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A THEORY OF POLITICAL CYCLES*

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Abstract

The literature on political cycles argues that the proximity of elections affects policy choices. This literature considers that opportunistic policymakers manipulate policy to increase their reelection probability. Previous theoretical studies assume that the policymaker can affect his reelection probability only with his last decision before the election. This assumption seems extreme, and directly produces a cycle without presenting a theory of why a policymaker's behavior is different closer to the election. We shall explain how, without this assumption, existing political-agency models can still produce cycles. In contrast to previous (theoretical and empirical) studies, we consider how the policymaker's decisions depend on his reputation (the beliefs about his future performance). Since the policymaker's reputation most likely changes over time, in general, one cannot conclude from observing the same behavior throughout the policymaker's term that the proximity of elections does not affect policy choices. Consequently, our findings suggest reinterpreting previous empirical results and controlling for changes in reputation in future empirical studies. More generally, our results deepen the understanding of agency relationships in which the agent's compensation is decided infrequently.

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Keywords: political cycles, career concerns, reputation, agency, dynamic games, elections.

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1 Introduction

The literature on political cycles argues that the proximity of elections affects policy choices.¹ This literature considers that opportunistic policymakers manipulate policy to increase their reelection probability.² Previous studies assume that the policymaker can affect his reelection probability only with his last decision before the election. This assumption seems extreme, and directly produces a cycle without presenting a theory of why a policymaker's behavior is different closer to the election. This paper explains how, without this assumption, existing political-agency models can still produce cycles.

A political-agency model of career concerns is presented. Voters reelect the incumbent policymaker if and only if they expect the incumbent's future performance to be better than the challenger's future performance. Voters' beliefs about the incumbent's future performance (the incumbent's *reputation*) are influenced by the incumbent's past performance. The incumbent wants to be reelected, and, therefore, he considers how his decisions affect his performance (and thus the reelection probability).

If the policymaker's decisions are influenced by his aspiration of affecting his *future reputation* (and thus the result of the election), it seems natural to expect that his decisions would depend on his *current reputation*. We shall show that this is indeed the case. Moreover, we shall show that for understanding why there are political cycles, it is crucial to consider the relationship between the policymaker's reputation and his decisions. Given that the policymaker's decisions depend on his reputation, one has to precisely define a political cycle. Because we want to focus on differences in the policymaker's behavior *due to the proximity of the next election*, we refer to differences in behavior across the policymaker's term *for a given reputation level* as political cycles. Of course, these political cycles may also generate cycles in the policymaker's average decisions.

²This does not mean that the policymaker is able to fine-tune the aggregate economic effects of economic policy. One may think that the policymaker is evaluated on the quality of services he provides. For example, Brender [2003] finds that "the incremental student success rate during the mayor's term had a significant positive effect on his reelection chances." The quality of education depends on economic policy (for example, it depends on the resources the policymaker makes available for education). Thus, the policymaker may decide to make more resources available for education in order to increase his reelection probability (instead of keeping resources for his favorite interest group or himself).

¹For a review of this literature, see Alesina, Roubini, and Cohen [1997], Drazen [2000], and Shi and Svensson [2003]. A related literature studies how the alternation in power of different political parties causes movements in the real economy. Partisan cycles are studied by, for example, Alesina [1987], Azzimonti Renzo [2005], and Cuadra and Sapriza [2005]. Besley and Case [1995] and Hess and Orphanides [1995, 2001] study how the presence of term limits introduces electoral cycles between terms (while this paper focuses on cycles within terms).

The findings in this paper suggest reinterpreting previous empirical results and controlling for changes in reputation in future empirical studies. Because of carefully chosen assumptions, previous theoretical studies have sidestepped the relationship between the policymaker's reputation and his optimal decisions. Empirical studies have followed the theoretical literature and have ignored that the policymaker's decisions depend on his reputation (for empirical analysis, past performance, the number of terms in office, the percentage of votes obtained in the previous election, or approval ratings could be used as an indication of the policymaker's reputation).³ Since the policymaker's reputation most likely changes over time, in general, one cannot conclude from observing the same behavior across the term that the proximity of elections does not affect policy choices (and there is no political cycle). The proximity of elections may indeed influence policy choices; however the policymaker's reputation may have changed in such a way that he ended up making the same decisions throughout the term. Similarly, one cannot conclude from observing differences in behavior throughout the term that there is a political cycle. The proximity of elections may not influence the policy decisions but the policymaker's reputation may have changed in such a way that he ended up taking different actions throughout the term.

Results from comparative-statics exercises (which represent comparisons across different economic and/or institutional environments) are also different if the policymaker can influence the reelection probability with his decisions in every period. For example, in contrast to the result by Shi and Svensson [2002], a change in the per-period value a policymaker assigns to being in office has no effect on the importance of the cycles.

More generally, our findings deepen the understanding of agency relationships in which the agent's compensation is decided infrequently.⁴ Let us consider, for example, the end of a contract that commits the principal to work with a certain agent. If the contract ends, the principal can choose to replace this agent with a new one. Stiroh [2003] and Wilczynski [2004] present empirical evidence of a *renegotiation cycle*: performance improves in the year before signing a multi-year contract, but declines after the contract is

³Empirical studies include, for example, Akhmedov and Zhuravskaya [2004], Alesina and Roubini [1992], Block [2002a, 2002b], Block, Ferreeb, and Singhe [2003], Brender and Drazen [2004], Drazen [2000], Gonzalez [2002], Kraemer [1997], Kuzu [2001], Padovano and Lagona [2002a, 2002b], Persson [2002], Persson and Tabellini [2002, 2003], Pettersson-Lidbom [2002], Reid [1998], Schuknecht [1996, 1999, 2000], and Shi and Svensson [2002].

⁴As discussed by Martinez [2005], the incentives generated by elections (or firing) are similar to the ones generated by other compensation schemes that imply a discontinuous increase in the compensation when the agent's reputation is good enough (and these compensation schemes are widely used).

signed. Even though the analysis in this paper applies to other employment relationships, for concreteness, the rest of the paper refers to voters and policymakers.

The rest of the paper is structured as follows. Section 2 describes the model. Section 3 presents the results. Section 4 concludes and suggests possible extensions.

2 The model

Following the current consensus in the literature (see Brender and Drazen [2004] and Shi and Svensson [2003]), a political-agency model of career concerns is presented.⁵ Voters reelect the incumbent policymaker if and only if they expect the incumbent's future performance to be better than the challenger's future performance. The incumbent's good performance helps him to get reelected. It indicates to the voters that the incumbent has the *ability* necessary to deal with the challenges he is facing (voters are *learning* the incumbent's ability, and this explains why the support for the incumbent changes over time).⁶ The incumbent wants to be reelected, and, therefore, he may manipulate policy to increase his reelection probability. As explained by Brender and Drazen [2004], "an incumbent might be rewarded at the polls only if he can hide the manipulation...." Thus, the incumbent's action can be unobservable or it can be observable in a model with uninformed voters. For example, in Besley and Case [1995] the incumbent's unobservable effort (as in most agency models); in Persson and Tabellini [2000] the incumbent's unobservable action is to allocate resources to less socially beneficial uses; and in Shi and Svensson [2002] the incumbent manipulates fiscal policy producing political budget cycles (with uninformed voters). In this paper, we shall refer to unobservable effort.⁷

We shall present a standard model but we shall not assume that the information structure is such that

⁶Empirical studies on *economic voting* show that voting depends on economic performance (for a review, see Lewis-Beck and Stegmaier [2000]).

⁷Alternatively, suppose that the incumbent decides the resources he makes available for providing a public service appreciated by the voters (for example, education). Let $\tau - r$ denote these resources where τ denotes the total available resources and r denotes the resources the incumbent reserves for his favorite interest group (or himself). Let u(r) denote the incumbent's utility. We can define $a \equiv \tau - r$ as the effort the incumbent exerts in the public service (not every voter is aware of the budget details) and $c(a) \equiv -u(\tau - a)$ as the cost of exerting effort (for a discussion of models of rent seeking see, for example, Persson and Tabellini [2000]).

⁵Barro [1973] started the large literature on political agency discussed in detail by Besley [2005]. Besley and Case [1995] and Hess and Orphanides [1995, 2001] present empirical evidence supporting this theory.

the incumbent can influence the reelection probability only with his last action before the election. In particular, we shall study a political-agency version of the model in Holmstrom's [1999] seminal paper on career concerns, and we shall focus on the stationary case. The principal's (voters') decision is whether to replace the incumbent, and he makes this decision every two periods. The rest of the assumptions described below are exactly as in Holmstrom [1999].

Thus, a dynamic game played by the voters and the incumbents is presented. The existence of conflicts among voters is not considered.⁸

2.1 The environment

Time is discrete and indexed by t. Elections occur every two periods. At the beginning of an election period, voters reelect the incumbent if and only if their expected utility is higher with the incumbent than with a challenger. After an election, or at the beginning of a period without election, the incumbent decides on his effort, $a_t \ge 0$. At period t, the amount of public good available, y_t , is a stochastic function of the incumbent's ability, $\bar{\eta}_t$, and his effort. In particular,

$$y_t = a_t + \bar{\eta}_t + \varepsilon_t,$$

where ε_t is a normally distributed random variable with expected value 0 and precision h_{ε} (the variance is $\frac{1}{h_{\varepsilon}}$). After the incumbent chooses his effort, the noise in the production process, ε_t , is realized.

The incumbent's ability evolves as a random walk. In particular, $\bar{\eta}_{t+1} = \bar{\eta}_t + \beta_t$ where β_t is assumed to be normally distributed with mean 0 and precision h_{β} .⁹

The players (the voters and the incumbent) are ignorant of the incumbent's ability.¹⁰ They have the same belief about the ability of a new incumbent. This belief is normally distributed with mean b_0 and

⁹As it is explained later, this assumption allows us to focus on the case in which the precisions of the beliefs about the incumbent's ability do not depend on the number of periods he was in office. Martinez [2004] presents a firing model of career concerns in which an agent's ability does not change over time and the main results presented here are not affected. Moreover, assuming that ability evolves over time allows us to represent situations in which the incumbent's tasks are changing over time and his ability depend on the tasks he is focusing on (let us consider, for example, the president of a country that becomes involved in a war).

¹⁰Having the incumbent not know his ability allows us to consider situations where a policymaker in a new position may be ignorant of his ability when met with new tasks. This assumption also helps to understand situations where a policymaker's success does not only depend on his individual ability but also on the ability of others working with him. Moreover, in models

⁸This paper may be interpreted as considering situations where the decisive voter cares about future performance and not about ideology. The model could be extended to include probabilistic voting (see Shi and Svensson [2002]).

precision $h_{\bar{\eta}}$ (and this is the belief about the period-0 incumbent's ability).

Define $\eta_t \equiv y_t - a_t = \bar{\eta}_t + \varepsilon_t$. That is, η_t is the signal about the incumbent's ability extracted from observing the incumbent's output in period t when it is believed that the incumbent exerted effort a_t .

The voters' per-period utility is given by y_t . For expositional simplicity, voters are restricted to replacing the incumbent only with policymakers that were not in office before.¹¹ A policymaker's perperiod utility is normalized to zero if he is not in office. The incumbent receives R after winning an election and in a period without elections.¹² The incumbent chooses his effort level. There is a cost to exerting effort, given by c(a), with c'(a) > 0, c''(a) > 0, and c'(0) = 0.

Players observe y_t while η_t is unobservable. The voters do not observe the incumbent's effort that is known by the incumbent.¹³

2.2 The learning process

From this point forward, *belief* refers to *belief about the incumbent's ability* unless stated otherwise (as when referring to the voters' beliefs about the effort the incumbent exerted).

Players learn about the incumbent's ability using Bayesian learning. Let b_{vt} and b_{it} denote the mean of the voters' and the incumbent's beliefs at the beginning of period t (from here on, at period t). When the players' beliefs are coincidental at t, let $b_t = b_{vt} = b_{it}$ denote their beliefs.

in which the incumbent knows his ability, a high-ability incumbent may increase his reelection probability by degrading future possibilities. This is a signal of high ability, and voters, knowing that the incumbent ruined the future, will decide to reelect him. This may not be the most appealing framework for explaining political cycles.

¹¹This is an interesting starting point, and it simplifies the analysis. The main results do not change if this assumption is removed. Previous studies analyze models of optimal firing of agents where the optimal action for the principal does not involve hiring a previously tried agent other than the incumbent (see, for example, Banks and Sundaram [1990]). Martinez [2004] shows that, in models of career concerns, it may be optimal to hire someone who was fired before. On the other hand, this is not the case in the examples presented in this paper.

¹²Diermeier, Keane, and Merlo [2005] find that the mean of the monetized value of a House seat and a Senate seat in 1995 dollars are equal to \$616,228 and \$1,673,763, respectively. Martinez [2005] explains that incentives would be similar if the per-period compensation is allowed to depend on the incumbent's reputation.

¹³Empirical evidence indicates that political cycles are more important if the share of informed voters in the electorate is smaller (see, for example, Shi and Svensson [2002]). This is consistent with models of career concerns in which the incumbent's action is not observed by (some) voters and is not consistent with signaling models in which voters infer the incumbent's ability through direct observations of his actions. For simplicity, the precision of the noise in the random walk ability process is chosen to make the mean of the distribution sufficient for characterizing beliefs. Thus, we assume that

$$h_{\beta} = \frac{h_{\bar{\eta}}^2 + h_{\bar{\eta}} h_{\varepsilon}}{h_{\varepsilon}}.$$

With this assumption, the precision of the period-t + 1 beliefs about the signal η_{t+1} is always equal to the precision of the period-t beliefs about the signal η_t and does not depend on the number of observations of the incumbent's output. This precision is given by

$$H \equiv \frac{h_{\bar{\eta}} h_{\varepsilon}}{h_{\varepsilon} + h_{\bar{\eta}}}$$

Consequently, there is no tenure effect in the determination of players' decisions.¹⁴ We shall refer to *belief* with mean b as *belief* b.

2.3 Equilibrium strategies

We shall assume that the incumbent plays a pure strategy and we shall use Perfect Bayesian Equilibrium as the equilibrium concept.

In a Perfect Bayesian Equilibrium, voters always believe they are on the equilibrium path (i.e., voters believe that the incumbent exerted the equilibrium effort in every period). Consequently, voters believe that their information set coincides with the incumbent's information set, and, therefore, the incumbent's belief coincides with their beliefs (and $b_{it} = b_{vt}$).

The incumbent knows that voters believe that he exerted the equilibrium effort in every period (according to the voters' beliefs) and, therefore, the incumbent is able to infer the voters' beliefs.

Following Martinez [2005], it can be shown that, for all histories of the game that imply the same beliefs, the players' optimal actions are the same.

Thus, the voters' beliefs are sufficient for characterizing their optimal reelection decisions. Let the voters' reelection strategy be denoted by $\iota_t(b_{vt})$, where $\iota_t(b_{vt})$ equals one if the incumbent is reelected, and zero if otherwise (and t is an election period).

The incumbent's optimal strategy is a mapping from both b_{it} and b_{vt} to a_t , and depends on the proximity of elections and on t. This strategy is denoted by $\hat{\alpha}_t(b_{it}, b_{vt})$ two periods before the next election and

¹⁴The tenure effect presented by Holmstrom [1999] is clear. With more output observations, the belief becomes more precise, and new observations have less weight in the future beliefs. Given that effort affects only these new observations, incentives to exert effort are weaker when the policymaker has been in office longer (and the beliefs are more precise). Thus, equilibrium effort declines with tenure.

 $\alpha_t(b_{it}, b_{vt})$ if there is an election next period. Let $\hat{\alpha}_t(x) \equiv \hat{\alpha}_t(x, x)$ and $\alpha_t(x) \equiv \alpha_t(x, x)$ for all x denote the incumbent's optimal strategies if the voters' and the incumbent's beliefs are coincidental (for example, on the equilibrium path).

2.4 Equilibrium learning

Observing output allows players to infer the signal η_t (and to update their beliefs). The incumbent knows his effort and he is always able to infer the signal correctly $(\eta_t = y_t - a_t)$. Voters do not observe the incumbent's effort and use their beliefs about the effort exerted by the incumbent to learn about the incumbent's ability. In a Perfect Bayesian Equilibrium, voters consider that the incumbent chooses the equilibrium effort level in every period. Thus, voters' inferred signal is given by

$$\eta_{vt}(b_{vt}, \eta_t, a_t) \equiv y - \alpha_t(b_{vt}) = \eta_t + a_t - \alpha_t(b_{vt}) \tag{1}$$

one period before the next election and by

$$\hat{\eta}_{vt}(b_{vt},\eta_t,a_t) \equiv y_t - \hat{\alpha}_t(b_{vt}) = \eta_t + a_t - \hat{\alpha}_t(b_{vt})$$

two periods before the next election.

On the equilibrium path, the incumbent exerts the equilibrium effort in every period, and the signal inferred by voters is equal to the signal inferred by the incumbent. Voters' inference may be wrong, however, when deviations from equilibrium behavior are considered.

According to Bayes' rule, the mean of the beliefs at t is a weighted sum of the mean at t - 1, and the inferred period-t - 1 signal where the weight of the mean at t - 1 is given by

$$\mu = \frac{h_{\bar{\eta}}}{h_{\bar{\eta}} + h_{\varepsilon}}.$$
(2)

Thus, the incumbent's belief at t is characterized by

$$b_{it} = B\left(b_{it-1}, \eta_{t-1}\right) \equiv \mu b_{it-1} + (1-\mu)\eta_{t-1}$$

If t is an election period, voters' beliefs are represented by

$$b_{vt} = B_{vt} \left(b_{vt-1}, \eta, a \right) \equiv B \left(b_{vt-1}, \eta_{vt-1} \left(b_{vt-1}, \eta, a \right) \right) = \mu b_{vt-1} + (1-\mu) \left(\eta + a - \alpha_{t-1} \left(b_{vt-1} \right) \right).$$
(3)

Similarly, one period before the next election,

$$b_{vt} = \hat{B}_{vt} \left(b_{vt-1}, \eta, a \right) \equiv B \left(b_{vt-1}, \hat{\eta}_{vt-1} \left(b_{vt-1}, \eta, a \right) \right) = \mu b_{vt-1} + (1-\mu) \left(\eta + a - \hat{\alpha}_{t-1} \left(b_{vt-1} \right) \right).$$
(4)

On the equilibrium path, given that the signal inferred by voters is equal to the signal inferred by the incumbent, the voters' and the incumbent's beliefs are coincidental (recall that at the beginning of the game, their beliefs are assumed to be coincidental). Their beliefs may be different, however, when the incumbent deviates from equilibrium behavior.

2.5 Equilibrium definition

Let $\delta \in (0, 1)$ denote the discount factor and let f_b denote the density function for a normally distributed random variable with mean b and precision H. At the beginning of an election period, a voter's expected lifetime utility is given by

$$\hat{V}_{t}(b_{v}) = \max_{I \in \{0,1\}} \left\{ \begin{array}{l} I\left[\int_{-\infty}^{\infty} \left[\hat{\alpha}_{t}(b_{v}) + \eta + \delta V_{t+1}(B(b_{v},\eta))\right] f_{b_{v}}(\eta) \, d\eta\right] + \dots \\ + (1-I)\left[\int_{-\infty}^{\infty} \left[\hat{\alpha}_{t}(b_{0}) + \eta + \delta V_{t+1}(B(b_{0},\eta))\right] f_{b_{0}}(\eta) \, d\eta\right] \end{array} \right\},\tag{5}$$

where

$$V_t(b_v) \equiv \int_{-\infty}^{\infty} \left[\alpha_t(b_v) + \eta + \delta \hat{V}_{t+1}(B(b_v, \eta)) \right] f_{b_v}(\eta) \, d\eta \tag{6}$$

denotes his expected lifetime utility at the beginning of a period without elections. The voters' equilibrium strategy, $\iota_t(b_v)$, is given by the solution of problem 5.

Two periods before the next election, at the time the incumbent chooses his effort (right after the current-period election), $\hat{W}_t(b_i, b_v)$ denotes his expected lifetime utility. Similarly, one period before the next election, $W_t(b_i, b_v)$ denotes the incumbent's expected lifetime utility. One period before an election, the incumbent's problem reads

$$W_t(b_i, b_v) = \max_a \left\{ R - c(a) + \delta \int_{-\infty}^{\infty} \hat{W}_{t+1} \left(B(b_i, \eta), B_{vt+1}(b_v, \eta, a) \right) \iota_{t+1} \left(B_{vt+1}(b_v, \eta, a) \right) f_{b_i}(\eta) \, d\eta \right\}$$
(7)

where

$$\hat{W}_{t}(b_{i}, b_{v}) = \max_{a} \left\{ R - c(a) + \delta \int_{-\infty}^{\infty} W_{t+1} \left(B(b_{i}, \eta), \hat{B}_{vt+1}(b_{v}, \eta, a) \right) f_{b_{i}}(\eta) \, d\eta \right\}.$$
(8)

Definition 1 An equilibrium consists of the functions $V_t(b_v)$, $W_t(b_i, b_v)$, and $W_t(b_i, b_v)$ and strategies $\iota_t(b_v)$, $\alpha_t(b_i, b_v)$, and $\hat{\alpha}_t(b_i, b_v)$ such that, for each period t:

- 1. $W_t(b_i, b_v)$ satisfies the incumbent's problem if t + 1 is an election period.
- 2. $V_t(b_v)$ and $\hat{W}_t(b_i, b_v)$ satisfy the voters' and the incumbent's problems if t + 2 is an election period.
- 3. $\iota_t(b_v)$ solves the voters' problem if t is an election period.

- 4. $\alpha_t(b_i, b_v)$ solves the incumbent's problem if t + 1 is an election period.
- 5. $\hat{\alpha}_t(b_i, b_v)$ solves the incumbent's problem if t + 2 is an election period.
- 6. The beliefs are obtained using the equilibrium strategies and Bayes' rule.

3 Results

It will be shown that a standard political-agency model generates political cycles without assuming that only the incumbent's last decision before the election can affect the reelection probability. Cycles result from the incumbent's effort-smoothing decision. We shall show that the incumbent's decisions depend on his current reputation and that it is crucial to consider this for understanding why there are political cycles. It will be explained that considering this makes it necessary to reinterpret previous empirical findings. We shall show that the relative effectiveness of the incumbent's decisions in altering future reelection probabilities is endogenous. In particular, even if the incumbent's decisions farther from the election is less informative of his performance after the election, the incumbent's decisions farther from the election can be more effective in increasing the reelection probability. Finally, we will show that results from comparative-statics exercises are different from findings in previous studies (where only the action in the last period before the election can affect the reelection probability).

3.1 One election

For expositional simplicity, a one-election version of the model is discussed first. This allows us to show that, without assuming that only the last action before the election can affect the reelection probability, existing political-agency models can still produce cycles. In order to have a better understanding of the way in which the results change if more periods are considered, the limit of the finite-horizon solution in an infinite-horizon version of the model is discussed later (the infinite-horizon case has particular interest because of its stationarity).

3.1.1 The political cycle

Let us consider a three-period model. There is a new incumbent in office at period 0 who exerts effort in periods 0 and 1 in order to affect the probability of reelection at period 2.

The model is solved using backward induction. At period 2, the incumbent has no incentives to exert effort, and $\alpha_2(b) = 0$ for all b. Given that every policymaker would exert zero effort, a policymaker's

expected productivity is given by his expected ability. Hence, voters want to reelect the incumbent if and only if his expected ability is higher than the expected ability of an unknown policymaker, i.e., $\iota_2(b_{v2}) = 1$ if and only if $b_{v2} > b_0$.

On the equilibrium path, the incumbent's period-1 problem reads:

$$\max_{a_1} \left\{ R - c(a_1) + \delta R P_{b_1}[B_{v2}(b_1, \eta_1, a_1) > b_0] \right\}$$
(9)

where $P_{b_1}[x]$ denotes the probability of x when η_1 is distributed according to b_1 . This problem is a particular case of problem 7.

The incumbent's equilibrium strategies are characterized through the first-order conditions of the incumbent's problems.¹⁵ At period 1, the incumbent's equilibrium strategy $\alpha_1(b_1)$ is given by

$$c'(\alpha_1(b_1)) = \delta R f_{b_1}\left(\frac{b_0 - \mu b_1}{1 - \mu}\right).$$
(10)

Martinez [2005] shows that equilibrium effort is hump shaped over reputation, and the maximum period-1 effort is obtained from an incumbent whose reputation is represented by b_0 (as illustrated in Figure 1).

At period 0, the beliefs are coincidental and represented by b_0 . The incumbent's problem is as described in equation 8. The next equation presents the Euler equation for this problem evaluated in equilibrium (for the derivation of a similar Euler equation, see Martinez [2005]):

$$c'(\alpha_0(b_0)) = \delta \int_{-\infty}^{\infty} r_0(B(b_0,\eta)) c'(\alpha_1(B(b_0,\eta))) f_{b_0}(\eta) d\eta$$
(11)

where

$$r_0(b) \equiv \left. \frac{\partial B_{v2}}{\partial b_v} \right|_{b_v = b} = \mu - (1 - \mu) \,\alpha_1'(b) \,. \tag{12}$$

The period-0 equilibrium effort $\alpha_0(b_0)$ can easily be obtained from equation 11 given the period-1 equilibrium strategy $\alpha_1(b)$ defined by equation 10.

¹⁵The last term in (9) is not globally concave. However, there are many ways of assuring the global concavity of the incumbent's problem. One way is to assume that the marginal cost function increases rapidly enough. For example, one could find an upper bound for the slope of the marginal benefit curve and assume that the slope of the marginal cost curve is always higher (this is particularly easy for problem 9). Another alternative is to assume that $c(a) = a^n$ and n is high enough. Consequently, the marginal cost is very low for a low a and, for a high enough a, it starts increasing very rapidly assuring that the marginal cost curve crosses the marginal benefit curve only once (from below) and the problem is globally concave. In particular, this makes the incumbent's problem globally concave in the examples discussed in this paper.

Equation 11 represents the typical intertemporal tradeoff in dynamic models: having less utility today allows the incumbent to have more utility next period. In this case, the marginal cost from a higher effort level today is compensated with an expected lower effort level next period.

The next proposition shows that the standard political-agency model presented here produces cycles without assuming that only the incumbent's decision in the last period before the election can affect the reelection probability.

Proposition 1 For small enough changes in the incumbent's reputation, the period-0 equilibrium effort is lower than the period-1 equilibrium effort. For large enough changes in the incumbent's reputation, the period-0 equilibrium effort is higher than the period-1 equilibrium effort.

Proof. Recall that $\alpha_1(B(b_0,\eta))$ is a symmetric function with maximum at $\eta = b_0$ $(B(b_0,b_0) = b_0)$, and, therefore, $c'(\alpha_1(B(b_0,\eta)))$ is a symmetric function with maximum at $\eta = b_0$. Moreover, $f_{b_0}(\eta)$ is a symmetric function with maximum at $\eta = b_0$, $r_0(b_0) = \mu$, and, for any $A \in \Re$, $r_0(b_0 + A) - r_0(b_0) =$ $r_0(b_0) - r_0(b_0 - A)$. Consequently,

$$c'(\alpha_0(b_0)) = \delta \mu \int_{-\infty}^{\infty} c'(\alpha_1(B(b_0,\eta))) f_{b_0}(\eta) d\eta.$$

Given that $\delta \mu < 1$,

$$c'(\alpha_0(b_0)) < \int_{-\infty}^{\infty} c'(\alpha_1(B(b_0,\eta))) f_{b_0}(\eta) d\eta.$$

Given that $\alpha_1(b_0) > \alpha_1(b)$ for all $b \neq b_0$ (see Martinez [2005]), $c'(\alpha_1(b_0)) > c'(\alpha_1(b))$ for all $b \neq b_0$. Therefore,

$$c'(\alpha_1(b_0)) > \int_{-\infty}^{\infty} c'(\alpha_1(B(b_0,\eta))) f_{b_0}(\eta) d\eta$$

Consequently, $c'(\alpha_1(b_0)) > c'(\alpha_0(b_0))$, and $\alpha_1(b_0) > \alpha_0(b_0)$ (by c'' > 0). The proposition follows from the properties of $\alpha_1(b)$ (illustrated in Figure 1 and discussed by Martinez [2005]).

Figure 1 illustrates the result in proposition 1 for the following example: $c(a) = a^5$, $\delta = 0.9$, R = 20, $b_0 = 0$, and $h_{\bar{\eta}} = h_{\varepsilon} = 0.75$.

As explained above, given that the period-1 incumbent's optimal decision depends on his reputation, one has to precisely define what is a political cycle. Because we want to focus on differences in the incumbent's behavior *due to the proximity of the next election*, we refer to differences in behavior across the incumbent's term *for a given reputation level* as political cycles. Thus, proposition 1 shows that the model presented here generates a political cycle. For the same reputation level (b_0) , the period-1



Figure 1: Equilibrium effort levels.

equilibrium effort is higher than the period-0 equilibrium effort (cycles for other reputations are analyzed in Section 3.2).

Proposition 1 also shows that since the incumbent's reputation most likely changes over time, in general, one cannot conclude from observing the same behavior across the term that the proximity of elections does not affect policy choices (and there is no political cycle). Policy choices may indeed depend on the proximity of elections; however the incumbent's reputation may change in such a way that he ends up making the same decisions throughout the term. Similarly, one cannot conclude from observing different policy choices throughout the term that there is a political cycle. Policy choices may not depend on the proximity of elections, but the incumbent's reputation may change in such a way that he ends up choosing different actions throughout the term. Empirical studies follow the theoretical literature and ignore that the incumbent's decisions depend on his reputation. Consequently, our findings suggest reinterpreting previous empirical results and controlling for changes in reputation in future empirical studies.

For the same reputation level (b_0) , why is the period-1 equilibrium effort higher than the period-0 equilibrium effort? The incumbent knows that he can affect the reelection probability with his efforts in periods 0 and 1. Therefore, he could exert more effort in period 0 and less effort in period 1 (or vice versa) and still have the same reelection probability. As shown by equation 11, the optimal effort-smoothing decision is such that the marginal cost of exerting effort in period 0 equals the expected marginal cost of exerting effort in period 1 (discounted by δ and the expected *relative effectiveness* discussed below). In period 0, the incumbent anticipates (using his next-period optimal strategy) that if his reputation does not change he will choose a high effort level in period 1, $\alpha_1(b_0)$. He also anticipates that, for example, if his period-0 performance turns out to be either very good or very bad (and, therefore, his period-1 reputation is either very good or very bad) he will exert low effort in period 1. In particular, the expected period-1 effort is lower than $\alpha_1(b_0)$, and the expected marginal cost of exerting effort in period 1 is lower than $c'(\alpha_1(b_0))$. Therefore, following the effort-smoothing rule, the incumbent chooses a not-so-high effort level in period 0 ($c'(\alpha_0(b_0)) < c'(\alpha_1(b_0))$). He chooses an effort level lower than what he would choose in period 1 for the same reputation, b_0 .

Previous theoretical studies assume that only the incumbent's performance in the last period before the election is useful as an indication of his future performance.¹⁶ Under this assumption, the incumbent's period-0 effort is not *effective* in affecting the reelection probability, and, consequently, the incumbent only exerts effort at period 1 (the cycle is a direct result of this assumption). This extreme assumption is motivated by the possibility that the incumbent's more recent performance may be more informative of his future performance.¹⁷ Here, we assume that the incumbent's more recent performance is more useful as an indication of his future performance.¹⁸ However, the *relative effectiveness* of the incumbent's efforts is endogenous here, and the period-0 effort could be more effective than the period-1 effort in changing the reelection probability. This is the case if with his period-0 effort the incumbent can make the voters believe that he will exert a lower period-1 effort and, therefore, can make the voters infer a higher period-1 signal. For example, suppose that the period-1 effort expected by the voters, $\alpha_1(b_{v1})$, is decreasing with respect to b_{v1} (as illustrated in Figure 1 for high reputation levels). Then, at period 1, if b_{v1} is higher, and the voters believe the incumbent exerted a lower effort, $\alpha_1(b_{v1})$, for any y_1 , the voters infer

¹⁷Similarly, it could be assumed that only the incumbent's action in the last period before the election is not observed by the voters (and only unobserved actions can affect the reelection probability) because one may think that the incumbent's actions further from the election are more easily observed.

¹⁸In the voters' period-2 belief $b_{v2} = \mu^2 b_0 + \mu (1-\mu) \eta_{v0} + (1-\mu) \eta_{v1}$, the weight of the period-0 signal is lower than the weight of the period-1 signal.

¹⁶Most empirical studies on *economic voting* do not discuss explicitly the time horizon considered by voters. However, some studies reject the hypothesis that voters consider only the incumbent's performance close to the election (see, for example, Abuelafia and Meloni [2000], Brender [2003], Fair [1996], Meloni [1997], Panzer and Paredes [1991], and Peltzman [1990, 1992]). An exception is presented by Eisenberg and Ketcham [2004] who find that "only the most recent year of economic performance significantly determines the incumbent's party's vote share." However, they consider four economic measures simultaneously and only 17 observations, so their analysis has limited power. Moreover, when they consider county-level performance (21,368 observations) they find that "voters appear to consider each of the three most recent years about equally."

a higher signal, $\eta_{v1}(b_{v1}) \equiv y_1 - \alpha_1(b_{v1})$. Voters think that y_1 is the result of a low effort and a high signal. Consequently, the incumbent's period-0 effort (that increases b_{v1}) has a positive effect on the voters' learning at periods 0 and 1, and it may be more effective than the period-1 effort in affecting the reelection probability. Hence, assuming that the incumbent's more recent performance may be more indicative of his future performance is quite different from assuming that the incumbent's performance farther from the election is not informative at all.

In equation 11, r_0 represents the relative effectiveness in changing the voters' period-2 beliefs, b_{v2} (and, therefore, the reelection probability) of the incumbent's period-0 effort (compared with his period-1 effort). As described above, the incumbent's period-0 effort affects b_{v1} directly, and it affects b_{v2} through b_{v1} (as indicated in equation 3). His period-1 effort affects b_{v2} directly. Thus, the relative effectiveness, r_0 , is the derivative of the voters period-2 beliefs, $b_{v2} = B(b_{v1}, \eta_{v1}(b_{v1}))$, with respect to their period-1 belief, b_{v1} . If the relative effectiveness, r_0 , is higher (lower) than one, it implies that the period-0 effort was relatively more (less) effective than the period-1 effort in changing b_{v2} .

3.1.2 Comparative statics

Comparative-statics exercises have been used to identify under what circumstances political cycles would be of higher magnitude. This section shows how considering that the incumbent can influence the reelection probability with his actions in every period affects this analysis.

Differences in the per-period office value R are studied. In a model where only the action in the last period before the election can affect the reelection probability, Shi and Svensson [2002] show that if the per-period office value is higher, political budget cycles are amplified. They find empirical evidence that supports this prediction.¹⁹ The intuition behind this result is simple. A higher R implies that there are stronger incentives to increase reelection probabilities. In their model, given that reelection probabilities can be increased only with the action in the last period before the election, an increase in R increases the importance of the cycles.

What can be learned about this relationship from the model presented here? If the incumbent can affect the reelection probability with his actions in every period, a higher R implies a higher effort level in every period. Let us compare the effort levels in periods 0 and 1. Equation 10 shows that a higher R implies a higher period-1 effort level for any reputation b. Equation 11 shows that if the incumbent

¹⁹They also analyze the effect of differences in the proportion of uninformed voters. The same could be done here if the model is reformulated.

expects a higher period-1 effort, he exerts a higher period-0 effort. In particular, if the marginal cost of effort is a homogeneous function, the next proposition shows that the office value only has a scale effect on political cycles. The difference between the effort levels observed in periods 0 and 1 as a percentage of the period-0 effort level is independent of R.

Proposition 2 Assume that the marginal cost of effort is a homogeneous function of order j. Then, for any period-1 reputation b, $\frac{\alpha_1(b)-\alpha_0(b_0)}{\alpha_0(b_0)}$ does not depend on R.

Proof. Let us consider any office value $R = R_0$. Let us suppose that there is a change in the office value from R_0 to $R_1 = \lambda R_0$ with $\lambda \in \Re$. Let $\alpha_t(b; R)$ denote the equilibrium effort level if the beliefs are represented by b and the per-period office value is R. The period-1 equilibrium effort level if the beliefs are represented by b and $R = R_0$, $\alpha_1(b; R_0)$, satisfies

$$c'(\alpha_1(b; R_0)) = \delta R_0 f_b\left(\frac{b_0 - \mu b}{1 - \mu}\right).$$

If $R = R_1$, $\alpha_1(b; R_1)$ satisfies

$$c'(\alpha_1(b; R_1)) = \delta R_1 f_b\left(\frac{b_0 - \mu b}{1 - \mu}\right).$$

Therefore, $c'(\alpha_1(b; R_1)) = \lambda c'(\alpha_1(b; R_0))$. Given that c' is homogenous of order j,

$$\lambda c'\left(\alpha_{1}\left(b;R_{0}\right)\right) = c'\left(\lambda^{\frac{1}{j}}\alpha_{1}\left(b;R_{0}\right)\right)$$

and $\alpha_1(b; R_1) = \lambda^{\frac{1}{j}} \alpha_1(b; R_0)$. For R_0 , the period-0 equilibrium effort is given by

$$c'(\alpha_0(b_0; R_0)) = \delta \mu \int_{-\infty}^{\infty} c'(\alpha_1(B(b_0, \eta); R_0)) f_{b_0}(\eta) d\eta,$$

and, for R_1 , the period-0 equilibrium effort is given by

$$c'(\alpha_0(b_0; R_1)) = \delta \mu \int_{-\infty}^{\infty} c'(\alpha_1(B(b_0, \eta); R_1)) f_{b_0}(\eta) d\eta.$$

Therefore, $c'(\alpha_0(b_0; R_1)) = \lambda c'(\alpha_0(b_0; R_0))$ and $\alpha_0(b_0; R_1) = \lambda^{\frac{1}{j}} \alpha_0(b_0; R_0)$. Thus,

$$\frac{\alpha_1(b; R_0) - \alpha_0(b_0; R_0)}{\alpha_0(b_0; R_0)} = \frac{\alpha_1(b; R_1) - \alpha_0(b_0; R_1)}{\alpha_0(b_0; R_1)}$$

and $\frac{\alpha_1(b)-\alpha_0(b_0)}{\alpha_0(b_0)}$ does not depend on R.

This result implies empirically testable implications that allow us to distinguish the model in this paper from the one presented by Shi and Svensson [2002]. On the other hand, this result does not contradict the empirical findings in Shi and Svensson [2002] because it does not refer to differences between the effort levels observed in periods 0 and 1 but to these differences as a percentage of the period-0 effort.

3.2 Multiple elections

Analyzing a model with more than one election allows us to consider that two periods before the next election the incumbent's reputation may be different from b_0 . Moreover, one period before the next election, the incumbent makes an effort-smoothing decision similar to the period-0 decision discussed above. The limit of the finite-horizon solutions, if players are far enough from the termination of the game, is discussed here. The infinite-horizon case has particular interest because of its stationarity: the incumbent's incentives (the number of future elections, the value of winning these elections, and his future actions) do not depend on time.

It is assumed that the optimal reelection rule is to reelect the incumbent if and only if his expected ability is higher than the one for an unknown challenger. After finding the incumbent's equilibrium strategies, this is checked to be true.

Two periods before the next election, the incumbent's problem is as described in (8) (and, for the infinite-horizon case, we do not need the time subscripts). Incentives are as described for period-0 in the one-election version of the model. These incentives are represented in the following Euler equation:

$$c'(\hat{\alpha}(b)) = \delta \int_{-\infty}^{\infty} \hat{r}(B(b,\eta))c'(\alpha(B(b,\eta))) f_b(\eta) d\eta$$
(13)

where

$$\hat{r}(b) \equiv \left. \frac{\partial B_v}{\partial b_v} \right|_{b_v = b} = \mu - (1 - \mu) \, \alpha'(b)$$

denotes the relative effectiveness of the incumbent's effort two periods before the next election.²⁰

One period before the next election, the incumbent's problem is as described in (7). The following Euler equation describes the incumbent's incentives when the beliefs are coincidental and represented by b:

$$c'(\alpha(b)) = \delta \hat{W}(b_0, b_0) f_b\left(\frac{b_0 - \mu b}{1 - \mu}\right) + \delta \int_{\frac{b_0 - \mu b}{1 - \mu}}^{\infty} r(B(b, \eta)) c'(\hat{\alpha}(B(b, \eta))) f_b(\eta) d\eta$$
(14)

where

$$r(b) \equiv \left. \frac{\partial B_v}{\partial b_v} \right|_{b_v = b} = \mu - (1 - \mu) \,\hat{\alpha}'(b)$$

denotes the relative effectiveness of the incumbent's effort one period before the next election.

²⁰Equation 13 gives the incumbent's equilibrium effort for any reputation b. However, two periods before the next election (and after the current period election), given the equilibrium voting rule, only agents with a good enough reputation ($b > b_0$) can be in office.



Figure 2: Incumbent's equilibrium strategy.

The first term in the right-hand side of equation 14 represents the gain from increasing the next-election reelection probability. The value of winning the election is endogenous and is given by $\hat{W}(b_0, b_0)$ (in the one-election version of the model, the value of winning the election is equal to $W_T(b_0, b_0) = R$).

The second term in the right-hand side of equation 14 represents the gain from increasing the reelection probability in the future elections. These incentives are similar to the ones the incumbent faces two periods before the next election. In order to increase future reelection probabilities, the incumbent may decide to exert effort now or in the future. The difference is that one period before the next election the incumbent knows that he may not enjoy the future benefit because he may lose the next-period election (in equation 14, this is represented in the lower bound in the integral).

Given the complexity of the problem studied here, a numerical approach is necessary. The Euler equations described in equations 13 and 14 below, and the expected lifetime utility for an incumbent two periods before the next election evaluated in equilibrium (when the incumbent's and the voters' beliefs are coincidental) constitute a system of three functional equations with three unknowns (the functions $\hat{W}(b, b)$, $\hat{\alpha}(b)$, and $\alpha(b)$). Numerical methods allow us to find these functions.

For all the parameter values considered, the voting strategy used for deriving the Euler equations is an equilibrium strategy. Figure 2 illustrates how the proximity of the next election affects the incumbent's decisions for the parameter values discussed in the example presented before. It shows that the numerical approach used for computing the solutions in the infinite-election version of the model produces results that are consistent with the ones obtained from closed-form solutions in the one-election version of the model.

Figure 2 shows that, for a given reputation b, the incumbent may decide to exert a higher effort farther from the next election. For understanding this, for a given b, let us compare the marginal cost of exerting effort one and two periods before the next election, $c'(\alpha(b))$ and $c'(\hat{\alpha}(b))$, respectively. Equation 13 shows that $c'(\hat{\alpha}(b))$ is equal to the expected marginal cost of exerting effort one period before the next election $c'(\alpha(B(b,\eta)))$ (weighted by the relative effectiveness and discounted by δ). In order to understand the way in which this expected marginal cost (and, therefore, $c'(\hat{\alpha}(b))$) compares with $c'(\alpha(b))$ (the marginal cost of $\alpha(B(b,\eta))$ evaluated at the expected $B(b,\eta)$) Jensen's inequality has to be considered. If $c'(\alpha(B(b,\eta)))$ is a convex (concave) function, Jensen's inequality implies an *inverted* (positive) political cycle, i.e., it predicts that the incumbent's effort level is higher (lower) farther from the election. One period before the next election, the equilibrium strategy is convex for extreme reputations b, and it is concave for reputations b close to b_0 . However, for good reputations (high b), the effort-smoothing incentives are also important one period before the next election (the incumbent is very likely to win the election, and, therefore, the lower bound in the integral in equation 14 is low), and the differences between the equilibrium efforts one and two periods before the next election are small.

4 Conclusions and extensions

This paper shows that a standard political-agency model generates political cycles without assuming that only the incumbent's last decision before the election can affect the reelection probability. Cycles result from the incumbent's effort-smoothing decision.

The paper shows that as it is natural to expect in this framework, the policymaker's decisions indeed depend on his current reputation, and that for understanding why there are political cycles, it is crucial to consider this. Thus, the model in this paper is a truly dynamic framework where a policymaker's optimal decisions depend on his reputation, and these decisions influence his future reputation. Empirical studies of political cycles follow the previous theoretical literature and ignore that the incumbent's decisions depend on his reputation (for empirical analysis, past performance, the number of terms in office, the percentage of votes obtained in the previous election, or approval ratings could be used as an indication of the incumbent's reputation). Consequently, our findings suggest reinterpreting previous empirical results and controlling for reputation in future empirical work. Since a policymaker's reputation most likely changes over time, in general, one cannot conclude from observing the same behavior across the policymaker's term that the proximity of elections does not affect policy choices.

We showed that even if the policymaker's performance farther from the election is less indicative of his performance after the election, the policymaker's decisions farther from the election can be more effective in increasing his reelection probability. The relative effectiveness of the policymaker's decisions in altering future reelections probabilities is endogenous here. Consequently, assuming that only the policymaker's last performance before the election is useful as an indication of his future performance (as done in previous studies) is quite different from assuming that the policymaker's more recent performance may be more useful as an indication of his future performance.

It is also shown that if policymakers can affect reelection probabilities with their decisions in every period, the results from comparative-statics exercises are different from the findings in previous work.

More generally, our findings deepen the understanding of agency relationships in which the agent's compensation is decided infrequently. Given that considering incentives from career concerns is necessary for designing optimal contracts that complement these incentives (see Gibbons and Murphy [1992]), analyzing the way in which career-concern incentives depend on the proximity of the compensation decision could be important for understanding the way in which contracts should depend on the proximity of the compensation decision.²¹

The next step in this research project is to test the empirical implications of the model. Analyzing the way in which the framework developed here could help explain differences in the frequency of elections (or the length of contracts) is also an interesting extension (for a similar discussion see Eggertsson and Le Borgne [2005]). If the incumbent's action is interpreted as effort or separating resources from the budget, an incumbent policymaker prefers to postpone elections while voters prefer to increase the frequency of elections (assuming that the election cost is not too large). This suggests that the frequency of elections may be decided in a bargaining process. The intensity of the players' preferences about the frequency of elections depends on the incumbent's reputation and parameter values. Differences in these variables could help explain differences in the frequency of elections. Moreover, the dynamic model presented here may help us explain changes in the frequency of elections. On the other hand, if the incumbent's action represents fiscal policy, elections may create incentives to choose some suboptimal policy and, therefore,

²¹In a model without learning about ability where the principal uses long-term contracts for providing incentives to the incumbent, Spear and Wang [2005] present an alternative reason for which the principal may want to replace the incumbent: it may be more costly to induce the incumbent to exert effort than to induce a new agent to exert effort. If the career-concern incentives discussed in this paper were complemented with incentives contracts, the firing motives considered by Spear and Wang [2005] could appear.

voters may dislike elections.

Additional natural extensions are analyzing cases with asymmetries in the learning processes, term limits and/or retirement for the policymakers, and a finite number of policymakers (political parties) participating in elections. Situations in which the incumbent's action affects voters' capacity to learn (as in Le Borgne and Lockwood [2004]) could also be considered.

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