politicians to be ideologically rigid. Even when voters want a politician to be open to choosing different policies on the basis of information, elections can induce him to disregard it. Moreover, elections often fail to induce the converse behavior, information-based moderation, whereby either a left- or right-leaning politician becomes more likely to use his policy information when it conflicts with his personal preferences. These seemingly perverse electoral incentives occur because an official wants to signal that his ideological preferences are similar to those of his electorate.

Paradoxically, there are situations in which both the incumbent and voters, if they were fully informed, would want the incumbent to take a different position. Thus as in other recent theories, politicians can have the incentive to pander to voters by taking positions that the politicians do not want and that voters would not want if they had better information (Canes-Wrone, Herron, and Shotts 2001; Maskin and Tirole 2004; Fox *forthcoming*). A new feature of this theory is that pandering is linked to the behaviors of ideological rigidity and information-based moderation; pandering is coincident with rigidity and does not occur if there is information-based moderation. More specifically, we show that dogmatic actions can be popular simply because voters are worried about electing an incumbent with the wrong policy preferences; if voters knew the incumbent shared their preferences, then these actions would not be popular.

Extensions of the theory show that voter knowledge strongly influences an official's incentive to use her private information. The more policy information voters have, the stronger this incentive and accordingly, the lower the incentive for ideological rigidity. Furthermore, the incentive for rigidity is lower when voters know an incumbent's preferences on an issue. The analysis as a whole therefore suggests we should see variation in rigidity across issues, time, and electoral systems according to voters' knowledge about policy and candidate preferences.

By focusing on these effects of voter knowledge, the theory highlights that electoral pressures unto themselves can induce elites to be more polarized than voters on particular issues. For instance, the results indicate that elected representatives from two moderate districts, which want their representatives to use all available policy information on an issue and vary only by the fact that one slightly leans left and the other slightly right, can have incentives to ignore relevant policy information and always vote to the left (in the case of the first district) and to the right (in the second case). Conventional explanations for why politicians might behave this way focus on elite actors such as party and interest group activists. Obviously, we are not suggesting that such actors are irrelevant. However, we have shown that even in the absence of such influences, officials can have incentives to be more ideologically rigid than their electorates.

Appendix

Proof of Proposition 1

We use a superscript t to denote (expected) utility from the period t policy choice. Throughout the appendix, we analyze utility differences that are functions of β as well as other parameters, though in an abuse of notation we omit the β arguments. The official's utility is $U^2(A|s) = -\beta\left(1-\theta^A(s)\right)$ from $x = A$ and $U^2(B|s) = -(1-\beta)\,\theta^A(s)$ from $x = B$. The difference is $U^2(B|s) - U^2(A|s) = \beta - \theta^A(s)$. The derivative with respect to β is 1, so we set $U^2(A|s) = U^2(B|s)$ for the cutpoints: $\underline{\beta}^2 = \theta^A(B)$ and $\overline{\beta}^2 = \theta^A(A)$.■

To prove Proposition 2 we first prove a few lemmas.

Lemma 1 *For any voter strategy ν and probabilities ϕ_A, ϕ_R, and ϕ_B that the challenger is type A, R, and B, the incumbent's expected utility difference between $x = B$ and $x = A$ in the first period is a continuous, piecewise linear, strictly increasing function of β_I.*

Proof. Let $U(x|s)$ denote the official's total expected utility from choosing policy $x \in \{A, B\}$ in the first period given signal s. We first consider a type A official, and find $U(B|s) - U(A|s)$. The first component of the difference between these utilities is the first period utility difference from the two actions, which by the reasoning in the proof of Proposition 1 is $\beta_I - \theta^A(s)$.

The second component is the second period effect of her first period action. The difference in her probability of being re-elected as a result of her policy choice is $r_B(s) - r_A(s)$. If the type A incumbent loses office, there is an increased chance of an incorrect policy B in the second period, which results in $-(1-\beta_I)$ utility. Specifically, with probability $\phi_R \pi (1-q)$ a type R challenger observes $s = B$ when $\omega = A$, and chooses $x = B$. Or, with probability $\phi_B \pi$, the challenger is type B and chooses $x = B$ when $\omega = A$. If a type A official loses office, there is also a decreased chance of an incorrect policy A in the second period, which results in $-\beta_I$ utility. With probability $\phi_R q (1-\pi)$ the challenger is type R and $s = B$ when $\omega = B$. Or, with probability $\phi_B (1-\pi)$, the challenger is type B and $\omega = B$. Combining these terms, for a type A incumbent, $\beta_I < \underline{\beta}^2$:

$$\begin{aligned} U(B|s) - U(A|s) &= \beta_I - \theta^A(s) + [r_B(s) - r_A(s)](1-\beta_I)\pi(\phi_R(1-q) + \phi_B) \\ &\quad - [r_B(s) - r_A(s)]\beta_I(1-\pi)(\phi_R q + \phi_B) \\ &= -\theta^A(s) + [r_B(s) - r_A(s)]\pi(\phi_R(1-q) + \phi_B) \\ &\quad + \beta_I\{1 - [r_B(s) - r_A(s)][(1-\pi)(\phi_R q + \phi_B) + \pi(\phi_R(1-q) + \phi_B)]\}. \end{aligned} \tag{3}$$

A type R incumbent's reasoning is similar, except that a type R challenger will act like the incumbent. For $\beta_I \in \left(\underline{\beta}^2, \overline{\beta}^2\right)$

$$\begin{aligned} U(B|s) - U(A|s) &= \beta_I - \theta^A(s) + [r_B(s) - r_A(s)](1-\beta_I)\pi(\phi_B q - \phi_A(1-q)) \\ &\quad + [r_B(s) - r_A(s)]\beta_I(1-\pi)(\phi_A q - \phi_B(1-q)) \\ &= -\theta^A(s) + [r_B(s) - r_A(s)]\pi(\phi_B q - \phi_A(1-q)) \\ &\quad + \beta_I\{1 + [r_B(s) - r_A(s)][(1-\pi)(\phi_A q - \phi_B(1-q)) + \pi(\phi_A(1-q) - \phi_B q)]\}. \end{aligned}$$

For a type B official, $\beta_I > \overline{\beta}^2$,

$$
\begin{aligned}
U(B|s) - U(A|s) &= \beta_I - \theta^A(s) - [r_B(s) - r_A(s)](1-\beta_I)\pi(\phi_A + \phi_R q) \\
&\quad + [r_B(s) - r_A(s)]\beta_I(1-\pi)(\phi_A + \phi_R(1-q)) \\
&= -\theta^A(s) - [r_B(s) - r_A(s)]\pi(\phi_A + \phi_R q) \\
&\quad + \beta_I\{1 + [r_B(s) - r_A(s)][(1-\pi)(\phi_A + \phi_R(1-q)) + \pi(\phi_A + \phi_R q)]\}.
\end{aligned}
$$

It is straightforward to confirm that $U(B|s) - U(A|s)$ is continuous at $\underline{\beta}^2$ and $\overline{\beta}^2$. Also, $U(B|s) - U(A|s)$ is clearly piecewise linear in β_I, and the slope is strictly greater than zero since $[r_B(s) - r_A(s)] \in [-1, 1]$, $\pi \in (0,1)$, $(\phi_R q + \phi_B) \in (0,1)$, $(\phi_R(1-q) + \phi_B) \in (0,1)$, $(\phi_A q - \phi_B(1-q)) \in (-1,1)$, $(\phi_A(1-q) - \phi_B q) \in (-1,1)$, $(\phi_A + \phi_R(1-q)) \in (0,1)$, and $(\phi_A + \phi_R q) \in (0,1)$.■

Lemma 2 *There exists a cutpoint $\tilde{\beta}$ such that for any voter strategy ν it is strictly optimal for an incumbent with $\beta_I \leq \tilde{\beta}$ to choose $x = A$ when $s = A$ the first period and it is strictly optimal for an incumbent with $\beta_I \geq \tilde{\beta}$ to choose $x = B$ when $s = B$ the first period.*

Proof. In period t, an official can observe $s = A$ or $s = B$. A type B official cares more about current-period effects of choosing $x = B$ when $s = B$ than when $s = A$, i.e., for any $\beta_I > \overline{\beta}^2$,

$$
\begin{aligned}
U^t(B|B) - U^t(A|B) &> U^t(B|A) - U^t(A|A) \\
\beta_I - \theta^A(B) &> \beta_I - \theta^A(A) \\
\theta^A(A) &> \theta^A(B).
\end{aligned}
$$

Similarly, for a type A official, i.e., $\beta_I < \underline{\beta}^2$, $U^t(A|A) - U^t(B|A) > U^t(A|B) - U^t(B|B)$.

For a type R official we find $\tilde{\beta}$ such that the official cares equally about the two decisions, $U^t(A|A) - U^t(B|A) = U^t(B|B) - U^t(A|B)$. This reduces to $\tilde{\beta} = \frac{\theta^A(A) + \theta^A(B)}{2}$.

We still must establish that for $\beta_I \leq \tilde{\beta}$, $x = A$ is optimal in the first period when $s = A$. For $\beta_I < \tilde{\beta}$, the biggest possible difference between an official's expected utility from her own policy choice when re-elected versus a challenger's policy choice occurs when $s = A$ in the second period. She can lose up to $U^2(A|A) - U^2(B|A)$ if the challenger is type B. However, this occurs with probability strictly less than 1, since the second period signal may be $s = B$ or the replacement official may be type A. Thus a strict upper bound on the official's expected second period utility loss from choosing $x = B$ when $s = A$ in the first period is $U^2(A|A) - U^2(B|A)$. Since the official's utility difference for first period policy when $s = A$, i.e., $U^1(A|A) - U^1(B|A)$, equals this upper bound it is strictly optimal for her to choose $x = A$. For $\beta_I \geq \tilde{\beta}$ a symmetric argument shows that $x = B$ is strictly optimal when $s = B$ in the first period.■

Lemma 3 *For any voter strategy ν, if $\pi \geq 1/2$, an official with $\beta_I = 0$ strictly prefers to choose $x = A$ in the first period regardless of s. If $\pi \leq 1/2$, an official with $\beta_I = 1$ strictly prefers to choose $x = B$ in the first period regardless of s.*

Proof. For $\pi \geq 1/2$ we show that an incumbent with $\beta_I = 0$ strictly prefers to choose $x = A$ even when $s = B$. We build on Equation (3) in the proof of Lemma 1. Note that for $\beta_I = 0$ this expression is maximized when $r_B(B) = 1$ and $r_A(B) = 0$. The distribution of official types F is uniform so $\phi_A = \underline{\beta}^2 = \theta^A(B)$, $\phi_B = 1 - \overline{\beta}^2 = 1 - \theta^A(A)$, and $\phi_R = \theta^A(A) - \theta^A(B)$. Substituting in, we need to show that $U(B|B) - U(A|B) = -\theta^A(B) +$
$\pi\left[\left(\theta^A(A) - \theta^A(B)\right)(1-q) + 1 - \theta^A(A)\right] < 0$, i.e., $\pi\left[1 - q\theta^A(A)\right] < \theta^A(B)\left[1 + \pi(1-q)\right]$. Since $\theta^A(A) = \frac{\pi q}{\pi q + (1-\pi)(1-q)}$ and $\theta^A(B) = \frac{\pi(1-q)}{(1-\pi)q + \pi(1-q)}$, we need $\pi\frac{\pi q + (1-\pi)(1-q) - q\pi q}{\pi q + (1-\pi)(1-q)} < \frac{\pi(1-q)[1+\pi(1-q)]}{(1-\pi)q + \pi(1-q)}$. For $\pi \geq 1/2$, $\pi q + (1-\pi)(1-q) \geq (1-\pi)q + \pi(1-q)$ so it is sufficient to focus on the numerator – after some algebra it simplifies to $0 < 2\pi(1-q)$, which holds since $q < 1$. A symmetric argument establishes the result for $\pi \leq 1/2$ and $\beta_I = 1$.■

Proof of Proposition 2

We first find the cutpoint $\underline{\beta}^1$, to the left of $\tilde{\beta}$ from Lemma 2, for the incumbent's first period behavior when $s = B$. Lemma 2 shows that $x = B$ is strictly optimal for all $\beta_I > \tilde{\beta}$, and that $U(B|B) - U(A|B) > 0$ for $\beta_I = \tilde{\beta}$. Lemma 1 shows that $U(B|B) - U(A|B)$ is continuous and strictly increasing in $\left[0, \tilde{\beta}\right]$. Thus $\underline{\beta}^1 = \max\{\beta_I : U(B|B) - U(A|B) \leq 0\}$ or if there is no $\beta_I \geq 0$ for which $U(B|B) - U(A|B) \leq 0$ then $\underline{\beta}^1 = 0$. A similar argument yields a cutpoint $\overline{\beta}^1 \in (\tilde{\beta}, 1]$, where $\overline{\beta}^1 = \min\{\beta_I : U(B|A) - U(A|A) \geq 0\}$, for first period official behavior when $s = A$. From Lemma 3, at least one of the inequalities in part 4 of the proposition must be strict.■

For Propositions 3 and 4, we characterize voter beliefs. We use the notation $\mu_T(x\omega)$ to refer to the voter's belief about the probability that the incumbent is type $T \in \{A, R, B\}$ given policy x and state of the world ω. Likewise ϕ_T denotes the probability that the challenger is type T.

Lemma 4 *For any first period official strategy as in Proposition 2, $\mu_A(AA) > \phi_A > \mu_A(BA)$, $\mu_A(AB) > \phi_A > \mu_A(BB)$, $\mu_B(AA) < \phi_B < \mu_B(BA)$, and $\mu_B(AB) < \phi_B < \mu_B(BB)$.*

We prove that $\mu_A(AA) > \phi_A > \mu_A(BA)$. The proofs for the other inequalities are very similar. Note that since ω is independent of the official's type, and there are only two possible actions, ϕ_A is a convex combination of $\mu_A(AA)$ and $\mu_A(BA)$ so it is sufficient to show that $\phi_A > \mu_A(BA)$. If $\underline{\beta}^1 \geq \underline{\beta}^2$ then no type A official ever chooses $x = B$ in the first period so $\mu_A(BA) = 0$. If $\underline{\beta}^1 < \underline{\beta}^2$ then $\mu_A(BA) = \frac{\left[F(\underline{\beta}^2) - F\left(\underline{\beta}^1\right)\right](1-q)}{\left[F(\overline{\beta}^1) - F\left(\underline{\beta}^1\right)\right](1-q) + \left[1 - F(\overline{\beta}^1)\right]} < \frac{\left[F(\underline{\beta}^2) - F\left(\underline{\beta}^1\right)\right]}{\left[F(\overline{\beta}^1) - F\left(\underline{\beta}^1\right)\right] + \left[1 - F(\overline{\beta}^1)\right]} <$
$\frac{\left[F(\underline{\beta}^2) - F\left(\underline{\beta}^1\right)\right] + F\left(\underline{\beta}^1\right)}{\left[F(\overline{\beta}^1) - F\left(\underline{\beta}^1\right)\right] + \left[1 - F(\overline{\beta}^1)\right] + F\left(\underline{\beta}^1\right)} = F(\underline{\beta}^2) = \phi_A$.■

We now state without proof a trivial lemma for preferences of type A and type B voters over the three types of officials. Proposition 3 follows directly from Lemmas 4 and 5.

Lemma 5 *A type A voter strictly prefers a type A official over a type R official and strictly prefers a type R official over a type B official. A type B voter has the opposite strict ordinal preferences.*

We prove Proposition 4 via a few lemmas. First we characterize cutpoints for voter behavior, β^A and β^B, that vary according to the incumbent's strategy in the first period.

Lemma 6 *If first period official behavior is characterized by cutpoints $\underline{\beta}^1$ and $\overline{\beta}^1$ as in Proposition 2 then there exist cutpoints β^A and β^B such that:*

1. $\underline{\beta}^2 < \beta^B < \beta^A < \overline{\beta}^2$
2. *If $\omega = B$, a voter $\beta_V < \beta^B$ strictly prefers to re-elect the official if $x = A$ and to remove her if $x = B$. A voter $\beta_V > \beta^B$ has the opposite strict preferences, and a voter $\beta_V = \beta^B$ is indifferent*
3. *If $\omega = A$, a voter $\beta_V < \beta^A$ strictly prefers to re-elect the official if $x = A$ and to remove her if $x = B$. A voter $\beta_V > \beta^A$ has the opposite strict preferences, and a voter $\beta_V = \beta^A$ is indifferent*

Proof. We first prove part 2 of the lemma. For a voter who observes $x = B$ and $\omega = B$, we show that the expected utility difference from re-electing versus removing the incumbent is a linear, and hence monotonic, function of β_V. We denote these utilities as $U(old|BB)$ and $U(new)$.

$$\begin{aligned}
U(old|BB) - U(new) &= -\mu_A(BB)\beta_V(1-\pi) - \mu_R(BB)(1-q)\left[\beta_V(1-\pi) + (1-\beta_V)\pi\right] \\
&\quad -\mu_B(BB)(1-\beta_V)\pi \\
&\quad - \left\{-\phi_A\beta_V(1-\pi) - \phi_R(1-q)\left[\beta_V(1-\pi) + (1-\beta_V)\pi\right] - \phi_B(1-\beta_V)\pi\right\} \\
&= \beta_V(1-\pi)\left\{\left[\phi_A - \mu_A(BB)\right] + \left[\phi_R - \mu_R(BB)\right](1-q)\right\} + \\
&\quad (1-\beta_V)\pi\left\{\left[\phi_R - \mu_R(BB)\right](1-q) + \left[\phi_B - \mu_B(BB)\right]\right\}
\end{aligned}$$

Also, from Lemmas 4 and 5 a voter at $\beta_V = \underline{\beta}^2$ strictly prefers to remove the official when $x = B$ and $\omega = B$ and a voter at $\beta_V = \overline{\beta}^2$ strictly prefers to retain her. Thus there exists a cutpoint $\beta^B \in \left(\underline{\beta}^2, \overline{\beta}^2\right)$ such that a voter with $\beta_V < \beta^B$ prefers to remove whereas a voter with $\beta_V > \beta^B$ strictly prefers to re-elect when $x = B$ and $\omega = B$. Also, since there are only two actions and the incumbent and challenger come from the same pool, we can draw conclusions about voter preferences when $x = A$ and $\omega = B$. Specifically, $U(old|AB) > U(new)$ iff $U(old|BB) < U(new)$, $U(old|AB) < U(new)$ iff $U(old|BB) > U(new)$, and $U(old|AB) = U(new)$ iff $U(old|BB) = U(new)$. Thus the same cutpoint β^B applies to voter preferences when $x = A$ and $\omega = B$, and we have proved part 2 of the lemma. The proof for part 3 is similar.

We now order the cutpoints. If $\beta^B \geq \beta^A$, a voter $\beta_V \in \left[\beta^B, \beta^A\right]$ weakly prefers to re-elect whenever $x \neq s$. We let $\hat{\beta}_V \in \left[\beta^B, \beta^A\right]$ be an arbitrary such voter and derive a contradiction. We use the notation $U\left(\beta > g\right)$ to denote a voter's expected utility from an official randomly drawn from the portion of the distribution F that is greater than $g \in (0,1)$. Similarly $U\left(\beta \in (g,h)\right)$ denotes expected utility from an official drawn from F restricted to the interval $(g,h) \subseteq (0,1)$.

For a voter at $\hat{\beta}_V$ to weakly prefer re-electing when $x = A$ and $\omega = B$ and weakly prefer removing the incumbent when $x = A$ and $\omega = A$ requires that $U(old|AB) \geq U(new)$ and $U(new) \geq U(old|AA)$, so $U(old|AB) \geq U(old|AA)$, i.e., $\frac{F\left(\underline{\beta}^1\right)U\left(\beta<\underline{\beta}^1\right)+(1-q)\left[F\left(\overline{\beta}^1\right)-F\left(\underline{\beta}^1\right)\right]U\left(\beta\in\left(\underline{\beta}^1,\overline{\beta}^1\right)\right)}{F\left(\underline{\beta}^1\right)+(1-q)\left[F\left(\overline{\beta}^1\right)-F\left(\underline{\beta}^1\right)\right]} \geq \frac{F\left(\underline{\beta}^1\right)U\left(\beta<\underline{\beta}^1\right)+q\left[F\left(\overline{\beta}^1\right)-F\left(\underline{\beta}^1\right)\right]U\left(\beta\in\left(\underline{\beta}^1,\overline{\beta}^1\right)\right)}{F\left(\underline{\beta}^1\right)+q\left[F\left(\overline{\beta}^1\right)-F\left(\underline{\beta}^1\right)\right]}$. After some algebra, this reduces to $U\left(\beta < \underline{\beta}^1\right) \geq U\left(\beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right)$. A symmetric argument for $x = B$ establishes that $U\left(\beta > \overline{\beta}^1\right) \geq U\left(\beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right)$.

Expressing $U\left(\beta > \overline{\beta}^1\right) \geq U\left(\beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right)$ in terms of the voter's utility from each of the three incumbent types $U(A), U(R)$, and $U(B)$ we need

$$\begin{aligned}
\Pr\left(\beta > \overline{\beta}^2 | \beta > \overline{\beta}^1\right) U(B) \quad &\geq \quad \Pr\left(\beta > \overline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) U(B) \\
+\Pr\left(\beta \in \left(\underline{\beta}^2, \overline{\beta}^2\right) | \beta > \overline{\beta}^1\right) U(R) \quad & \quad\quad +\Pr\left(\beta \in \left(\underline{\beta}^2, \overline{\beta}^2\right) | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) U(R) \\
& \quad\quad +\Pr\left(\beta < \underline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) U(A). \qquad (4)
\end{aligned}$$

Since $\Pr\left(\beta > \overline{\beta}^2 | \beta > \overline{\beta}^1\right) > \Pr\left(\beta > \overline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right)$ and $U(R) > U(B)$ for a type R voter, Equation (4) requires that $\Pr\left(\beta < \underline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) > 0$, i.e., $\underline{\beta}^1 < \underline{\beta}^2$.

A similar argument building on $U\left(\beta < \underline{\beta}^1\right) \geq U\left(\beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right)$ establishes that $\overline{\beta}^1 > \overline{\beta}^2$, i.e., $\Pr\left(\beta > \overline{\beta}^2 | \beta > \overline{\beta}^1\right) = 1$. Plugging this latter result back in to Equation (4) we get
$U(B) \geq \Pr\left(\beta > \overline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) U(B) + \Pr\left(\beta \in \left(\underline{\beta}^2, \overline{\beta}^2\right) | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) U(R) +$
$\Pr\left(\beta < \underline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) U(A)$. Since $U(R) > U(A)$ for a type R voter and
$\Pr\left(\beta > \overline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) + \Pr\left(\beta \in \left(\underline{\beta}^2, \overline{\beta}^2\right) | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) + \Pr\left(\beta < \underline{\beta}^2 | \beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right) = 1$, it must be the case that $U(B) > U(A)$.

But working from $U\left(\beta < \underline{\beta}^1\right) \geq U\left(\beta \in \left(\underline{\beta}^1, \overline{\beta}^1\right)\right)$ a symmetric argument shows that $U(B) < U(A)$, which is a contradiction.■

Proposition 4 summarizes the following three lemmas.

Lemma 7 *Each of the following is an equilibrium voter strategy for some* $\beta_V \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$: *(1)* $\nu_{AA} = \nu_{AB} = 1, \nu_{BB} = \nu_{BA} = 0$; *(2)* $\nu_{AA} = 1, \nu_{AB} \in (0,1), \nu_{BB} \in (0,1), \nu_{BA} = 0$; *(3)* $\nu_{AA} = 1, \nu_{AB} = 0, \nu_{BB} = 1, \nu_{BA} = 0$; *(4)* $\nu_{AA} \in (0,1), \nu_{AB} = 0, \nu_{BB} = 1, \nu_{BA} \in (0,1)$; *(5)* $\nu_{AA} = \nu_{AB} = 0, \nu_{BB} = \nu_{BA} = 1$.

Proof. For (1), set $\nu_{AA} = \nu_{AB} = 1$ and $\nu_{BB} = \nu_{BA} = 0$, which, by Proposition 2, implies cutpoints $\underline{\beta}^1$ and $\overline{\beta}^1$ for first period official behavior. By Lemma 6, this official behavior implies voter cutpoints β^B and β^A. The voter behavior in part (1) is optimal for any $\beta_V \leq \beta^B$.

For (2), let $\nu_{AA} = 1$ and $\nu_{BA} = 0$, and let ν_{AB} and ν_{BB} each take any arbitrary value in $(0,1)$. Proposition 2 gives cutpoints $\underline{\beta}^1$ and $\overline{\beta}^1$, and Lemma 6 gives the resulting voter cutpoints β^B and β^A. For $\beta_V = \beta^B$ it is optimal to play $\nu_{AA} = 1$ and $\nu_{BA} = 0$. Since this voter type is indifferent after observing either $x = A$ or $x = B$ when $\omega = B$, he can mix using the particular ν_{AB} and ν_{BB} that were used to generate this β^B. The arguments for (3)-(5) are similar.■

Lemma 8 *Any equilibrium voter strategy must be one of the 7 types in Lemma 7.*

Proof. Consider any (possibly mixed) voter strategy ν. Given ν, Proposition 2 implies cutpoints $\underline{\beta}^1$ and $\overline{\beta}^1$ for first period official behavior. Given these cutpoints, Lemma 6 characterizes cutpoints for voter behavior. The only voter strategies ν that are compatible with these cutpoints are the types listed in Lemma 7.■

Lemma 9 *For any $\beta_V \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$ there exists an equilibrium.*

We set up a continuous function $\lambda(z){:}[0,5] \to \left[\underline{\beta}^2, \overline{\beta}^2\right]$. Each $z \in [0,5]$ specifies a particular equilibrium from Lemma 7, and we use the intermediate value theorem to show that for any $\beta_V \in \left[\underline{\beta}^2, \overline{\beta}^2\right]$ there is some z such that $\beta_V \in \lambda(z)$, i.e., there is an equilibrium. The intuition behind the proof is that there are three intervals of β_V values for the three types of pure strategy equilibria in parts (1), (3) and (5) of Lemma 7, and any gaps between these intervals can be filled in using specific mixed strategy equilibria from parts (2) and (4).

We begin by setting up notation. First let $\beta_{(1)}$ be the maximum β_V for which the voter can play $\nu_{AA} = \nu_{AB} = 1$ and $\nu_{BB} = \nu_{BA} = 0$ in equilibrium. Specifically $\beta_{(1)}$ is the value of β^B from Lemma 6 generated by official behavior that is optimal given $\nu_{AA} = \nu_{AB} = 1$ and $\nu_{BB} = \nu_{BA} = 0$. Likewise we set $\nu_{AA} = 1, \nu_{AB} = 0, \nu_{BB} = 1$, and $\nu_{BA} = 0$, and let $\beta_{(2)}$ be the minimum and $\beta_{(3)}$ be the maximum β_V for which this voter behavior can occur in equilibrium; these are the β^B and β^A from Lemma 6 generated by official behavior that is a best response to $\nu_{AA} = 1, \nu_{AB} = 0, \nu_{BB} = 1$, and $\nu_{BA} = 0$. Finally, let $\beta_{(4)}$ be the minimum β_V for which the voter can play $\nu_{AA} = \nu_{AB} = 0$ and $\nu_{BB} = \nu_{BA} = 1$ in equilibrium. This is the value of β^A from Lemma 6 generated by official behavior that is a best response to $\nu_{AA} = \nu_{AB} = 0$ and $\nu_{BB} = \nu_{BA} = 1$.

Define $\lambda(z)$ as follows:

$$\lambda(z) = \begin{cases} \underline{\beta}^2 + z(\beta_{(1)} - \underline{\beta}^2) & \text{for } z \in [0,1] \\ \beta \in \left[\underline{\beta}^2, \overline{\beta}^2\right] : \nu_{AA} = 1, \nu_{AB} = 2 - z, \nu_{BB} = z - 1, \nu_{BA} = 0 \text{ is an equilibrium} & \text{for } z \in (1,2) \\ \beta_{(2)} + (z-2)(\beta_{(3)} - \beta_{(2)}) & \text{for } z \in [2,3] \\ \beta \in \left[\underline{\beta}^2, \overline{\beta}^2\right] : \nu_{AA} = 4 - z, \nu_{AB} = 0, \nu_{BB} = 1, \nu_{BA} = z - 3 \text{ is an equilibrium} & \text{for } z \in (3,4) \\ \beta_{(4)} + (z-4)(\overline{\beta}^2 - \beta_{(4)}). & \text{for } z \in [4,5] \end{cases}$$

By construction, for $z \in [0,1]$ there is an equilibrium in which $\nu_{AA} = \nu_{AB} = 1$ and $\nu_{BB} = \nu_{BA} = 0$; for $z \in [2,3]$ there is an equilibrium in which $\nu_{AA} = 1, \nu_{AB} = 0, \nu_{BB} = 1$, and $\nu_{BA} = 0$; and for $z \in [4,5]$ there is an equilibrium in which $\nu_{AA} = \nu_{AB} = 0$ and $\nu_{BB} = \nu_{BA} = 1$. Also $\lambda(z)$ is nonempty for $z \in [0,1] \cup [2,3] \cup [4,5]$ and by Lemma 7, $\lambda(z)$ is nonempty, $\forall z \in (1,2) \cup (3,4)$. Finally, $\lambda(0) = \underline{\beta}^2$ and $\lambda(5) = \overline{\beta}^2$ so to apply the intermediate value theorem, all we need to do is to show that $\lambda(z)$ is continuous.

Clearly $\lambda(z)$ is continuous on $[0,1), (2,3)$, and $(4,5]$, so we just need to check continuity on $[1,2]$ and $[3,4]$. Suppose $z_n \to \tilde{z}$; we need to show that $\lambda(z_n) \to \lambda(\tilde{z})$. To do this we define $\underline{\beta}^1(\tilde{z})$ and $\overline{\beta}^1(\tilde{z})$ to be the cutpoints for incumbent policy choice from Proposition 2 given voter behavior specified by $\tilde{z}$, and similarly define $\underline{\beta}^1(z_n)$ and $\overline{\beta}^1(z_n)$ based on z_n. We show that $\underline{\beta}^1(z_n) \to \underline{\beta}^1(\tilde{z})$ and $\overline{\beta}^1(z_n) \to \overline{\beta}^1(\tilde{z})$. We use Lemma 6 to define cutpoints for voter behavior $\beta^B(\tilde{z}), \beta^A(\tilde{z})$, $\beta^B(z_n)$, and $\beta^A(z_n)$ then show that $\beta^B(z_n) \to \beta^B(\tilde{z})$ and $\beta^A(z_n) \to \beta^A(\tilde{z})$. Finally we show that convergence of the voter cutpoints ensures that $\lambda(z_n) \to \lambda(\tilde{z})$.

To show $\underline{\beta}^1(z_n) \to \underline{\beta}^1(\tilde{z})$ recall from the proof of Proposition 2 that $\underline{\beta}^1 = \max\{\beta_I \in [0,1] : U(B|B) - U(A|B) \leq 0\}$. From Lemma 1, $U(B|B) - U(A|B)$ is continuous and strictly increasing in β_I. We now note that it has a slope that is strictly bounded away from zero, since in Equation (3) for $\beta_I < \underline{\beta}^2$, $(1-\pi)(\phi_R q + \phi_B) + \pi(\phi_R(1-q) + \phi_B)$ $= \phi_R((1-\pi)q + \pi(1-q)) + \phi_B < 1$. Similarly, for $\beta_I \in \left(\underline{\beta}^2, \overline{\beta}^2\right)$, $(1-\pi)(\phi_A q - \phi_B(1-q))$

$+\pi\left(\phi_A\left(1-q\right)-\phi_B q\right)=\phi_A((1-\pi)\,q+\pi\left(1-q\right))-\phi_B((1-\pi)(1-q)+\pi q)\in\left(-1,1\right).$ Let $d>0$ be a lower bound on the slope of $U\left(B|B\right)-U(A|B)$. From Equations (1) and (2) in the main text the re-election probability difference $\left[r_A\left(s\right)-r_B\left(s\right)\right]$ is a continuous function of the voter strategy ν, and $\nu_{AA},\nu_{AB},\nu_{BB},\nu_{BA}$ are continuous functions of z, as set up in the definition of $\lambda\left(\cdot\right)$. Thus the utility difference for z_n, which we denote as $U_n\left(B|B\right)-U_n(A|B)$ converges pointwise to the utility difference for $\tilde{z}$, which we denote as $\tilde{U}\left(B|B\right)-\tilde{U}(A|B)$. And, if we pick an $\epsilon>0$ and let $\delta=\epsilon d$ there exists an N such that for all $n>N$, at $\underline{\beta}^1\left(\tilde{z}\right)$, $U_n\left(B|B\right)-U_n(A|B)<\delta$ and thus $\left|\underline{\beta}^1\left(z_n\right)-\underline{\beta}^1\left(\tilde{z}\right)\right|<\frac{\delta}{d}=\epsilon$. If $\underline{\beta}^1\left(\tilde{z}\right)=0$ and $\tilde{U}\left(B|B\right)-\tilde{U}(A|B)>0$ for $\beta_V=0$ then there exists an N such that for all $n>N$, $U_n\left(B|B\right)-U_n(A|B)>0$ and thus $\underline{\beta}^1\left(z_n\right)=0$. By an argument similar to the one in this paragraph, $\overline{\beta}^1\left(z_n\right)\to\overline{\beta}^1\left(\tilde{z}\right)$.

We now establish convergence of the voter cutpoints, starting with $\beta^B\left(z_n\right)\to\beta^B\left(\tilde{z}\right)$. As noted in the proof of Lemma 6, for a given pair of incumbent behavior cutpoints $\underline{\beta}^1\left(\tilde{z}\right)$ and $\overline{\beta}^1\left(\tilde{z}\right)$, $\tilde{U}(old|AB)-\tilde{U}(new)$, the voter's utility difference for re-electing versus removing the incumbent when $x=A$ and $\omega=B$, is strictly positive for $\beta_V=\underline{\beta}^2$. Likewise, given $\underline{\beta}^1\left(\tilde{z}\right)$ and $\overline{\beta}^1\left(\tilde{z}\right)$ for a voter with preference $\beta_V=\overline{\beta}^2$, $\tilde{U}(old|AB)-\tilde{U}(new)$ is strictly negative. Let $d>0$ be the slope of this utility difference function, and note that since voter beliefs $\mu\left(\cdot\right)$ are a continuous function of $\underline{\beta}^1$ and $\overline{\beta}^1$, $U_n(old|AB)-U_n(new)$ converges pointwise to $\tilde{U}(old|AB)-\tilde{U}(new)$ so we can pick N such that for $n>N$ the absolute value of the slope of $U_n(old|AB)-U_n(new)$ is greater than $\frac{d}{2}$. Then the same type of argument we used to show that $\underline{\beta}^1\left(z_n\right)\to\underline{\beta}^1\left(\tilde{z}\right)$ can be used to show that $\beta^B\left(z_n\right)\to\beta^B\left(\tilde{z}\right)$. The argument for $\beta^A\left(z_n\right)\to\beta^A\left(\tilde{z}\right)$ is similar.

To show that $\lambda\left(z_n\right)\to\lambda\left(\tilde{z}\right)$ we consider two cases. First suppose $\tilde{z}\in(1,2)\cup(3,4)$, and consider the specific subcase $\tilde{z}\in(1,2)$. Then $z_n\to\tilde{z}$ implies that there exists an N such that $\forall n>N$, $z_n\in(1,2)$. For such $z_n\in(1,2)$, by Lemma 6 and the definition of $\lambda\left(\cdot\right)$, $\lambda\left(z_n\right)=\beta^B\left(z_n\right)$ and $\beta^B\left(z_n\right)\to\beta^B\left(\tilde{z}\right)=\lambda\left(\tilde{z}\right)$. The argument is similar for $\tilde{z}\in(3,4)$, using β^A.

Now suppose $\tilde{z} \in \{1, 2, 3, 4\}$, and consider the specific case $\tilde{z} = 1$, in which case $\lambda(\tilde{z}) = \beta_{(1)}$. Pick any $\epsilon > 0$, and note from the definition of $\lambda(\cdot)$ that we can pick an N_1 such that for any $n > N_1$, if $z_n \leq 1$ then $\left|\beta_{(1)} - \lambda(z_n)\right| < \epsilon$. Similarly, since for $z_n > 1, \lambda(z_n) = \beta^B(z_n)$ and $\beta^B(z_n) \to \beta^B(\tilde{z}) = \beta_{(1)}$, given ϵ we can pick an N_2 such that for any $n > N_2$, if $z_n > 1$ then $\left|\beta_{(1)} - \lambda(z_n)\right| < \epsilon$. Thus for any $n > \max\{N_1, N_2\}$, $\left|\beta_{(1)} - \lambda(z_n)\right| < \epsilon$.■

Notes

[1]See Fiorina (2006) for further discussion of problems associated with ideological rigidity.

[2]For a review of the literature see Grofman (2004), which underscores the role of elections in providing "centripetal" incentives for politicians.

[3]Role of Polls in Policymaking Survey, conducted by Princeton Survey Research Associates Jan. 3 - Mar. 26, 2001 on a national adult population. Respondents were asked, "I am going to read you two statements. Please tell me which comes closer to your views, even if neither is exactly right. The first statement is, elected and government officials should use their knowledge and judgement to make decisions about what is best policy to pursue, even if this goes against what the majority of the public wants. The second statement is, elected and government officials should follow what the majority wants, even if it goes against the officials' knowledge and judgement. Which comes closer to your views?" The first statement was preferred by 44% of conservatives, 51% of moderates, and 44% of liberals. Comparing moderates to the other two groups in a pairwise comparison, the difference is significant at conventional levels with $p = 0.015$, two-tailed.

[4]This assumption is not only standard in general electoral models, but also policy-specific ones. See, for instance, Gordon and Huber's (2002) analysis of elected prosecutors, where an incumbent can be replaced by someone who is more or less punitive, or Downs and Rocke (1994), where an incumbent executive can be replaced by a challenger who is more pro- or anti-war.

[5]To minimize subscripts and superscripts, we abuse notation by using A and B to refer to a state of the world and the signal that corresponds to that state, as well as the action that is appropriate in that state.

[6]All numerical cutpoints for β_V in the example are rounded to two decimal places.

[7]Proofs for the extensions, and the comparative claims about them, are available upon request.

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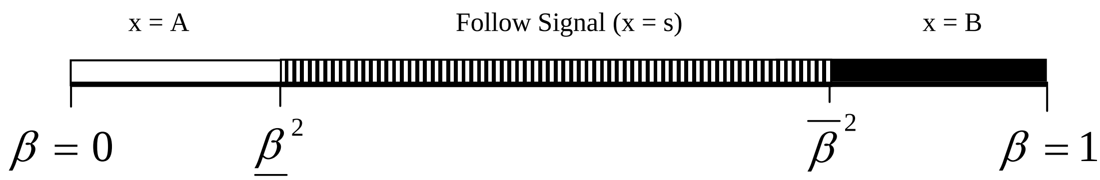
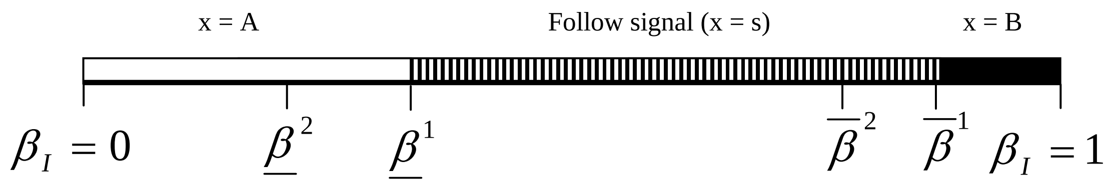
<u>Figure 1</u>: Second period behavior of official

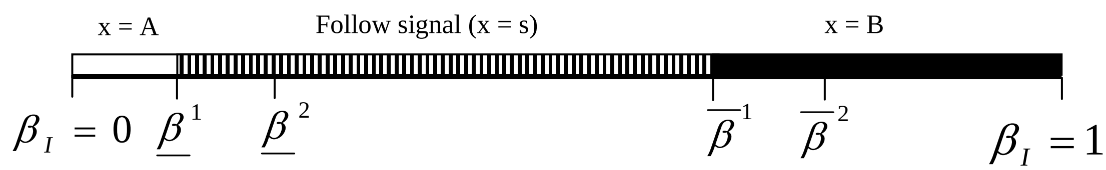


<u>Figure 2</u>: First period behavior of incumbent

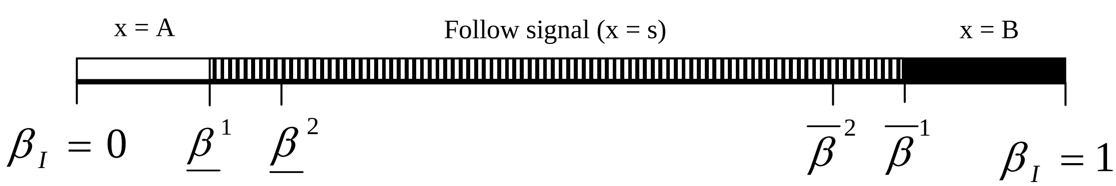
(a) Official who is rewarded for choosing x = A



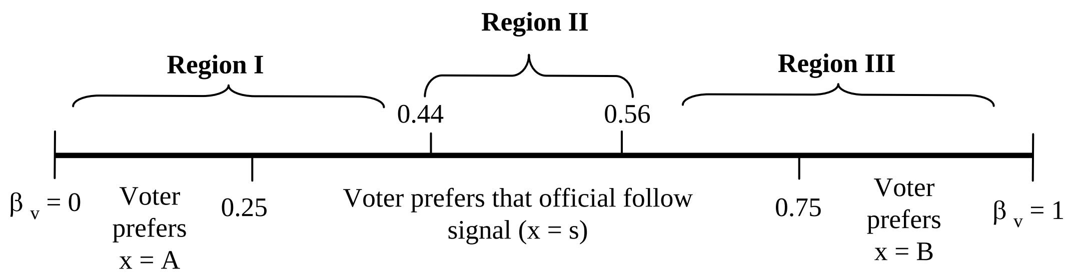
(b) Official who is rewarded for choosing x = B



(c) Moderation by official who is rewarded for following signal



<u>Figure 3</u>: Pure strategy equilibria in Example 1, as a function of voter preferences β_v



Region I: Official wins re-election if and only if $x = A$
Region II: Official wins re-election if and only if $x = \omega$
Region III: Official wins re-election if and only if $x = B$