ACCOUNTABILITY AND INCENTIVES

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September 2012

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Abstract. I study a model of electoral competition where both economic policy and politicians' effort affect voters' payoff. If voters cannot distinguish the effect of policy and effort, politicians acquire an implicit incentive to exert effort. This incentive can last through every period in an infinitely repeated game, provided there is uncertainty in every period regarding the policy's effectiveness. As uncertainty decreases, set of effort-exerting equilibria shrinks. Though the electorate manages to hold the incumbent politician accountable on effort dimension, it may not eliminate inefficient persistence in policy choice even when cost of changing policy is negligible.

1. Introduction

Electoral competition should provide incentives for the incumbent leader to act in voters' interests. Electoral competition theory studies two types of incentives. The first case (Barro 1973; Ferejohn 1986) assumes that voters vote retrospectively and punishes bad behavior by removing poorly performing incumbents from office. Because the electorate rewards good performance with reappointment to office, incumbents are motivated to exert costly effort. In this type of model, voters use a backward-looking strategy in which they do not change their re-election rule after observing the incumbent's performance. I call this incentive an *explicit incentive* because it is similar to the incentive that would have arisen if an explicit performance-contingent contract without any mention of commitment had been given to the incumbent at the beginning of the period. Another type of incentive, which I refer to as *implicit incentive*, arises when the incumbent's performance in the current period provides information about some variable that affects voters' payoff in later periods. This literature starts with Holmstorm's (1999) seminal work on a managerial incentive problem in a dynamic setting. In this model (Lohmann, 1998; Persson and Tabellini, 2000: chaps. 4 and 9), popularly known as a career concern model, economic performance signals the incumbent's competence, and voters reward competence with reelection. To appear more competent and increase the chances of reelection, the incumbent undertakes costly effort. These models do not assume any voter commitment to a specific reelection rule. Instead, voters reelect the incumbent only if the expected payoff from reelecting the incumbent exceeds the expected payoff from not reelecting the incumbent.

Although these theories capture important aspects of reality, each has its own deficiencies. In the retrospective voting model voters are strongly committed to their re-election rule. The career concern model does not take the policy effectiveness into consideration. In reality, voters payoff depends not only on the effort put in by politicians but also on the current policies' effectiveness. If an economic policy fails to address their interests, voters care more about replacing the policy than electing competent officials. The career concern model completely ignores the role of policy effectiveness, however. It also predicts that politicians work hard only in their career-building stages; as information about competence level becomes certain to voters, politicians' incentive to exert effort disappears.

In this paper, I consider an alternate factor that can provide an implicit incentive to leaders to undertake desirable but costly effort: the absence of perfect observability of policy effectiveness. To this end, I analyze a model where both policy and effort affect outcome. Voters can only observe the outcome; they cannot distinguish the impact of the policy from the effort of the politician. Voters can replace a politician by incurring a transition cost. The model assumes that if the incumbent exerts effort, a better economic outcome is more likely under an effective economic policy than an ineffective one. In this scenario, if voters observe a bad outcome, and if they still believe the incumbent has exerted effort, then they would attribute the bad outcome only to a bad economic policy. If the chances of reelection increase with policy effectiveness, the incumbent would exert effort to convince voters that the policy is indeed effective.

I consider an infinitely repeated election game where the incumbent leader faces a series of elections. When some uncertainty regarding the policy effectiveness is present, the implicit incentive can sustain effort in every period. Furthermore, given a level of uncertainty about current policy effectiveness, I find an upper limit on the cost of effort such that for any level of cost below that limit, there exists an equilibrium where the incumbent always exerts effort in equilibrium. This equilibrium will be the unique equilibrium if the cost of transition is less than the probability of effectiveness of an untested policy. For a higher range of values of the transition cost, there will be multiple equilibria. I also find that the incumbent does not change the policy in equilibrium even if the cost of changing the policy is negligible. These results show that even if an implicit incentive can induce incumbents to undertake the costly effort, it fails to motivate them to change a policy when it is not ex ante optimal. Hence, the electorate can never achieve the ex ante first best outcome.

This paper is organized as follows. In section 2, I present a two-period model to illustrate policy uncertainty's ability to induce responsive behavior by the incumbent in the first period. Section 3 describes the infinite horizon model. Section 4 discusses the role of the imperfect observability assumption. Sections 5-7 present the equilibrium analysis and section 8 concludes with a brief discussion.

1.1. **Related literature.** The explicit incentive models described earlier originate from Barro (1973). In Barro, politicians want to maximize rent from holding office. Voters can control incumbents' behavior by basing the incumbents' reelection probability on their delivery of social welfare above a threshold. Because politicians desire reappointment, election acts as a disciplinary mechanism to control incumbent behavior. Ferejohn (1986) studies an extended version of this game with exogenous rents from office and costly effort. Persson, Roland, and Tabellini (1997) adapt the same model and show how separation of power can induce responsive behavior in the incumbent. Finally, Austen-Smith and Banks (1989) study electoral accountability when voters adopt retrospective voting strategies based on the difference between incumbents' performance and their initial policy platform.

The literature on implicit incentives draws on Holmstrom's (1999) career concern model, which is extended by Dewatripont, Jewitt and Tirole (1999a, 1999b) to allow alternative assumptions regarding information structure. Applied in political theory (Persson and Tabellini, 2000), the career concerns model assumes candidates maximize the expected value of their competence and studies the role of election as a selection mechanism. Ashworth (2005) considers a similar career concern model with policy uncertainty. In Ashworth, politicians decide how to allocate resources between constituency work and policy work during their tenure. He finds that politicians devote excessive time to constituency work early in their career to affect voters' learning process; only career concern motivates politicians to exert effort. In this kind of model, information about the candidate's intrinsic type is revealed through outcome. In my model, on the other hand, voters learn information about economic policy, which the candidate may change if he wishes. Thus, the decision whether to continue with the previous period's policy and give information about the policy to voters, is a strategic decision by the candidate.

Canes-Wrone, Herron and Shotts (2001) study an electoral accountability model where voters are ill-informed about policy effectiveness. In addition, while voters know that candidates have more accurate information, they are aware that the quality of the information depends upon candidates' competence levels, which are also their private information. They analyze conditions under which candidates may or may not pander to voters by choosing a popular policy, given their private information about policy effectiveness. Since quality of private information varies across candidates, the election also acts as a selection mechanism. Maskin and Tirole (2004) also study a similar model of executive policy making. Maskin and Tirole study relative efficiency of different constitutional designs, namely, accountable politicians, non-accountable judges, and direct democracy in policy making. In this kind of model, candidates have more information about policy effectiveness than voters have. Candidates sometime pander to voters by following popular policy, even if their private information suggest that the policy could be ineffective. In my model, on the other hand, voters and candidates have the same information. Given the same level of information about policy effectiveness, I address the moral hazard question in a political agency framework.

The most closely related studies on sustaining costly effort for an infinite number of periods are Mailath and Samuelson (2001) and Hörner (2003). In Mailath and Samuelson, the agent can occasionally exit the market, but the principal cannot observe this event. Given this kind of unobservability, they show that a responsive equilibrium can last for an infinite number of periods. In Hörner, reputation-building behavior arises under persistent competition in which firms' revenues do not vary continuously with consumer expectation.

2. A two-period example

In this section, I present a two-period model to illustrate how opportunist leaders can commit to serve responsibly when there is imperfect observability of policy outcome. In each period, a leader holds office and decides whether to run the office responsibly or corruptly. His payoff from holding the office is b. He incurs a cost of $c_e > 0$ if he runs the office responsibly. If he is out of office, he gets zero. The leader chooses a policy variable with an outcome of p. The policy can be effective or ineffective. Ex ante, the probability that any policy would be effective is $\pi \in (0, 1)$. A leader can implement a new policy at no cost when he is serving his first term in office; thus, in the first period, the leader can choose any policy vector at no cost. If he is reelected, however, he enters the second period, where he incurs a costs to implement a new policy. Let $c_p > 0$ denote the leader's cost of changing the existing policy. Note that a challenger, if elected, does not face any cost to change the policy in the second period because he is serving his first term. In each period, all leaders want to maximize expected payoffs. We assume that the leader's effort is observable only to the leader himself. Voters observe only outcomes.

At the end of each period, an outcome is realized. The outcome can be good (G), moderate (M), or bad (B). I consider a single voter who receives utility from the realized outcome. The voter gets 2 units of utility if the outcome is good, 1 unit of utility if the outcome is moderate and 0 units of utility if the outcome is bad. Both the implemented policy and the leader's effort affect outcome. If the policy is effective and the leader serves corruptly, the outcome would be M; if the leader serves responsibly, then the outcome can be either G with probability μ or M with probability $(1 - \mu)$. On the other hand, if the policy is ineffective, then the outcome is bad if the leader serves corruptly; if he serves responsibly then either a moderate outcome is realized with probability μ or a bad outcome is realized with probability $(1 - \mu)$. If the leader replaces the existing policy with a new policy, then the probability that the new policy would be effective is given by a parameter $\pi > 0$. Notably, voters pay a transition cost $c_t > 0$ whenever they elect a non-incumbent leader.

The game involves three players: an incumbent leader I a challenger C and a voter. The game proceeds as follows. At the beginning of period 1, I chooses a policy and decides whether to serve responsibly. At the end of period 1, the first-period outcome is realized and everyone observes the outcome. The voter updates his belief regarding the type of the policy chosen in period 1, and decides whether or not reelect the incumbent. Then, period 2 begins and the temporal game is repeated. We consider the *Perfect Bayesian Equilibrium* (PBE) in pure strategies for this game. Therefore, the strategy of every player is sequentially rational given other players' strategies and the belief is updated according to the Bayes' rule along the equilibrium path. There are essentially two different kinds of equilibria. In one of these, the incumbent serves responsibly in the first period. In the other, he serves corruptly in the first period. I will call the former R *equilibria*, and the latter C *equilibria*.

2.1. **Equilibrium under perfect observation.**

In the perfect observation case, the voter can perfectly observe the policy's effectiveness at the end of the first period. Since in the final period, whoever runs the office will not take any costly action, the voter only cares about the policy's effectiveness. Moreover, the incumbent's actions in the first-period cannot affect the voter's perception of the policy's effectiveness; indeed, because the voter can perfectly observe the policy's outcome, the incumbent's actions cannot sway voter perception. Hence, the incumbent will not take any costly action even in the first period.

Only C equilibria exist in the perfect observation case. If $\pi < c_t$ in this C equilibria, the office is run corruptly in both period 1 and period 2. The voter always reelects the incumbent in this case, and the challenger, if elected, either continues with the existing policy (in one possible equilibrium) or may select a new policy (another possible equilibrium). If $\pi \geq c_t$, then there is another electoral equilibrium in which the voter replaces the incumbent if and only if the first period policy is ineffective, the challenger chooses a new policy in the second period, and the office is run corruptly both in period 1 and in period 2.

2.2. **Equilibrium under imperfect observation.** In the imperfect observation case, the voter can observe the policy's effectiveness only if the policy produces an extreme result. If $o = M$, then the voter cannot determine whether this outcome stems from an ineffective policy selection or incumbent corruption. If the voter expects the incumbent to run the office responsibly, then after observing the moderate outcome M, he revises his belief about the policy's effectiveness following Bayes' rule:

$$\eta\left(p = e \mid o = M\right) = \frac{\pi\left(1-\mu\right)}{\pi\left(1-\mu\right)+\mu\left(1-\pi\right)}.$$

If the incumbent serves responsibly, then a moderate outcome could occur under effective policy with a probability of $(1-\mu)$. So in the numerator we have the probability of a moderate outcome under an effective policy, and in the denominator, we have the total probability of a moderate outcome. If the voter does not expect the incumbent to serve responsibly, then his belief about the policy's effectiveness will be:

$$\eta\left(p = e \mid o = M\right) = 1.$$

Indeed, if the voter expects the incumbent not to serve responsibly, then a moderate outcome can occur only if the policy is effective. Because $\frac{\pi(1-\mu)}{\pi(1-\mu)+\mu(1-\pi)} < 1$, if the voter expects the incumbent to serve responsibly, and if the incumbent does not do so, then the posterior probability of the policy's effectiveness will decrease. This situation endogenously creates an incentive for the incumbent to serve responsibly. On the other hand, if the voter expects the incumbent to serve corruptly, the incumbent can increase the posterior probability of the policy's effectiveness by deviating to serve responsibly. Thus, under imperfect observation, it is possible to sustain an equilibrium in which the incumbent serves responsibly in the first period.

Before stating the first proposition, I introduce a new variable here. Let δ_1 be defined as follows:

$$\delta_1 = \pi - \frac{\pi\left(1-\mu\right)}{\pi\left(1-\mu\right)+\mu\left(1-\pi\right)}.$$

δ_1 measures the difference in expected benefit between a new policy and an existing policy that resulted in a moderate outcome in the last period. δ_1 is positive if and only if $\mu \geq \frac{1}{2}$. If the transition cost c_t is greater than δ_1, then the voter's expected return from selecting a challenger would be low compared with the expected return from reelecting the incumbent after observing a moderate outcome. Therefore, the voter would reward the politician even after observing a moderate outcome, when he believes that the politician served responsibly.

Proposition 1.

- *If $\delta_1 \leq c_t \leq \pi + \mu$, then an R equilibrium exists if $\frac{b}{c_e} \geq \frac{1-\mu(1-\pi)}{\mu(1-\pi)}$. In this R equilibrium, the incumbent serves responsibly in the first period. The voter reelects the incumbent if either a good or a moderate outcome is realized. In the second period, if the incumbent is reelected, he continues with the existing policy and serves corruptly. If the challenger is elected, then the challenger selects a new policy, and serves corruptly.*
- *If $0 \leq c_t < \delta_1$, an R equilibrium exists if $\frac{b}{c_e} \geq \frac{1-\mu\pi}{\mu\pi}$. In this R equilibrium, the incumbent serves responsibly in the first period. The voter reelects the incumbent only if a good outcome is realized. In the second period, if the incumbent is reelected, he continues with the existing policy and serves corruptly. If the challenger is elected, then the challenger selects a new policy, and serves corruptly.*
- *Moreover, if $\frac{b}{c_e} \geq \frac{1-\mu(1-\pi)}{\mu(1-\pi)}$, no C equilibrium exists*[1].

Proof. In Appendix. □

[1]To prove this result, I assume the voter can use only monotone strategies, in which the reelection probability monotonically increases as the outcome moves from bad to good. Note that for any given parameter value, an equilibrium exists in which the incumbent uses a mixed strategy in the first period.

This result arises from the following line of reasoning. If the transition cost is too high in particular, if $c_t \geq \delta_1 -$ then the voter cannot credibly commit to a punishment strategy leading him to reelect the incumbent only if a good outcome occurs. In this case, if I serves responsibly, he will not be reelected only when the outcome is bad, a situation that has probability $(1-\pi)(1-\mu)$. On the other hand, if he serves corruptly, a bad outcome would be realized when the policy is ineffective, which has probability $(1-\pi)$. The incumbent achieves a short-term gain c_e (negative of loss by serving responsibly), however, by serving corruptly in the first period. To decide whether to serve corruptly or responsibly, the incumbent compares the short-term gain c_e with the expected loss in second-period payoff $(b+c_e)((1-\pi)-(1-\pi)(1-\mu))$ from serving corruptly. By comparing,we get the condition for the existence of an R equilibrium when $\delta_1 \leq c_t$. If $c_t < \delta_1$, the voter can commit to a punishment strategy in which he reelects the incumbent only when the outcome is good. In this case, the incumbent compares his short-term gain c from serving corruptly in the first period with the expected loss $(b+c_e)(1-\pi\mu)$ from serving corruptly. In any C equilibrium, the incumbent does not have an incentive to serve responsibly if the voter expects him to serve corruptly. When the incumbent is expected to serve corruptly, a bad outcome will not be realized only if the policy is effective. Therefore, by deviating to serve responsibly in the first period, the incumbent can increase his reelection probability to 1 by probability $((1-\pi)-(1-\pi)(1-\mu))$. Hence, the incumbent deviates if his expected benefit from doing so $-$ $(b+c_e)((1-\pi)-(1-\pi)(1-\mu))-$ exceeds his short-term loss from deviation or c_e.

2.3. **Comparative statics results on π :.** Note that δ_1 approaches zero as π approaches either 0 or 1. Let us consider a strictly positive transition cost $c_t > 0$ and $\mu > \frac{1}{2}$ so that δ_1 is strictly positive. As π goes to zero (i.e., when $\pi < c_t$) no R equilibrium exists. As π goes to 1, we will have $\delta_1 \leq c_t$. Therefore, only the first type of R equilibria mentioned in Proposition 1 can arise. As π becomes large, however, $\frac{1-\mu(1-\pi)}{\mu(1-\pi)}$ will become arbitrarily high, which implies that no R equilibrium will exist. So for extreme values of π (i.e., those that approach 0 or 1), R equilibria do not exist. For intermediate values of π, on the other hand, R equilibria can exist.

The incumbent's decision not to serve responsibly in all periods depends critically on two assumptions: First, if a policy is effective in the first period, then it is assumed to be effective in the second period, too; furthermore, the second period is the game's final period. The first assumption plays the following role: If, at the end of the first period, an extreme outcome occurs, then the voter receives perfect information about the type of policy; so, in subsequent periods, the incumbent's action does not change the policy's expected value to the voters. The incumbent therefore has no incentive to serve responsibly once an extreme outcome occurs. If a moderate outcome occurs, on the other hand, the voter's posterior belief in the policy's effectiveness would be weaker than his prior belief when he expects the incumbent to serve responsibly. He can still reelect the incumbent, however, provided that the transition cost exceeds the difference in the expected gain from following an untested new policy and from continuing with the existing policy that resulted in that last period's moderate outcome.

The role of the second assumption is the strongest in the two-period game. If we extend this game to a multi-period setting, as the number of periods increases, the effect of this assumption weakens, and we find the following: In the last period, the candidate does not serve responsibly. But in any period other than the final period, the incumbent would exert effort after a moderate outcome occurs. To demonstrate the effect of the first assumption, in the following section we drop the second assumption in an infinite horizon setup and show that equilibria exist in which the candidate can commit to serve responsibly in every period.

3. Infinite horizon game

In the previous section, I illustrated, in a two-period example how unobservability of candidate effort can generate an implicit incentive for the incumbent politician to respond to voters' interests. We now explore this implicit incentive in an infinite horizon setting. More specifically, I examine a political setup in which a long-lived incumbent politician faces a series of elections. In every election, a single voter decides whether to reelect the incumbent or the challenger. In this setting, the incumbent is different from a challenger on the following grounds: a) the incumbent faces a positive cost to change the existing policy whereas the challenger does not, and b) the voter faces a positive cost if the incumbent is not reelected. I call the first type of cost the *persistency cost* (denoted by c_p) and the second type of cost the *transition cost* (denoted by c_t). Empirical support for policy persistence abounds. One interpretation for this phenomenon states that the groups who benefit from the current policy also provide political support to the ruling party, thereby influencing political decision making. The transition cost may result from the inefficiency of the new leader, who is still learning the job, or the cost to the voter of supporting a successful campaign to replace the incumbent leader. The voter encounters a trade-off in replacing the incumbent leader: he weighs a transition cost against a cost of continuing an ineffective policy.

This is an infinitely repeated game in which election occurs in discrete time periods indexed by $t,\ t = 1, 2, ...$ The period-t stage game is formulated as described in the previous example. At the end of each period, good, moderate, or bad outcome is realized. A generic outcome is denoted by z, where z takes a value in the set $\{G, M, B\}$. I consider a single voter (avoiding conflict of interest among voters) who gains utility from the realized outcome. In particular, I consider a simple payoff structure in which the voter earns 2 units of utility if $z = G$, 1 unit of utility if $z = M$, and 0 units of utility if $z = B$. For every period, the existing leader receives a benefit from holding office, given by $b > 0$. A losing candidate receives zero payoff. The leader decides whether to serve responsibly or corruptly. A responsible effort incurs a positive cost, given by $c_e > 0$.

Both the implemented policy and the leader's effort affect outcome.. A policy can be either effective or ineffective. Under an effective policy:

$$\begin{aligned} \text{If the leader serves corruptly, } z &= M \\ \text{If the leader serves responsibly, } z &= \begin{cases} G & \text{with probability } \mu \\ M & \text{with probability } 1-\mu \end{cases}. \end{aligned}$$

Under an ineffective policy :

$$\begin{aligned} \text{If the leader serves corruptly, } z &= B \\ \text{If the leader serves responsibly, } z &= \begin{cases} M & \text{with probability } \mu \\ B & \text{with probability } 1-\mu \end{cases}. \end{aligned}$$

If a new policy replaces the existing policy, then the probability of the new policy's effectiveness is given by a parameter $\pi > 0$.

To sustain the implicit incentive in an infinitely repeated game setting, uncertainty about the policy's effectiveness must be present in every period. I introduce a new parameter to incorporate this behavior. In particular, I assume a policy that was effective in the last period could be ineffective in the current period with some positive probability $\lambda \in (0, 1)$. So, even after acquiring perfect information about last period's policy, the voter is unsure whether the policy will still be effective in the current period. This uncertainty has two implications in our setup. First, it directly reduces the expected value of a policy that was effective in the most recent period. As the resale value of the effective policy diminishes, the incumbent's incentive to serve responsibly decreases. On the other hand, this strengthens the voter's commitment to follow a strict punishment strategy of rewarding the incumbent only when a good outcome is realized. This behavior occurs because the policy's expected value in the next period after a moderate outcome occurs in the last period is reduced by a factor $(1 - \lambda)$. Thus, the relative importance of an alternate policy increases even when there is a positive transition cost.

3.0.1. $t-$***th period stage game***. The t-th period starts with an election in which the voter decides whether to reelect the incumbent. Let I_t denote the incumbent who held the office in the last period, and let C_t denote the challenger. The winner of this election holds the office for the current period. He first decides whether to replace the previous period's policy. The state variable, denoted by η_t, is the common belief that the last period's policy is effective in the current period. Let ϕ_t denote the interim belief after the winner makes the decision whether to replace the previous period's policy. So, ϕ_t equals η_t if the winner does not replace the previous period's policy, and equals π otherwise. Next, the winner finally decides whether to serve responsibly. At the end of the period, the outcome is realized. Voters then update their belief that the current policy would remain effective in the next period; this new belief becomes the next period's state value. In the infinite horizon setup we assume that the candidate wants to maximize the discounted sum of future payoffs where the discount factor is given by $\beta \in (0,1)$.

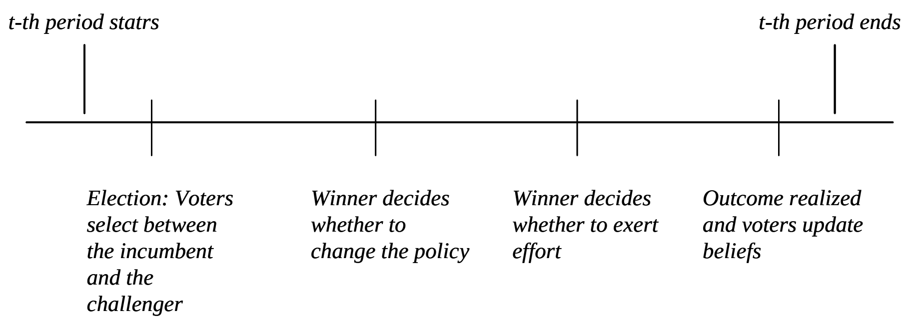

Figure 1: t - th period stage game

3.0.2. ***Markovian strategies.*** The belief η that the policy is effective is the players' only payoff-relevant variable. Hence, the state of the game is defined as the voter's belief that the policy is effective. A Markovian pure strategy for I_t is given by the mappings

$$n_i : [0,1] \to \{0,1\} \qquad r_i : [0,1] \to \{0,1\}.$$

The mapping $n_i(\eta)$ is the probability that last period's policy is replaced by a new policy. The mapping $r_i(\phi)$ is the probability of the office holder's serving responsibly given the interim belief ϕ. Note that the choice of $n_i(\eta)$ entirely determines the interim belief ϕ. If $n_i(\eta)$ equals 0, then ϕ equals η; otherwise ϕ equals π. A Markovian pure strategy for C_t is given by the mappings:

$$n_c : [0,1] \to \{0,1\} \qquad r_c : [0,1] \to \{0,1\}.$$

The mapping $n_c(\eta)$ is the probability that the last period's policy is replaced by a new policy. The mapping $r_c(\phi)$ is the probability the office holder will serve responsibly given the interim belief ϕ. The only difference between these candidates is that C_t incurs zero cost to change the policy whereas I_t incurs a positive cost $c_p > 0$.

The voter's Markovian pure strategy is given by the mapping

$$v_i : [0,1] \to \{0,1\},$$

where v_i is the probability of reelecting I_t. The voter is considered to be myopic and maximizes only his next period payoff. By keeping the voter's strategy as a function only of his interim belief, I implicitly assume that a candidate who starts the period with the state value π and decides to retain the policy will be treated the same as a candidate who starts with any different state value but changes the policy..

I use $\psi(\phi(z))$ to denote the voter's posterior belief that the policy would be effective in the next period given the outcome z and the interim belief ϕ. In Markov perfect equilibrium, the candidates maximize the discounted sum of future payoffs; the voter, on the other hand, maximizes his return from the current period and uses Bayes' rule to update the posterior probabilities.

Definition 1. *A Markov perfect equilibrium in pure strategies is the vector* $(r_i, n_i, r_c, n_c, v, \eta)$ *such that*

a: $(r_i, n_i), (r_c, n_c)$, *and* v *are payoff-maximizing strategies of the incumbent, the challenger, and the voters given others' strategies.*

b: *beliefs are updated following Bayes' rule:*

i:

$$\psi(\phi(G)) = (1-\lambda).$$

ii:

$$\psi(\phi(M)) = \frac{(1-\lambda)\phi[r_k(\phi)(1-\mu) + (1-r_k(\phi))]}{\phi[r_k(\phi)(1-\mu) + (1-r_k(\phi))] + (1-\phi)\mu r_k(\phi)},$$

where k *denotes the candidate who is serving in the current period.*

iii:

$$\psi(\phi(B)) = 0.$$

For notational simplicity, I will denote $\psi(\phi(z))$ by ϕ_z from now on. Note that if the leader serves corruptly in equilibrium, then the outcome G will not be reached with strictly positive probability. I assume that if the voter observes a good outcome when he expects the leader to serve corruptly, the voter assigns probability one to the event that the policy is effective.

4. The role of the imperfect observability of policy effect

Before illustrating how the implicit incentive is generated in the infinite horizon game, I address the benchmark case: perfect observability of policy effectiveness. If policy effectiveness were perfectly observable at the end of the period $t-1$, then at the beginning of the t-th period, the voter would know for sure whether the policy was effective in the last period. This fact implies two possible values for η_t: 0 or $(1-\lambda)$. Moreover, the incumbent's action does not affect the voter's posterior belief. Therefore, his continuation payoff from period $t+1$, which depends only on the voter's posterior belief, is independent of his action in the current period. This behavior implies that the winner of the election, regardless whether he is the incumbent or the challenger, will not incur the positive cost c_e of serving responsibly. Thus, the game merely boils down to the winner deciding in every period whether to change the policy and incurring the cost c_p. In this game, there is a unique Markov perfect equilibrium in pure strategies in which no leader serves responsibly. The following proposition describes the equilibrium behavior in the perfect observability case.

Proposition 2. *In any Markov equilibrium, when the voter can perfectly observes policy effectiveness, the incumbent never changes the policy. If elected, neither the incumbent nor the challenger exerts any effort to serve responsibly.*

Proof. See Appendix. □

Notably, these properties can arise in many equilibria. In fact, for any $\eta_0 \in (0, 1-\lambda)$, there exists an equilibrium in which the voter uses the following reelection strategy:

$$v(\eta) = \begin{cases} 1 & \text{if } \eta \geq \eta_0 \\ 0 & \text{if } \eta < \eta_0 \end{cases}.$$

This reelection strategy can be supported in an equilibrium in which the incumbent's strategy is given by $(n_i, r_i = 0)$, where $n_i(0) = n_i = (1-\lambda) = 0$, and $n_i(\eta) \in \{0,1\}$ for all $\eta \in (0, 1-\lambda)$. Because η can take only two possible values - 0 and $(1-\lambda)$ - and because $v(0) = 0$, the only values of the state variable at which the leader makes a move is $(1-\lambda)$. For both the voter and the challenger, it is optimal not to change the policy at $\eta = (1-\lambda)$.

5. Analysis

5.1. **Implicit incentive and disincentive for responsive behavior.** If, at any state in an equilibrium, the voter expects leader to serve responsibly, then the leader must have an incentive to exert effort at that state value. If he serves responsibly at an interim belief ϕ, where the voter believes he's serving responsibly, the leader's payoff is

$$b - c_e + \beta\left[\phi\mu V\left(\phi_G\right) + \left(\mu\left(1-\phi\right) + \phi\left(1-\mu\right)\right)V\left(\phi_M\right) + \left(1-\mu\right)\left(1-\phi\right)V\left(\phi_B\right)\right]. \tag{5.1}$$

If he deviates to serve corruptly when the voters believe he's serving responsibly, his payoff is

$$b + \beta\left[\phi V\left(\phi_M\right) + \left(1-\phi\right)V\left(\phi_B\right)\right]. \tag{5.2}$$

So, if at a state ϕ that can be reached along the equilibrium path with a positive probability that the leader serves responsibly, (?) must be greater than or equal to (?). After simplifying, this constraint can be written as

$$\phi\mu V\left(\phi_G\right) + \left(\mu\left(1-2\phi\right)\right)V\left(\phi_M\right) - \mu\left(1-\phi\right)V\left(\phi_B\right) - \frac{c_e}{\beta} \geq 0.$$

For future reference, I will call this constraint the *incentive constraint*, and I will denote the expression on the left-hand side of the inequality by $I\left(\phi\right)$.

Similarly, at any state in an equilibrium, if the voter expects the leader to serve corruptly then the leader must have an incentive for serving corruptly. If he serves corruptly and is expected to serve corruptly, his payoff is

$$b + \beta\left[\phi V\left(\phi_M\right) + \left(1-\phi\right)V\left(\phi_B\right)\right]. \tag{5.3}$$

If instead he deviates to serve responsibly, his payoff is

$$b - c_e + \beta\left[\left(\phi + \mu - \phi\mu\right)V\left(\phi_M\right) + \left(1-\phi\right)\left(1-\mu\right)V\left(\phi_B\right)\right]. \tag{5.4}$$

Note that in this case, $\phi_M = \phi_G = \left(1-\lambda\right)$. Hence, the leader will stick to the corrupt behavior when the voter expects him to do so, if the expression in (5.1) is greater than the expression in (5.2). After simplifying, this constraint can be written as

$$\mu\left(1-\phi\right)V\left(\phi_G\right) - \mu\left(1-\phi\right)V\left(\phi_B\right) - \frac{c_e}{\beta} \leq 0.$$

I will call this constraint the *disincentive constraint*, and I will denote the left hand side of the above inequality by $D\left(\phi\right)$.

5.2. **The voter's decision problem.** The voter has to decide whether to reelect the incumbent before the incumbent leader moves. For any given interim belief ϕ, the voter always will strictly prefer the leader to serve responsibly; indeed, responsible service by the leader always increases the voter's expected payoff given ϕ. Because the voter faces a transition cost $c_t > 0$ when electing a challenger, the voter strictly will prefer the incumbent leader rather than the challenger to change the policy when the policy is no longer suiting his interests. To determine when a policy change is optimal for the voter, we compare his expected benefit from the two action profiles: $\left(n_i = 0, r_i = 1\right)$ and $\left(n_i = 1, r_i = 1\right)$. His expected benefit from the action profile $\left(n_i = 0, r_i = 1\right)$ at state η is

$$2\eta\mu + \mu\left(1-\eta\right) + \eta\left(1-\mu\right),$$

and his expected benefit from the action profile $\left(n_i = 1, r_i = 1\right)$ at state η is

$$2\pi\mu + \mu\left(1-\pi\right) + \pi\left(1-\mu\right).$$

Comparing these benefits, we see that the voter would prefer a policy change if and only if $\eta < \pi$ (given $r_i = 1$). Hence, the voter's first-best would be to induce the incumbent leader to follow the strategy $\left(n_i = 0, r_i = 1\right)$ if $\eta < \pi$ and to follow $\left(n_i = 1, r_i = 1\right)$ if $\pi \leq \eta$. If $\eta < \pi$, then the voter's interest will conflict with the incumbent's only with regard to his decision to run the office responsibly. However, if

$\eta \geq \pi$, then the voter's interest will conflict with the incumbent leader's both in terms of the incumbent's decision to change the existing policy and his decision to serve responsibly.

The following two results describe the voter's behavior in any Markov equilibrium of the game. The first lemma suggests that if, in any equilibrium, the incumbent changes the policy at a state η, then the voter must have set a reelection probability of 1 at that state; indeed, if the incumbent changes the policy, the interim belief changes from η to π. At π, on the other hand, the incumbent leader faces the same incentives as the challenger, so his optimal action would be the same as the action followed by the challenger. This situation implies that the voter would receive a higher expected utility from reelecting the incumbent; reelecting the incumbent allows the voter to save the transition cost of electing the challenger.

Lemma 1. *In any equilibrium, if at any state η, the incumbent replaces the policy (or, $n_i(\eta) = 1$), then the voter must reelect the incumbent (or, $v(\eta) = 1$).*

Proof. See Appendix. □

The following lemma suggests that we can effectively restrict our attention only to the class of monotonically increasing strategies by the voter.

Lemma 2. *In any Markov equilibrium, the voter's strategy must be monotonically increasing in η.*

Proof. See Appendix. □

6. First-best is never achievable

The voter can never achieve the first-best outcome as no Markov equilibrium in pure strategy will ever exist where the incumbent leader would change the policy. So, if $\eta < \pi$, the voter cannot control the incumbent's decision to replace or maintain the ineffective policy. Even if the voter could possibly implement a new policy by electing the challenger, he would incur a cost of c_t. The argument for proving this result follows.

From Lemma 2, we see that the voter's strategy in any equilibrium would be either (i) $v(\eta)$ equals 1 for all η or (ii) $v(\eta)$ equals 0 if and only if $\eta < \eta_o$ for some $\eta_0 \in (0, 1-\lambda)$. In the first case, the incumbent will not exert any costly effort because his action no longer affect his reelection probability. However, the voter's payoff from electing the challenger is $\pi - c_t$; hence he must receive at least this much utility at any η. This kind of equilibrium therefore survives only if $\pi - c_t \leq 0$. On the other hand, when the voter uses a cutoff strategy that is increasing in η, there is no equilibrium with $n_i(\eta) = 1$: If for some η, $n_i(\eta) = 1$, the leader's continuation payoff must be as high as the persistence cost c_p. In proving the theorem, I show that the incentive to change the policy, given any monotonically increasing reelection rule set by the voter, is maximized at $\eta = 0$. So, if for some η, $n_i(\eta) = 1$, then the leader will have an incentive to change the policy at $\eta = 0$. In that case, however, the voter would be better off reelecting the leader at $\eta = 0$. We therefore arrive at the following proposition:

Proposition 3. *There is no Markov equilibrium in pure strategies where the incumbent replaces the existing policy with a strictly positive probability at any state that can be reached with a positive probability along the equilibrium path.*

This proposition does not mean that the implicit incentive to induce a responsive behavior from the leader would disappear. However, this does suggest that the voter could never achieve the first-best in this scenario. When $\eta < \pi$, the voter could not make the incumbent leader change the existing policy. Notably, this result does not depend on the magnitude of the persistence cost.

7. Responsive equilibrium and other equilibria

Definition 2. *A responsive equilibrium is a Markov equilibrium in pure strategies where the leader serves the office responsibly at every state η that can be reached with a positive probability along the equilibrium path. A nonresponsive equilibrium is any equilibrium that is not a responsive equilibrium. A corrupt equilibrium is a Markov equilibrium in pure strategies where the leaders serve the office corruptly at every state η that can be reached with a positive probability along the equilibrium path.*

Any corrupt equilibrium is therefore a nonresponsive equilibrium. Note that if the transition cost is high, the voter's ability to control the incumbent's behavior decreases as his payoff from the alternate option, that is, electing the challenger, decreases with the transition cost. The voter's maximum expected payoff from electing the challenger is $\pi+\mu-c_t$. This follows since the voter receives 2 if the outcome G is realized, which has the probability of occurrence $\pi\mu$ if the challenger exerts effort in equilibrium, and the voter receives 1 if the outcome M is realized, which has the probability of occurrence $\pi(1-\mu)+\mu(1-\pi)$ after incurring the transition cost c_t. Hence, if $\pi+\mu-c_t<0$, the voter has no incentive to reelect the challenger in any scenario. However, for sufficiently low values of the cost of effort, there will always be a responsive equilibrium.

Proposition 4. *If the transition cost c_t is greater than $(\pi+\mu)$, there will be no responsive equilibria. If the transition cost c_t is less than or equals $(\pi+\mu)$, then for any $\lambda\in(0,1)$, there exists a constant $\overline{c}_e(\lambda)>0$ such that for every level of cost of effort c_e less than that the constant $\overline{c}_e$, (or, $0\leq c_e<\overline{c}_e$), there will be a responsive equilibrium.*

Sketch of the proof: The above discussion suggests that if $\pi+\mu-c_t<0$, then the voter will always elect the leader with probability 1. This reasoning implies that the leader will have a constant long-term value function that is independent of the state value η. The incentive constraint $I(\eta)$ and the disincentive constraint $D(\eta)$ will not be satisfied if the long-term value function is constant, however. Therefore, in this equilibrium, the implicit incentive for responsive behavior is absent; if the voter does not expect the leader to exert any effort, the leader's optimal action would be to avoid exerting any effort. To prove the second part, we first see that for any given λ, there exists $\overline{c}_e>0$ such that the incentive constraint is satisfied in a range of $\eta\in[\eta_0,1-\lambda]$. So, if the voter sets the reelection strategy as $v(\eta)=1$ if and only if $\eta\geq\eta_0$, then for all possible values of η at which the incumbent is elected, the leader will face the incentive that induces responsive behavior. Moreover, for all $c<\overline{c}_e$, the same condition holds, implying that a responsive equilibrium will occur for any such c.

Note that if a responsive equilibrium exists, then we must have $v(0)=0$. As from Lemma 2, we already know that if $v(0)=1$, then $v(\eta)=1$ for all η. But then the leader's long-term value function would be independent of η. This fact implies that the leader will have no incentive to take any costly action; more specifically, he will have no incentive for responsive behavior along the equilibrium path. But this kind of equilibrium can survive only if the payoff from electing a challenger is negative even when the challenger is not working. The condition that determines the existence of such an equilibrium is $\pi-c_t<0$. If $\pi\leq c_t\leq\pi+\mu$, in addition to the corrupt equilibria mentioned above, there will be responsive equilibria, which are unique in the voter's following strategy:

$$v(\eta)=\begin{cases}1 & \text{if } \eta\geq\pi-c_t\\ 0 & \text{if } \eta<\pi-c_t\end{cases}.$$

The uniqueness property is shown in the proof of Proposition 4 in the appendix. However, the number of equilibria that can be supported is infinite. In particular, for any $c<\overline{c}_e$, there will be one such equilibrium.

It is easy to verify that as λ increases, the cutoff value $c_e(\lambda)$ decreases. For a low value of λ, the set of values of c_e that can satisfy the inequality $I(\eta)\geq 0$ is a subset of the set of the values of c_e that satisfy the same inequality for a high value of λ.

Corollary 1. *As λ increases, $\bar{c}_e(\lambda)$ decreases.*

The above proposition gives a necessary and sufficient condition for the existence of responsive equilibria. The expression $(\pi + \mu - c_t)$ is the expected payoff from electing the challenger when he is committed to exert effort in equilibrium. If $\pi + \mu - c_t < 0$, a corrupt equilibrium is the only possible equilibrium in which no candidate exerts any effort at any state in equilibrium The state-path of this dynamic game is a stochastic process where at any period t, the state value can be either $1 - \lambda$ or 0 with probabilities η and $1 - \eta$ respectively, given the last period state value η. It is evident that 0 is an absorbing state here.

If $\pi + \mu - c_t \geq 0$, both kinds of equilibria exist. In any responsive equilibrium, the voter must not reelect the incumbent if a bad outcome occurred in the last period. But, a corrupt equilibrium may exist in which the voter does reelect the incumbent even after a bad outcome occurred in the last period. Let us first find out the condition where the voter would reelect the incumbent after a bad outcome occurred, and therefore, the incumbent can not commit to exert any effort. Since the voter is following a monotone strategy in equilibrium, if he reelects the incumbent following a bad outcome in the last period, he must reelects the incumbents at every state. If instead, he elects the challenger, in equilibrium, he can at least get $\pi - c_t$. Moreover, in this kind of equilibrium, the challenger cannot commit to exert any effort as the voter's reelection strategy in the following period does not depend on the current period outcome. Therefore, a corrupt equilibrium exists in which the voter always reelect the incumbent if and only if $\pi - c_t \leq 0$.

Proposition 5. *A corrupt equilibrium in which the voter always reelect the incumbent exists if and only if the probability of effectiveness of an untested policy π is less than or equals the transition cost c_t (or, $\pi \leq c_t$).*

Comparing the above result with proposition 4, we see that both responsive equilibrium and corrupt equilibrium exist if $\pi \leq c_t \leq \pi + \mu$. The condition $\pi \leq c_t$ is also a necessary and sufficient condition for the existence of an equilibrium where the voter reelects the incumbent following a bad outcome in the last period. If $c_t < \pi$, by electing the challenger the voter can at least get a strictly positive payoff $\pi - c_t$. If he reelects the incumbent after a bad outcome occurred he gets zero payoff. Because if an equilibrium exists and the incumbent gets reelected following a bad outcome, he will not exert any effort. The voter's payoff by reelecting the incumbent in any equilibrium following a bad outcome will be 0. Thus, iff $c_t < \pi$, in any equilibrium the voter must not reelect the incumbent following a bad outcome in the last period. Proposition 4 says that for sufficiently low cost of effort, responsive equilibria exist.

To find other equilibria that may exist in this case, we study the relation between the incentive constraint $I(\phi)$ and disincentive constraint $D(\phi)$. If the voter does not reelect the incumbent following a bad outcome, then in any equilibrium, the incumbent's long term value function V at $\phi_B = 0$ would be 0. This property implies that the value function is a strictly increasing function in the posterior belief ϕ for all ϕ at which $V(\phi) > 0$.

Lemma 3. *If in an equilibrium the voter does not reelect the incumbent following a bad outcome in the last period, the long term continuation payoff of the incumbent is zero when the posterior belief equals zero and it is strictly increasing in the posterior belief at all posterior belief in which the long term payoff is strictly positive.*

Proof. In appendix. □

From lemma 3, we can rewrite the incentive constraint and the disincentive constraint as

$$\begin{aligned} I(\phi) &= \phi\mu V(\phi_G) + (\mu(1-2\phi)) V(\phi_M) - \frac{c_e}{\beta} \geq 0 \\ \text{and, } D(\phi) &= \mu(1-\phi) V(\phi_G) - \frac{c_e}{\beta} \leq 0. \end{aligned}$$

Since $V(\phi_M) \in [0, V(\phi_G))$, $I(\phi)$ is strictly less than $D(\phi)$. Hence at some posterior belief ϕ, if the incentive constraint is satisfied, the disincentive constraint will not be satisfied. This fact implies that if there is a responsive equilibria for a specific set of parameter values, no non responsive equilibrium can exist for the same set of parameter values. Furthermore, $D(\phi)$ is decreasing in the posterior belief ϕ. Hence, if in an equilibrium at some posterior belief ϕ, the voter believes that the candidate will not exert any effort, then at any posterior belief $\phi' > \phi$, the candidate does not have any incentive to exert effort. Combining these two facts together, we get the following proposition.

Proposition 6. *When the probability of effectiveness of an untested policy π is greater than the transition cost c_t (or, $c_t < \pi$), if a responsive equilibrium exists for a given set of parameter values, no non responsive equilibrium exists for the same set of parameter values.*

Proof. In appendix. □

Therefore if a responsive equilibria exists when the transition cost is less than the probability of effectiveness of an untested policy, that responsive equilibrium is the unique equilibrium in that setting. Combining this result with the results from proposition 4, we see that for low values of transition cost, there exists a unique responsive equilibria.

8. Concluding remarks

Unobservability of policy effectiveness plays a pivotal role in generating implicit incentives for leaders to serve responsibly. Underlying this result is the electorate's expectations for a leader's performance; by not performing, the leader weakens voters' belief in the policy's effectiveness. Because voters care about the policy, if they believe the policy is ineffective, they will elect the challenger to change the existing policy. By doing so, they can make the leader commit to exert costly effort. In the infinite horizon game, I show that as long as some amount of uncertainty surrounds the policy's effectiveness, this implicit incentive can last in every period. As uncertainty decreases, however, the condition required for existence of a responsive equilibrium becomes stringent. If the cost of transition is less than the probability of an untested policy's effectiveness, then this responsive equilibrium is the unique equilibrium. Furthermore, this analysis suggests that even if the implicit incentive induces the leader to exert costly effort, it fails to control the policy properly, even when voters perceive the policy to be ineffective ex ante.

9. Appendix

Proof of Proposition 1. In the two-period game, no player is going to take any costly action in the second period. This means that the incumbent if elected, is going to stick to the existing policy and serve corruptly and the challenger is going serve corruptly, too. However, if the challenger continues with the existing policy in any equilibrium, the voter is not going to elect him as he incurs a positive transition cost to elect the challenger. Therefore, if in any equilibrium, the voter elects the challenger, the challenger changes the policy. The expected benefit to the voter of electing the challenger is therefore $\pi - \delta$. Let η_e denote the posterior probability that the policy is effective. Clearly, $\eta_e(G) = 1 - \eta_e(B) = 1$. When the incumbent serves responsibly, then

$$\eta_e(M) = \frac{\pi(1-\mu)}{\pi(1-\mu) + \mu(1-\pi)}.$$

If the candidate serves corruptly, then

$$\eta_e(M) = 1.$$

Let v_1 denote the strategy by the voter where the voter reelects the incumbent only if $o = G$. Similarly, v_2 and v_3 are defined as strategies by the voter where the voter reelects the incumbent only if $o = G$ or M, and if $o = G, M$ or B. In any responsive equilibria, if $\pi < \delta$, then the voter is going to choose the strategy v_3. However, if the voter chooses the strategy v_3, the incumbent's dominant action in period 1 would be to serve corruptly. Hence, if $\pi < \delta$, no responsive equilibrium exists. If $\delta \leq \pi$ and $\pi - \delta \leq \eta_e(M)$, then the voter's optimal strategy is v_2. In any responsive equilibrium, $\pi - \delta \leq \eta_e(M) \Leftrightarrow \delta_1 \leq \delta$. Hence, if $\delta_1 \leq \delta$, the voter rewards the incumbent by reelecting him if o is either G or M. In the first period, the incumbent by serving responsibly, gets a payoff

$$b + (1 - (1 - \pi)(1 - \mu))(b + c).$$

Instead, if he serves corruptly in the first period, he gets

$$(b + c) + \pi (b + c).$$

Comparing the above payoffs, we find that the incumbent acts responsibly if $\frac{b}{c} \geq \frac{1-\mu(1-\pi)}{\mu(1-\pi)}$.

If $\delta < \delta_1$, or, $\eta_e(M) < \pi - \delta$ then the voter cannot commit to a strategy where he reelects the incumbent when a moderate outcome is realized. Therefore, the voter takes the most severe punishment strategy v_1. When the voter takes v_1, by serving responsibly, the incumbent gets

$$b + \pi\mu (b + c).$$

If he serves corruptly, then the voter's payoff is $(b + c)$. Comparing these payoffs, we find that the incumbent serves corruptly if $\frac{b}{c} \geq \frac{1-\mu\pi}{\mu\pi}$.

Finally, let us determine the condition when no C equilibrium exists. In any C equilibrium, the voter always reelects the incumbent if $o = G$ or M. Hence, by serving responsibly, the candidate gets

$$b + (1 - (1 - \pi)(1 - \mu))(b + c).$$

By serving corruptly, he gets

$$(b + c) + \pi (b + c).$$

Therefore, the candidate deviates to serve responsibly if $b+(1-(1-\pi)(1-\mu))(b+c) \geq (b+c)+\pi(b+c)$,which gives our final result in proposition 1. □

Proof of Proposition 2. The second part is easy to see as the leader's action does not affect the value of the state variable, hence he has no incentive to put in any costly effort. To see the first part, note that if any equilibrium exists, then we must have $v(0) = 0$ if $\pi - c_t > 0$, that is the voter rejects the incumbent if $\eta_t = 0$. Otherwise, if the incumbent is elected when $\eta = 0$, he has no incentive to change the policy at $\eta = 0$. At $\eta = 0$, if the policy is not changed, there will be no updating at that state since the bad outcome will be realized in subsequent periods, and by the Markov assumption, this is an absorbing state. The leader will get a continuation payoff of $b/(1 - \beta)$, which is the maximum possible payoff he can achieve. However, in that case the voter has incentive to replace him if $\pi - c_t > 0$. Therefore if any equilibrium exists and if $\pi - c_t > 0$, we have $v(0) = 0$. Moreover, this implies if any equilibrium exists, we must have $n_i(0) = 0$, since otherwise the voter would elect the incumbent at $\eta = 0$, contradicting that $v(0) = 0$. At any η, the leaders long term payoff function if he does not change the policy, is given by

$$b + \beta\eta V (1 - \lambda)$$

where $V(\phi)$ is the value function of the leader when the value of the state variable is ϕ. On the other hand, by changing the policy he gets

$$b - c_p + \beta\pi V (1 - \lambda).$$

So, he will have no incentive to change the policy at η if $(\pi - \eta) < \frac{c_p}{\beta V(1-\lambda)}$. As, $1 - \lambda$ is assumed to be greater than π, the voter will not change the policy if the policy is effective. Finally the voter's expected payoff from electing the challenger is $\pi - c_t$, and he is going to elect the challenger if $\eta < \pi - c_t$ at any η that can be reached with positive probability along the equilibrium path. Only two values of η will be reached, namely, 0 and $(1 - \lambda)$. Therefore in any equilibrium, along the equilibrium path, the policy will not be changed by the incumbent. □

Proof of Lemma 1. If possible, let us assume that $v(\eta) = 0$ for some η with $n_i(\eta) = 1$. This implies that the voter's payoff from electing the challenger is more than the payoff from reelecting the incumbent. Since not reelecting the incumbent is a costly action to the voter, this is possible only if $r_c(\pi) = 1$ and $r_i(\pi) = 0$ in equilibrium. However, by setting $r_c(\pi) = 1$, the challenger incurs a positive cost c_e. This suggests that the challenger has a positive incentive to serve responsibly at π. Since his incentive to serve responsibly only depends on the interim belief π, and since the incumbent leader faces the same set of incentives the challenger faces, this implies that the incumbent would also choose $r_i(\pi) = 1$. But given $n_i(\pi) = 1,\ r_i(\pi) = 1$, the voter is strictly better off by choosing $v(\eta) = 1$. Contradiction. □

Proof of Lemma 2. Suppose there exist η_1 and η_2 with $\eta_1 < \eta_2$ such that $1 = v(\eta_1) > v(\eta_2) = 0$. From Lemma 1, we know that $n_i(\eta_2)$ must be equal to 0. I first claim that $n_i(\eta_1)$ also has to be equal to 0. If we have $n_i(\eta_1) = 1$, which means that the incumbent replaces the policy at η_1, then the continuation payoff of the incumbent at the interim belief π must be greater than the transition cost c_t. However, since the transition cost does not depend on the value of the state variable this implies that at η_2, the incumbent leader's payoff at η_2 from following $(n_i = 1)$ is strictly positive. However, in that case the voter is strictly better off by choosing $v(\eta_2)$ to be equal to 1. Hence we must have $n_i(\eta_1) = 0$. Furthermore, given $n_i(\eta_1) = 0$, $n_i(\eta_2) = 0$, and $v(\eta_1) = 1,\ v(\eta_2) = 0$, it must be the case $1 = r_i(\eta_1) > r_i(\eta_2) = 0$. However, if in equilibrium $r_i(\eta_2) = 0$, then the disincentive constraint must be satisfied at η_2, contradicting that the incentive constraint is satisfied at η_1. □

Proof of Proposition 3. From Lemma 2, we know that the voter's strategy in any equilibrium must be of the following form:

$$v(\eta) = \begin{cases} 1 & \text{if } \eta \geq \eta_0 \\ 0 & \text{if } \eta < \eta_0 \end{cases}.$$

If $\eta_0 = 0$ or $\eta_G\ (= 1 - \lambda)$, then the candidates will not take any costly action in any period as their action will not affect their reelection probability. So consider the case when $\eta_0 \in (0, 1 - \lambda)$. Moreover, if possible, suppose at some $\eta' \geq \eta_0$, the incumbent replaces the policy, it implies that his continuation payoff at the belief π (since after replacement, the interim belief changes to π) exceeds the persistence cost c_p, or $V(\pi) - c_p \geq \max(V(\eta'), 0)$. Moreover, this continuation payoff is a function of π only, and therefore is independent of η. Therefore at any $\eta < \eta'$, the incumbent would actually be better off by replacing the policy since V is decreasing in η. However, from Lemma 2, we see that in that case the voter would always reward the incumbent with reelection, contradicting that $\eta_0 > 0$. □

Proof of Proposition 4. It is easy to see why no responsive equilibria exists if $\pi + \mu - c_t < 0$. Here I will prove the second part of the proposition by construction. First note that, as argued in the text of the paper, in any responsive equilibrium we must have $v(0) = 0$. From lemma 2, we know that the voter's strategy in this kind of equilibrium will look like

$$v(\eta) = \begin{cases} 1 & \text{if } \eta \geq \eta_0 \\ 0 & \text{if } \eta < \eta_0 \end{cases}.$$

The incumbent leader therefore has to make a move only at $\eta \in [\eta_0, 1 - \lambda]$. In order to sustain the responsive equilibria, we must have $I(\eta) > 0$ for all $\eta \in [\eta_0, 1 - \lambda]$ where $I(\eta)$ is given by

$$\eta\mu V(\eta_G) + (\mu(1 - 2\eta)) V(\eta_M) - \mu(1 - \eta) V(\eta_B) - \frac{c_e}{\beta} \geq 0.$$

Note that if $v(0) = 0$, then $V(0) = 0$. This implies that the left hand side of the inequality becomes $\phi\eta\mu V(\eta_G) + (\mu(1 - 2\eta)) V(\eta_M) - \frac{c_e}{\beta} \geq 0$. As $\eta\mu V(\eta_G) + (\mu(1 - 2\eta)) V(\eta_M)$ is always positive for every $\eta \in [0, 1]$, there exists $\overline{c}_e > 0$ such that the inequality is satisfied for all $c_e < \overline{c}_e$. Moreover, by setting $\eta_0 + \mu$ to the payoff by electing the challenger, we get that $\eta_0 = \pi - c_t$. □

Proof of Proposition 5. Case1: $\pi + \mu \leq c_t$.

The maximum possible payoff that the voter can get by electing the challenger is $2\pi\mu + \pi(1-\mu) + \mu(1-\pi)$, which is $\pi + \mu$. But he incurs a cost c_t to make this transition. Hence, his net payoff is $\pi + \mu - c_t$. If his net payoff is negative, the voter will not elect the challenger for any belief ϕ. Given the voter's strategy to reelect the incumbent with probability 1 at any belief, the incumbent's optimal action will be not exerting effort.

Case 2: $\pi \leq c_t < \pi + \mu$.

In this situation, if in an equilibrium the challenger can commit to exert effort after his election, the voter's net payoff will be positive. I show that there always exists an equilibrium in which the challenger fail to commit to exert any effort. Therefore, the voter's net payoff from electing the challenger will be $\pi - c_t$, which is negative. Consider a strategy profile, in which the voter reelects the incumbent at any belief ϕ. If the voter follows this strategy, the challenger, if elected, will have no incentive to exert effort. By exerting effort, he incurs a cost c_e; but his probability of reelection does not change. Therefore, given this strategy followed by the voter, the challenger cannot commit to exert effort. On the other hand, if the challenger does not exert effort, the voter's strategy to elect the incumbent at any posterior is rational, since his payoff from electing the challenger is negative. Therefore, this equilibrium exists as long as $\pi \leq c_t$. In this equilibrium, no candidate exerts effort at any stage. The voter always reelect incumbent with probability 1.

Case 3: $c_t < \pi$.

We need to show that there does not exist any corrupt equilibrium in which the voter always reelect the incumbent with probability 1 at any posterior. To see this, let us assume, if possible, the converse is true. However, if the voter always reelects the incumbent, then the incumbent will not take any costly action at any stage. But then by electing the challenger, the voter gets $\pi - c_t$, which is strictly positive. When the belief is low (less than $\pi - c_t$), reelecting the incumbent is not rational strategy for the voter. Hence contradiction. □

Proof of Lemma 3. Note that the posterior belief about the policy effectiveness after observing a bad outcome is 0 (or, $\eta_B = 0$ at any η). If the voter does not reelect the incumbent after observing a bad outcome, we have $v(0) = 0$. Hence, in an equilibrium in which the incumbent exerts effort at some belief η, his long term value function is given by

$$V(\eta) = v(\eta)\left[b - c_e + \beta\left[\eta\mu V(\eta_G) + (\eta(1-\mu) + \mu(1-\eta))V(\eta_M)\right]\right].$$

On the other hand, in an equilibrium in which the incumbent does not exert effort at some belief η, his long term value function is given by

$$V(\eta) = v(\eta)\left[b + \beta\eta V(\eta_G)\right].$$

If $v(\eta) = 0$, we have $V(\eta) = 0$. If $v(\eta) > 0$, in the first case, the solution to this Bellman equation is an increasing function of η, since...

In the second case, if $v(\eta) > 0$, we can solve for the functional form of $V(\eta)$, which is given by

$$V(\eta) = b + \beta\eta V(\eta_G);\ V(\eta_G) = \frac{b}{1-\beta\eta}.$$

$V(\eta)$ is strictly increasing in η. □

Proof of Proposition 6. If $c_t < \pi$, the voter must reject the incumbent in any equilibrium. This result follows from Proposition 5. From Lemma 3, we see that if the voter rejects the incumbent following a bad outcome, then $v(0) = 0$ and $V(\eta)$ is an increasing function in η. Combining these two facts, we can rewrite the incentive and disincentive constraints at some belief ϕ as

$$\begin{aligned} I(\phi) &= \phi\mu V(\phi_G) + (\mu(1-2\phi))V(\phi_M) - \frac{c_e}{\beta} \geq 0 \\ \text{and, } D(\phi) &= \mu(1-\phi)V(\phi_G) - \frac{c_e}{\beta} \leq 0. \end{aligned}$$

Since $V(\phi_G) > V(\phi_M)$ for any belief ϕ we have $I(\phi) < D(\phi)$ for every ϕ. In a responsive equilibrium exists, $I(\phi) \geq 0$ at every ϕ that will be reached in equilibrium with positive probability. Hence, $D(\phi) > 0$ at every

ϕ that will be reached with positive probability in that equilibrium. Moreover, $D(\phi)$ is a decreasing function of ϕ. So if $D(\phi) > 0$ at some ϕ, then at every $\phi' < \phi$, $D(\phi') > 0$. Now consider a typical responsive equilibrium for a given set of parameter values. The voter takes a cutoff strategy of reelecting the incumbent if and only if $\eta > \eta_0$ for some $\eta_0 \in (0, 1-\lambda]$. If $I(\eta) \geq 0$ at every $\eta \in (0, 1-\lambda]$, then $D(\eta) > 0$ at at every $\eta \in (0, 1-\lambda]$. Moreover, since $D(\eta)$ is decreasing in η, it implies that $D(\eta) > 0$ at every $\eta \in [0, 1-\lambda]$. Hence, no non responsive equilibrium can exist for the same set of parameter values. □

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