Political Life Cycles*

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Abstract

We develop and test a formal model of leader political life cycle effects within a selectorate framework. The model leads to novel hypotheses about the provision of public goods, private goods, and freedoms over a leader's tenure in power. The analyses show, as hypothesized, that the total provision of benefits, as well as the provision of public goods and freedoms decrease significantly the longer a leader is in power while the proportion of rewards in the form of private goods (such as corruption opportunities) increases.

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*Replication files are available in the JOP Dataverse (https://dataverse.harvard.edu/dataverse/jop). The empirical analysis has been successfully replicated by the JOP replication analyst. We are very grateful for comments and feedback from audiences at the Politics departments at New York University, Yale University, Princeton University and from Helen Milner.

1 Introduction

All too often the optimism of a new government entering office is slowly replaced by disappointment as leaders appear to deliver fewer and fewer public-spirited policies, and, instead, increasingly line their own pockets. Such disappointment is not misplaced. Based on an extension of the selectorate theory, we offer a theory about the dynamics that induce political life cycle effects within any leader's winning coalition and evidence that tests the proposed effects. We demonstrate that new leaders work relatively hard on behalf of their supporters and the people and tend to focus on providing public goods. However, as tenure increases, leaders offer fewer rewards and shift their policy focus towards graft and corruption. While these temporal effects are small relative to differences across institutions, the evidence shows that the quality of governance declines as leader tenure increases. The analysis demonstrates that people are not falsely optimistic about what new leaders will deliver. Rather, as new leaders become established, they simply deliver less.

Broadly speaking, all survival-oriented political leaders allocate a portion of their government's revenue across two policy dimensions: public goods and private goods. The amounts allocated are expected to reflect the quantity required to secure the acquiescence of their subjects and the backing of their coalition of essential supporters. The provision of public goods – including spending or the promotion of such policies as national security, access to education, healthcare, protection of freedoms, and other public services – is intended to sustain enough citizen support to forestall the leadership's deposition. As well, all leaders, whether they head a democracy, monarchy, theocracy, military regime, or some other form of autocracy, must allocate some portion of revenue in the form of private goods intended to secure the loyalty of the government's essential backers. The puzzle we examine relates to how that survival-motivated allocation of public and private benefits changes as an incumbent's time in power increases.

How much of a government's revenue is spent on public goods and private goods versus falling into the discretionary pot of the incumbent is known to vary greatly across regime types. Numerous studies have established, for instance, that more democratic governments spend proportionately more on public goods-oriented policies while less democratic regimes focus more spending on private goods aimed at their key backers (Lake and Baum, 2001; Deacon and Saha, 2006; Deacon, 2009).

Empirical tests of public and private goods provision strongly support the theoretical contention that more democratic, more accountable regimes – those that depend on a larger winning coalition – indeed do provide more public goods and fewer private goods than do their smaller-coalition counterparts. However, the predictions from these theoretical accounts of resource allocations and policy choices remain incomplete.

We extend selectorate-based explanations of governance by demonstrating theoretically and empirically that a political life cycle exists that alters the equilibrium mix of public and private goods. This life cycle also affects the total amount spent to sustain coalition loyalty. The analysis demonstrates that, conditional on coalition size, the longer a leader has been in power, the less she spends to maintain coalition loyalty, the fewer public goods she provides, and the more she allocates to private goods relative to public goods. While the effect of a leader's time in office is secondary to the policy allocation incentives induced by coalition size, this paper uncovers a previously unstudied impact of a leader's life cycle. While democratic leaders deliver more public goods than autocrats, both democrats and autocrats reduce their provision of public goods as their tenure increases. In addition to the life cycle effects on policy provision, the theory predicts that the risks leaders face from deposition, coup d'état or mass uprising decline significantly as tenure increases (Bueno de Mesquita and Smith, Forthcoming).

Although the dynamic nature of the formal argument necessitates significant technical modeling, the theory's insights are straightforward. Leaders and their supporters have idiosyncratic likes and dislikes. Perhaps these are due to such considerations as shared ethnicity, cultural commonalities, or old school ties. Whatever the reason, any leader prefers to surround herself with people she likes and trusts. However, to succeed in coming to power she will take support from whomever will back her. As she becomes established in power she gradually learns whom she likes and trusts and whom she dislikes or distrusts in her coalition. If the leader believes a supporter is in the latter category, then she replaces that supporter with someone she anticipates she will like better. Of course, learning is slow because a leader always tells her supporters that she likes and trusts them right up to the moment she replaces them and her supporters naturally do things that they think will appeal to the leader. They want to be liked. Such opacity slows the leader's ability to find out

whom she likes and trusts. However, the leader gradually learns and replaces those she dislikes.

When a leader first comes to power, the supporters that put a leader on the throne rightfully fear being replaced. As an illustration, Kim Jong-Un ousted his uncle, Jang Song-thaek, about a year after he consolidated his hold on power even though, or perhaps because, his uncle had been instrumental in bringing him to power, was seen as a close advisor, and even might have been a potential rival.[1] Fidel Castro followed a similar pattern. Two of Castro's 21 original cabinet ministers, appointed upon victory in 1959, were out by the end of the year and four more were replaced in 1960. Indeed, several of his closest associates during the revolution were not only removed from power; they were executed in short order once he succeeded in overthrowing the Batista regime.

Given the high likelihood of being replaced, supporters lack confidence early on that they will be around to enjoy the long-term flow of rewards and so leaders work hard to buy their loyalty. Over time, the risk of being replaced diminishes as leaders have taken the opportunity to reshuffle their coalition. Increasing tenure improves supporters' expectations of access to a long-run flow of rewards for as long as the leader retains power. As a result, backers of established leaders have a vested interest in keeping them in power and so suppress attempts by the people to overturn the regime. With supporter loyalty to the incumbent becoming more concentrated over time, leaders can cut back on the rewards they provide. Further, with loyal supporters being willing to suppress the masses, potential revolutionaries are deterred, meaning that the leader can provide fewer societal rewards to the masses. As tenure increases supporters become more loyal, leaders provide fewer rewards and shift the focus of rewards away from the general public and towards graft and other private goods for their core supporters.

2 Previous Studies of Leader-Tenure Effects

To the best of our knowledge, there are no previous studies of the life cycle effects examined here. Given the novelty of the question addressed here, there are no existing competing arguments to

[1] https://www.nytimes.com/2012/09/06/world/asia/north-korea-may-be-preparing-economic-reforms.html

directly compare and contrast. However, this project relates to a number of existing literatures. Our underlying approach is embedded in selectorate theory and within that setting a leader's fate has been tied to factors like health (Bueno de Mesquita and Smith, 2018) or threats of rebellion or coup d'état (Bueno de Mesquita and Smith, 2017). This paper contributes by considering how leaders best reconstruct their winning coalition over time so as to provide the optimal mix of benefits to enhance survival (Riker, 1962).

Our study specifically contributes to research into how leaders' personal characteristics, especially their time in office, affect their policy choices and their political survival (Horowitz, Stam and Ellis, 2015). While our analysis is at the country level, we explicitly focus on leader behavior and the nature of individual incumbents' policy provisions (cf. McGillivray and Smith, 2008; Chiozza and Goemans, 2011). Oftentimes, leadership change also alters the relationships between nations, suggesting the importance of leaders as units of analysis (McGillivray and Stam, 2004; Mattes, Leeds and Carroll, 2015). Gelpi and Grieco (2001) also appeal to the notion of tenure or experience in making the argument that experienced leaders are less likely to be the targets of international conflict.

In a similar fashion, scholars of international relations have rigorously examined how domestic incentives shape the timing and provision of foreign policies. In the conflict literature, there has been much consideration of how the timing of conflict interacts with the electoral calendar (e.g., Gaubatz, 1991; Williams, 2013; Zeigler, Pierskalla and Mazumder, 2014; Chiozza, 2017; Smith and Spaniel, 2019; Bak, 2020). Studies of the "diversionary war hypothesis" (Levy, 1989) probe how domestic electoral incentives tempt leaders to initiate adventurous foreign policies (Smith, 1996; Tarar, 2006). In addition, others investigate how political business cycles and macroeconomic policies are manipulated for electoral gain (e.g., Nordhaus, 1975; Alesina, 1987; Rogoff, 1990; Schultz, 1995). These studies make clear that leader tenure plays an important role in understanding key political phenomena.

Our work is distinct from but connects to the political economy literature on term limits. Many democracies and even a few autocracies have introduced term limits over the past several decades. The life cycle results that we present here suggest a possible reason for such term limits. Since

leaders reduce their provision of public goods the longer they are in office and public goods are an especially important component of benefits in democracies, term limits may be a way to restrict the loss of public goods provision by forcing turnover in leaders, thereby ensuring an increase in public goods with each new incumbent (Ashworth, 2012).

With the insights of previous studies into leader tenure in mind, we focus attention on how and why the provision of public and private goods changes the longer an incumbent remains in power. We turn now to modeling how a leader's life cycle in power alters policy allocations.

3 A Political Life Cycle Model

In developing a model of life cycle effects on resource allocations we begin with the formal foundations of the selectorate theory (Bueno de Mesquita et al., 2003). We assume some familiarity with selectorate theory and so provide only a minimal summary of its essential features. Critically, leaders are assumed to have their eye on survival in office while also maximizing control over discretionary revenue. To remain in power, they need to maintain the support of a winning coalition of size W. That coalition is drawn from a pool of people with at least a nominal say in choosing leaders and is known as the selectorate (S). Everyone in society (N) enjoys the benefit of whatever public goods their government provides while only members of the winning coalition benefit from whatever private goods – such as government-tolerated corruption opportunities – the government provides.

Leaders always face threats to their hold on power at least from a political rival, and sometimes from a mass uprising and/or a coup from within their winning coalition (Svolik, 2012). To maintain loyalty, leaders need to offer their supporters at least as many rewards as a rival can credibly offer. In this regard, an established leader has a significant incumbency advantage over her rivals. Should a rival come to power, he is liable to reorganize his coalition of supporters, replacing some coalition members whose support was essential in coming to power with alternatives whom this new leader likes more or believes he can trust more. The risk of being displaced from the coalition and how this risk evolves under new leadership lies at the heart of our explanation of political life cycles.

Leaders have affinities or degrees of idiosyncratic loyalty towards potential supporters: they like

or trust some more than others. As we noted, such affinities might be based upon ethnic networks, religious affiliations, hometowns, educational ties, or other idiosyncratic features. While supporters are generally aware of such connections, they cannot be certain as to which type of connection is going to be most salient to a leader, or where they rank within the relevant group. Hence, we are agnostic as to which of these features is most salient to any particular leader. From a theoretical perspective, we simply assume that leaders like (have affinity for) some supporters more than others. In the original exposition of selectorate theory, it was assumed that upon coming to power these affinities were revealed and so the leader reshuffles the coalition immediately after coming to power. Such a reshuffling ensures that the leader surrounds herself with people she likes. The innovation here is to model the revelation of affinities as a gradual learning process and examine the impact of this learning on coalition dynamics, political survival, and policy provision.

As a leader's tenure increases she learns more and more about her affinity for coalition members. She replaces low affinity supporters, those whom she dislikes. When a leader first comes to power supporters are uncertain as to whether the leader will subsequently replace them. However, if a supporter has been retained for many periods, then he can be fairly certain that he will be kept in the coalition in the long term.

3.1 Model Setup

Consider a polity with a continuum of residents so that the polity's size is N. The political leader, L, faces threats both from within her coalition of W supporters (which we refer to as the deposition risk) and from the masses, M, who seek to overturn the existing political order through revolution. We consider an indefinitely repeated game ($t = 0, 1, 2, \ldots$) in which leader L forms a coalition of supporters of size W (technically a mass of W supporters since we consider a continuum of people) and rewards these supporters with public (g_t) and private (z_t) goods. The masses, player M, decide whether or not to rebel. The coalition then decides whether to depose the leader with a rival, and, should they face a revolutionary threat, whether to suppress the masses or take a passive role and tacitly allow the masses to succeed.

The loyalty of coalition members and their willingness to suppress the masses depends upon

three factors: 1) the value of immediate policy rewards; that is, the level of public and private goods; 2) the leader's performance on all other issues, modeled as a valence shock, θ_t; and 3) the expectations of members within the coalition about being retained and rewarded in future coalitions. This final factor is critical to the coalition dynamics that arise as a leader learns whom she favors.

To model the learning dynamics, we assume each potential coalition member could be a high or low affinity type, α_H or α_L respectively. These affinities reflect how much the leader favors having the person in her coalition for whatever reason. We let a_0 define the proportion of people that the leader likes at the beginning of her tenure ($W < a_0$). By this we mean that she regards them as high affinity types. However, she is initially uncertain about her affinity for individuals and everyone has an incentive for opacity. The leader always reassures her supporters that she likes them since tipping them off that they will be replaced is risky while she still relies on their support. Likewise, coalition members have incentives to act and say what they think the leader wants to see and hear. These opacity incentives mean the leader cannot immediately recognize low affinity types. Instead she gradually learns who is who. To model this learning process we assume that at the end of each period, the leader detects a low affinity type with probability q. Rather than retain such low affinity types – people she does not favor, like, or trust – she replaces them, thereby altering the composition of her future coalition. We use the notation a_t to represent the proportion of high affinity types in the leader's coalition at the start of period t and a_{t+1} to represent this proportion at the end of the period (and therefore at the start of the next period) after the leader has had an opportunity to learn and weed out low affinity types.

For technical convenience, the model assumes that the coalition is composed of a mass of supporters rather than discrete individuals. The infinitely continuous number of coalition members allows for the use of population statistics which greatly simplifies the exposition. If the coalition were composed of a large finite number of supporters, then the results would be substantively similar as the sample statistics converge to the population statistics. We discuss the technical issues raised by this assumption in the appendix. For ease of language we will often discuss the coalition choices as being made by individuals rather than a continuum.

3.2 Stage Game

The game starts when a new leader comes to power with an initial coalition of supporters of size W. In each period t, the leader sets policy, the masses decide whether to rebel or not, and the coalition decides whether to depose the leader and whether to suppress the masses if rebellion occurs. After these political deposition risks, the leader learns about the affinities of her supporters. The timing of the stage game is as follows.

1. Policy formation: Leader offers public and private goods, g_t and z_t.

2. Revolution choice: The masses observe the cost of rebellion, K_t, and decide whether to rebel.

3. Deposition and suppression choice: Coalition members observe a valence shock θ_t. Absent a revolution, they decide whether to 1) retain the leader, or 2) depose the incumbent. If there is a revolution then the coalition decides whether to 1) retain the leader and suppress the revolution, 2) depose the incumbent and suppress the revolution, or 3) acquiesce to the revolution and allow it to succeed.

4. Learning: If the leader survives, then for any low affinity type there is a q probability that the leader identifies his affinity. Any coalition member identified as a low affinity type will be shuffled out of the coalition and replaced by an alternative selector in future periods.

The valence shocks, θ_t's, are identically and independently distributed with distribution $F(x) = Pr(\theta_t \leq x)$. We assume $F(\cdot)$ is strictly concave, continuous and twice differentiable and focus on the exponential distribution. K_t, the cost of rebellion in period t has distribution $H(x) = Pr(K_t \leq x)$. We use the uniform distribution for analytical simplicity.

3.3 Payoffs

If the leader remains in power, then members of the coalition receive a payoff of $u(g_t, z_t) - \theta_t + y_t$, where $u(g_t, z_t)$ is the value of the public and private goods rewards, θ_t is the valence shock and y_t reflects the net present value of future rewards. We assume that $u(\cdot, \cdot)$ is additively separable, concave and twice differentiable. To construct examples we use $u(g, z) = \sqrt{g} + \sqrt{z}$. If the leader

remains in power, then the masses receive $u(g_t, 0)$, the value of the public goods provision. Only coalition members benefit from private goods.

If a revolution occurs and succeeds, then the game ends with the masses receiving a payoff r_M and coalition members receiving a payoff r_W. If a new leader comes to power without a successful revolution, then the game ends with the masses receiving payoff c_M and the coalition members receiving payoff c_W. If a coalition member is shuffled out of the coalition, then his payoff is γ. Depending on the context, being removed from the coalition might have extreme consequences, such as being sent to the gulag or killed. However, in larger coalition systems reshuffles are much more innocuous and simply mean no longer benefiting from graft or that a group to which the supporter belongs no longer receives pork or favorable regulatory policies. The key assumption is that being reshuffled out of the coalition is worse than remaining in the coalition, which we formally define as $\gamma < c_W$.

The masses pay cost K_t if they rebel. If the coalition suppresses a rebellion and retains the incumbent, then its members pay cost η. If, in the face of a revolution, the coalition deposes the leader, then coalition members pay cost $\frac{\eta}{2}$ to suppress the revolution. In practice, revolutionary movements lose much of their impetus when the leader against whom the people are rebelling is gone, and as a result suppression is easier and less costly.[2]

Mass Action	Outcome	Coalition Payoff	Mass Payoff
No Revolution	Leader Retained	$u(g_t, z_t) - \theta_t + y_t$	$u(g_t, 0)$
	Leader Deposed	c_W	c_M
Revolution	Leader Retained & Suppression	$u(g_t, z_t) - \theta_t + y_t - \eta$	$u(g_t, 0) - K_t$
	Leader Deposed & Suppression	$c_W - \frac{\eta}{2}$	$c_M - K_t$
	Revolution Wins	r_W	$r_M - K_t$

Table 1: Payoffs

Leaders operate under a budget constraint. They have revenue R, and they provide g_t public and z_t private goods. The cost of public goods is p and the effective cost of private goods is the number of people who receive them, W, so the cost of providing policy is $p\, g_t + W\, z_t \leq R$.

The incumbent's well-being, or utility, depends on three components: survival in office (Ψ);

[2]The theoretical results, of course, do not depend on this lower suppression cost. We model this feature because we believe it is substantively appropriate.

unspent resources, $(R - p\,g_t - W\,z_t)$, and being surrounded by high affinity types $(\mu\,a_{t+1})$. The first two components are straightforward elements. Leaders want to survive in office (the office holding benefit is Ψ) and use state funds for their own discretionary purposes.[3]

$$U_L(g_t, z_t) = \underbrace{\mathbb{1}_{Survive}\Psi}_{\text{survival}} + \underbrace{R - p\,g_t - W\,z_t}_{\text{discretionary resources}} + \underbrace{\mu\,a_{t+1}}_{\text{among friends}} \tag{1}$$

Leaders like to surround themselves with people they like and trust. As discussed above, a_{t+1} refers to the proportion of high affinity types in the coalition at the end of period t and μ represents the value the leader attaches to being surrounded by high affinity types. The leader does not want low affinity types, people she dislikes or distrusts, in the coalition and so replaces any coalition member whom she detects to be of low affinity.

Figure 1 depicts the sequence of play as a game tree.

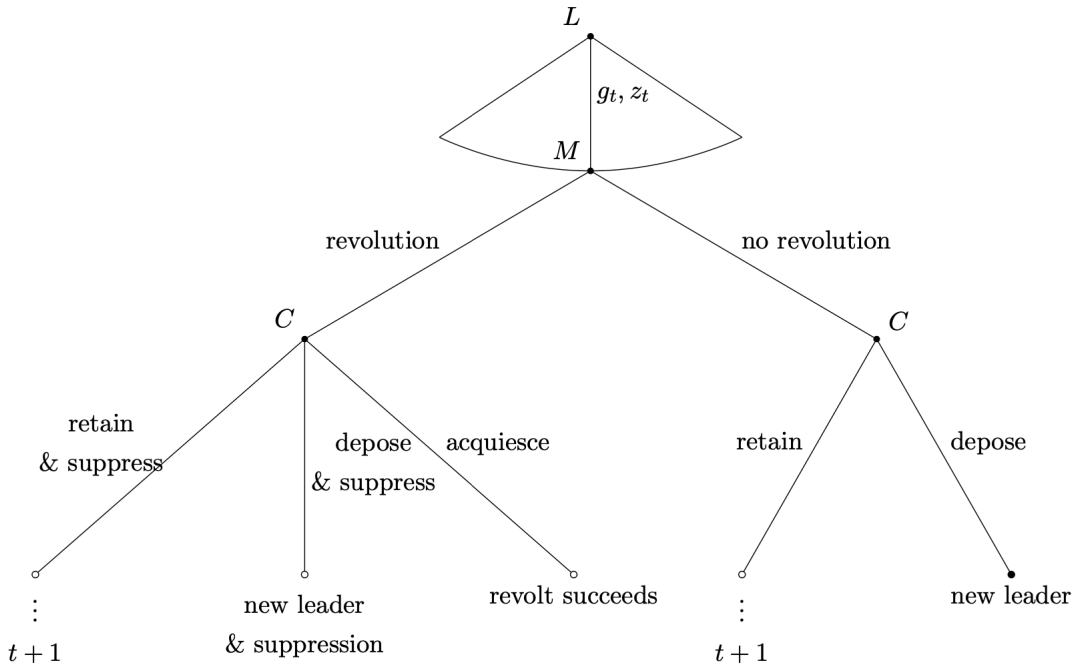


Figure 1: The Game Tree

[3]To focus on interior solutions, we assume that the leader has sufficient resources such that she never exhausts available resources.

4 Theoretical Analysis

With the sequence of play and payoffs established, we now turn to the analysis of the game. In doing so, we characterize the unique subgame perfect equilibrium in weakly undominated strategies. Coalition members have a common discount factor, discounting future payoffs by δ. We assume the leader and masses maximize payoffs on a period-by-period basis.

4.1 Learning Technology

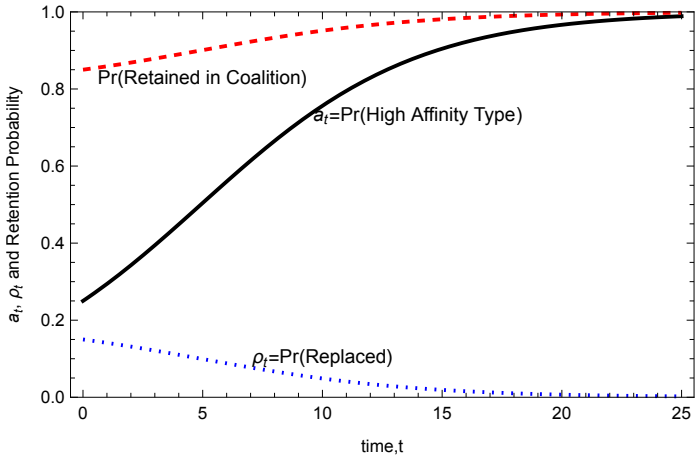
Let ρ_t represent the likelihood that a supporter is removed from the coalition in period t. The key substantive assumption for our model is that over time the leader learns whom she likes and trusts and whom she dislikes and distrusts. She removes the latter from the coalition. Initially there are many people in the coalition that the leader will eventually want to replace. Over time, as replacements have already taken place, the rate at which the leader replaces supporters declines. Thus, the longer a supporter has been kept in the coalition the greater their expectation of being retained in the future.

Recall that the initial proportion of people that the leader has high affinity for is $a_0 = Pr(\alpha_H)$. In each period there is a chance, q, that the leader identifies a low affinity person: $Pr(\text{identify}|\alpha_L) = q$. The leader learns this information about members of her coalition and about some potential members, that is, some sufficient subset of selectors. For simplicity, we assume that there are no false positives, $Pr(\text{identify}|\alpha_H) = 0$. By Bayes Rule, the proportion of high affinity types in the coalition at the start of period t is $a_t = \frac{a_0}{a_0+(1-a_0)Pr(\text{not identified before period t})} = \frac{a_0}{a_0+(1-a_0)(1-q)^t}$. We assume that the affinity relation is unidirectional, so a selector's opinion of the leader does not help him determine whether the leader will like him or not. However, we might equally have set up the model with the selectors having idiosyncratic preferences for the leader and the leader progressively learning whom she can trust and whom is likely to be disloyal. The leader removes any coalition member identified as a low affinity type so the probability of being replaced in period t is therefore $\rho_t = (1 - a_t)q = \frac{q(1-a_0)(1-q)^t}{a_0+(1-a_0)(1-q)^t}$, which is decreasing in t. The proportion of the coalition that is high affinity at the beginning of the period is $a_t = \frac{a_0}{a_0+(1-a_0)(1-q)^t}$ and at the end of the period is $a_{t+1} = \frac{a_0}{a_0+(1-a_0)(1-q)^{t+1}}$, both of which are increasing in t. These results imply the first proposition.

Proposition 1 *The probability of being reshuffled from the coalition declines over time. In the limit, as* $t \to \infty$, $\rho_t \to 0$ *and* $a_t \to 1$.

Figure 2 graphically illustrates how the proportion of high types in the coalition (a_t), the probability of being replaced (ρ_t), and the probability that a member is retained in the coalition change over the tenure of a leader.

Figure 2: Learning Dynamics and Coalition Reshuffles



To ease the exposition of the game it is useful to introduce notation for the net present value, or continuation value, of the game for coalition members. Let Y_t represent the net present value of being in the coalition at the start of period t. As introduced above, y_t represents the net present value of coalition membership at the start of step 4 of the stage game; that is, y_t is the net present value of coalition membership after the revolution and political deposition stages have occurred but before the learning stage is played out. The continuation value y_t then depends upon two eventualities: whether the incumbent retains the supporter or whether the incumbent replaces the supporter before the start of the next period. The net present value of being retained in the coalition is δY_{t+1}; the net present value of being removed from the coalition is $\delta\gamma$. Therefore

$$y_t = \underbrace{\delta(1-\rho_t)Y_{t+1}}_{\text{retained in coalition}} + \underbrace{\delta\rho_t\gamma.}_{\text{reshuffled from coalition}} \tag{2}$$

To clarify, Y_t represents the expected value of the game for a coalition member at the start of

period t and y_t represents the continuation value after the political deposition phase of the stage game. With these continuation values in hand, we next derive the occurrence of revolutions, the coalition's choice and the optimal policy allocations by leaders.

4.2 Policy Provisions, Political Survival and Coalition Dynamics

4.2.1 Suppression, Deposition and Revolution

Suppose that in period t the leader provides g_t public goods and z_t private goods. These policies are worth $u(g_t, z_t)$ to coalition members and $u(g_t, 0)$ to the masses. If the masses do not revolt, then the coalition decides whether to retain or depose the leader. If the coalition members depose the leader, then their payoff is c_W. If they retain her, then their payoff is $u(g_t, z_t) - \theta_t + y_t$, where $u(g_t, z_t)$ corresponds to the current period policies, θ_t to the valence shock, and y_t to expectations of future rewards. The coalition members prefer to retain their leader provided that

$$\theta_t \leq \hat{\theta}_t = u(g_t, z_t) + y_t - c_W. \tag{3}$$

That is, the leader is retained if the valence shock (current dissatisfaction with her performance) is smaller than the value she is expected to produce for coalition members (through the current provision of public and private goods and their continuation value) compared to their expected value if she is deposed.

If a revolution occurs, then the coalition chooses between retaining the leader and suppression (worth $u(g_t, z_t) - \theta_t - \eta + y_t$), deposing the leader and suppression (worth $c_W - \frac{\eta}{2}$), or allowing the revolution to succeed (worth r_W). There are two cases: in the first case, if $c_W - \frac{\eta}{2} \geq r_W$, then the coalition retains the leader if

$$\theta_t \leq \tilde{\theta}_t = u(g_t, z_t) + y_t - c_W - \frac{\eta}{2}, \tag{4}$$

and deposes her otherwise. In the second case, if $c_W - \frac{\eta}{2} < r_W$, then the coalition suppresses the

revolution and retains the leader if

$$\theta_t \leq \overline{\theta_t} = u(g_t, z_t) + y_t - \eta - r_W, \tag{5}$$

otherwise the coalition allows the revolution to succeed.

In case 1, if the masses rebel, then the leader will be deposed if $\theta_t > \tilde{\theta}_t$ which occurs with probability $1 - F\left(\tilde{\theta}_t\right)$. The masses rebel if and only if

$$\underbrace{F\left(\tilde{\theta}_t\right) u(g_t, 0) + \left(1 - F\left(\tilde{\theta}_t\right)\right) c_M - K_t}_{\text{value of rebellion}} \geq \underbrace{F\left(\hat{\theta}_t\right) u(g_t, 0) + \left(1 - F\left(\hat{\theta}_t\right)\right) c_M}_{\text{no rebellion}}.$$

So the masses rebel only if

$$K_t \leq \tilde{k_t} = (c_M - u(g_t, 0)) \left(F\left(\hat{\theta}_t\right) - F\left(\tilde{\theta}_t\right)\right), \tag{6}$$

which occurs with probability $H(\tilde{k_t})$. Note that in case 1, the masses have no expectation of revolutionary success, but rebellion helps precipitate the ouster of the incumbent by the coalition.

In case 2, $c_W - \frac{\eta}{2} < r_W$, the masses rebel if and only if

$$\underbrace{F\left(\overline{\theta_t}\right) u(g_t, 0) + \left(1 - F\left(\overline{\theta_t}\right)\right) r_M - K_t}_{\text{value of rebellion}} \geq \underbrace{F\left(\hat{\theta}_t\right) u(g_t, 0) + \left(1 - F\left(\hat{\theta}_t\right)\right) c_M}_{\text{no rebellion}},$$

so the masses rebel whenever

$$K_t \leq \overline{k_t} = r_M - c_M + F(\hat{\theta}_t) \left(c_M - u(g_t, 0)\right) - F\left(\overline{\theta_t}\right) \left(r_M - u(g_t, 0)\right), \tag{7}$$

which occurs with probability $H(\overline{k_t})$. Equations 3, 4, 5, 6 and 7 characterize coalition and mass behavior given policies g_t and z_t and expectations of future rewards y_t.

4.2.2 Optimal Policy Provision

If $c_W - \frac{\eta}{2} \geq r_W$ (case 1), then the leader's payoff is

$$\mathcal{L} = \Psi \left(F(\hat{\theta}_t) - H(\tilde{k}_t) \left(F(\hat{\theta}_t) - F(\tilde{\theta}_t) \right) \right) + (R - p\, g_t - W\, z_t) + \mu\, a_{t+1}. \tag{8}$$

The first term corresponds to the probability the leader survives, the middle term corresponds to retained resources and the final term is the value of being surrounded by high affinity types. If $c_W - \frac{\eta}{2} < r_W$ (case 2), then there is an analogous expression for $\mathcal{L}$ in which the $\tilde{\theta}$ and $\tilde{k}$ terms are replaced by $\overline{\theta}$ and $\overline{k}$ terms. Maximizing the leader's payoff with respect to g_t and z_t provides a characterization of the leader's optimal policies, given in Proposition 2. To reduce notation, we suppress the subscript t's.

Proposition 2 *In case 1, $c_W - \frac{\eta}{2} \geq r_W$, given y_t expectations about future payoffs L's policies g_t and z_t are characterized by*

$$\frac{W}{u_z(g,z)\,\Psi} = \underbrace{F'(\hat{\theta}) - \left(F'(\hat{\theta}) - F'(\tilde{\theta}) \right) \left(H(\tilde{k}) + H'(\tilde{k})\, \tilde{k} \right)}_{X_1} \tag{9}$$

and

$$\frac{p}{u_g(g,z)\,\Psi} = X_1 + \underbrace{\left(F(\hat{\theta}) - F(\tilde{\theta}) \right)^2 H'(\tilde{k})}_{X_2}, \tag{10}$$

where $u_z(g,z) = \frac{\partial u(g,z)}{\partial z}$ and $u_g(g,z) = \frac{\partial u(g,z)}{\partial g}$.

The characterization for case 2 is similar and is shown in the appendix along with proofs. Proposition 2 provides clear implications. The left-hand side of equations 9 and 10 are the marginal costs of policy provision (W with respect to private goods and p with respect to public goods) divided by the product of the value of holding office and the marginal values of additional policy rewards. The right-hand side of the equations shows how increased policy rewards reduce the risk of deposition.

Two substantively important results follow from these equations.

First, the leader spends additional resources on policy rewards up to the point that her increased likelihood of retaining office equals her marginal cost of providing more policy. Second, relative to rewarding her coalition members most efficiently, the leader's policy provisions are "biased" towards public goods. Formally, define this public goods bias as $bias = \frac{p}{u_g(g,z)} / \frac{W}{u_z(g,z)} = \frac{X_1+X_2}{X_1}$. There is an additional term (X_2) on the right-hand side of equation 10 that is not in equation 9. The provision of additional policy benefits buys coalition loyalty that makes coalition members more likely to retain the leader and suppress any revolution. If the leader's only concern were buying coalition loyalty, then she would most efficiently spend resources by balancing marginal costs with marginal benefits: in this case, $bias = 1$. However, public goods enhance survival through a second mechanism. Increased public goods make the status quo more valuable to the masses and this reduces the likelihood that they will rebel. Since the leader is more likely to be deposed if a revolution occurs ($\tilde{\theta}, \overline{\theta} < \hat{\theta}$), the leader is biased towards public goods as these public rewards restrain revolutionary tendencies while also rewarding supporters.

4.3 Political Life Cycles

Our exposition of the existence and effects of political life cycles relies on the following comparative static results:

Proposition 3 *The comparative statics with respect to y_t are $0 > \frac{dg_t}{dy_t} > -\frac{1}{u_g(g_t,z_t)}$, $\frac{du(g_t,z_t)}{dy_t} < 0$, and $\frac{d}{dy_t}(y_t + u(g_t, z_t)) > 0$. The equilibrium thresholds $\hat{\theta}_t$, $\tilde{\theta}_t$ and $\overline{\theta_t}$ are increasing in y_t and $\tilde{k_t}$ and $\overline{k_t}$ are decreasing in y_t. Therefore, as y_t increases, political survival becomes easier and revolution becomes less likely.*

While couched in calculus terms, this result has a simple substantive interpretation. As the value of future coalition membership increases (y_t increases), the leader reduces her provision of rewards in the immediate period (g_t, z_t decrease). However, the extent to which she cuts back on policy provision does not fully offset the increased value of future rewards. As the value of future coalition membership increases, the valence shock thresholds ($\tilde{\theta}$, $\overline{\theta}$ and $\hat{\theta}$) all increase, even as the leader provides less policy. The intuition is a straightforward consequence of convex preferences, by which

we mean that leaders prefer a mix of increased survival and less spending over a larger increase in survival. As future membership in the coalition y_t becomes more valuable, the coalition is more loyal. In turn, this loyalty deters revolutionaries from attempting an uprising. However, rather than enjoying only the survival benefit of this enhanced loyalty, the leader can slightly cut back on policy provision, keeping slightly more resources for herself, and still survive at a higher rate.

The results from propositions 1 and 3 combine to generate the political life cycle result.

Proposition 4 *As leader tenure increases, the leader provides fewer goods, is more likely to survive, faces fewer revolutions, and the bias towards public goods diminishes.*

The life cycle implications follow from a set of changes that we have established take place as a leader's tenure in office increases. Coalition members recognize that their risk of being shuffled out of the coalition diminishes as leader tenure increases. This enhanced expectation of being retained in the coalition increases the net present value of being a coalition member. Consequently, this increases the coalition's loyalty to the incumbent. Since the coalition, being more loyal, is less likely to depose the leader or back a revolution, the leader can afford to offer its members fewer rewards. Paradoxically, despite spending less to reward her coalition, the likelihood that the incumbent retains power still increases. Furthermore, as political loyalty grows within the coalition, the masses are more deterred from rebellion. This deterrence diminishes the leader's incentive to favor public goods as a means to buy off the masses and so the proportion of private benefits increases even as total spending to secure the coalition's loyalty decreases over the incumbent's political life cycle. Leaders get away with more despite providing less over time.

5 Empirical Analysis

The life cycle selectorate model implies numerous testable hypotheses. Here we focus on those directly related to how long a leader has been in power and what benefits that leader provides. Specifically, we test:

1. The longer a leader has been in office, holding coalition size constant, the fewer rewards she provides to members of the winning coalition.

2. The longer a leader has been in office, holding coalition size constant, the fewer public goods she provides.

3. The longer a leader has been in office, holding coalition size constant, the greater the proportion of benefits provided in the form of private goods rather than public goods.

The model also has implications regarding threats of leader deposition and the occurrence of revolutions (Bueno de Mesquita and Smith, Forthcoming). While there is robust empirical support for those predictions, we do not investigate them further here.

5.1 Data and Estimation

We test our theoretical predictions with data from 165 countries between 1970 and 2019 across a wide range of policy provisions to document the effects of the political life cycle. We examine three categories of benefits: private goods, public goods, and coordination goods. Our policy measures use data from the V-Dem Project (Coppedge et al., 2022), the World Bank (World Bank, 2022*a*), Freedom House (Freedom House, 2017), and other sources.

To measure Private goods we use the V-Dem variable *v2excrptps*, the extent of corruption in the public sector. As with other common measures of corruption such as Transparency International's Corruption Perception Index (Transparency International, 2019) and the World Bank's World Governance Index (World Bank, 2022*b*), the V-Dem measures are also based on expert surveys. However, the V-Dem variables are available for a wider set of countries over a longer period of time. The basic measure of Public goods is V-Dem's *v2peapspol* variable, which examines equity in provision of public services across political groups. This variable captures the extent to which government policies enhance the welfare of the people in general rather than just political supporters.

We also replicate the public goods tests with what we refer to as coordination goods. We draw attention to these policies because they are measured directly as performance outputs, and not spending, since they are relatively costless to provide. Policies such as freedom of assembly, free press and free speech represent the extent to which citizens can freely express their views and organize against the government while remaining free from political persecution. We use the

v2caassemb from V-Dem as the main measure of coordination goods. It measures the extent to which people enjoy freedom of peaceful assembly. Other measures of coordination goods that we investigate include the extent to which press freedom is restricted (Freedom House, 2017), freedom from torture using *v2cltort* from V-Dem, and the political terror scale (Haschke, 2019). To place our measures on similar magnitude scales, we standardize Private, Public and Freedom of Assembly measures to take values between 0 and 1.

While some of our analyses investigate individual policies or their consequences, we also examine the model's aggregate predictions. Over time the theory anticipates that the leader provides fewer overall rewards. We define Total Rewards as the sum of Public Goods + Private Goods + Freedom of Assembly, where each of the component variables has been standardized to take values between 0 and 1. This aggregate level of rewards is anticipated to decline as tenure increases.

The theory predicts that as tenure increases, leaders spend less on rewarding their coalition and shift the focus of policy provision towards private goods. As a result, the level of public goods should unambiguously decline with tenure. The provision of private goods is more nuanced as it is determined by two offsetting effects: the overall decline in rewards and a shift in the optimal mix of policies towards private goods. Note that this latter effect does not say that private goods expenditures unambiguously increase. The theory allows that private goods provision could go up or could go down slower than public goods provision but given the shift toward private goods, the theory contends that private goods will not go down at the same rate or faster than public goods. Of course, in the real world, private goods spending could increase, decrease faster, decrease slower, or decrease at the same rate as public goods. Hence, rather than test the effect of tenure on private goods in isolation, we examine the focus of government policy by looking at the ratio $\frac{\text{Private}}{\text{Public+Private}}$. As explained, the theory anticipates that this ratio will increase as leader tenure increases while making no prediction about how the absolute quantity of private goods provision responds to tenure.

The foundation of the political life cycle is that policy provisions change over the course of a leader's tenure. As such, our main independent variable of interest is the length of the leader's time in office. We utilize data by Smith (2022) which updates the Archigos data (Goemans, Gleditsch

and Chiozza, 2009) through December 2021. These data provide the entry and exit time of leaders from office.

Political institutions are, in selectorate logic, the main driver of the types of policies that leaders provide. The institutional measure that we employ is the magnitude of the size of the winning coalition. We use the new measure of this concept proposed by Bueno de Mesquita and Smith (2022), which places polities on a 0 to 1 scale. As discussed later, we replicate our tests using the Polity Democracy-Autocracy index and find similar results.

We control for numerous characteristics of each state's economic health. Measures of wealth (per capita GDP in constant $), economic growth, population size and the extent of a nation's natural resource wealth (as a % of GDP) are taken from the World Development Indicators (World Bank, 2022*a*).

Our unit of observation is the country-year. To examine variance in policy provision over time, we estimate a series of fixed effects ordinary least squares (OLS) regression models. Specifically, for a policy outcome Y_{it} for country i in year t, we estimate $Y_{it} = X'_{it}\beta + \lambda_i + \omega_t + \varepsilon_{it}$, where $X'_{it}\beta$ is a vector of covariates, including leader tenure and coalition size. We specify country and year fixed effects, denoted as λ_i and ω_t respectively.

5.2 Empirical Results

An ideal test of our hypotheses would examine policy provisions year-by-year throughout the tenure of each leader while holding constant the institutions under which the leader governed. The theoretical exposition, however, tells us that changes to institutions are themselves potentially endogenous to the political life cycle. That is, the institutional structure informs the optimal mix of policy provisions designed to enhance leader survival; leader survival over time further shapes the types of policies leaders will pursue. And, as the policy mix changes, so too does the optimal institutional configuration. Hence, we must acknowledge the inherent difficulty that arises when coalition size changes endogenously.

We could sample only on those polities that we know, *ex post*, did not experience a change in coalition size during a leader's tenure, but this greatly reduces the sample size and relies on

information that leaders did not know when they began modifying the benefits they provided to their coalition. Although such an approach yields strongly supportive results, we prefer to rely only on *ex ante* information and on a sample that is unrestricted. Hence, our tests control for the lagged size of the country's winning coalition, W_{t-1}. This is an imperfect substitute for monitoring leaders under conditions where their institutional settings are unchanging but we believe it is the appropriate and demanding way to test the hypotheses.

Our hypothesis tests are divided into two tables. Table 2 reports the results from our estimating equations for Total Rewards (the sum of Public Goods + Private Goods + Freedom of Assembly), Public Goods Spending, and the proportion of Private Goods to Public Goods. Recall that hypotheses 1 and 2 indicate, respectively, that the coefficient on tenure with respect to Total Rewards and Public Goods should be significantly negative. Hypothesis 3 indicates, conversely, that the coefficient for tenure when the dependent variable is $\frac{\text{Private}}{\text{Private+Public}}$ should be positive and significant. This is exactly what we see in Table 2.

Table 2 also indicates, as expected, that the larger the polity's winning coalition, the greater is the total spending on benefits; the greater is the provision of public goods; and the smaller is the provision of private goods. For instance, moving from a relatively small to a relatively large coalition system, say $W_{t-1} = .4$ to $W_{t-1} = .8$ (a change from the 25th percentile to the 70th percentile in our data), would lead to an increase of about 0.344 in the provision of Total Rewards, which is approximately one standard deviation of the dependent variable. Moving from a leader's first to tenth year in office, the comparable change is a decline of policy provision of -0.05, only about 13% of a standard deviation of the dependent variable. While the cross-institutional differences are large (and probably understated as the analyses include country fixed effects and many nations experience only modest institutional change over our period of study), increasing tenure, as hypothesized, significantly reduces the quantity and quality of governance. For public goods, we see that moving from a smaller to a larger coalition system explains about two-fifths of a standard deviation of the dependent variable, while the life cycle effect explains about one-tenth of a standard deviation. Similarly, when considering the ratio of private to public goods, a comparable shift in coalition size explains about a quarter of a standard deviation in the dependent variable,

while the life cycle effect explains about 10%. Thus, while we see that institutional configurations play a dominant role in describing policy provision, we also see a consistent and significant effect of a leader's tenure in predicting governance outcomes.

	Total Rewards (1)	Public Goods (2)	$\frac{\text{Private}}{\text{Private + Public}}$ (3)
Log(Tenure)	-0.019***	-0.011***	0.008***
	(0.006)	(0.003)	(0.002)
W_{t-1}	0.833***	0.215***	-0.101***
	(0.076)	(0.035)	(0.024)
Log(GDPpc_{t-1})	-0.0001	0.024*	-0.021***
	(0.021)	(0.013)	(0.008)
Log(Population_{t-1})	-0.042	-0.018	0.024
	(0.036)	(0.024)	(0.017)
Growth	0.0002	0.0005**	-0.0003***
	(0.0005)	(0.0002)	(0.0001)
Resource Rents	-0.001	-0.001**	0.0009***
	(0.0010)	(0.0005)	(0.0003)
Observations	6,929	6,929	6,929
R^2	0.860	0.925	0.941
Within R^2	0.349	0.182	0.125
Country fixed effects	✓	✓	✓
Year fixed effects	✓	✓	✓

Standard errors clustered by country
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Estimation of the Political Life Cycle: Main Results (OLS)

Table 2 is clearly supportive of the model's predictions regarding the effects of a leader's life cycle on the shifting provision of goods. Institutions play a dominant role in determining policy provisions, but the overall size of policy rewards declines with tenure and a longer tenure is associated with a private goods policy focus. Table 3 probes the results further, turning our attention to the economically inexpensive but politically costly provision of the subset of public goods we have called coordination goods. That is, Table 3 investigates how a leader's life cycle in power influences the provision of Freedom of Assembly, Restricted Press Freedom, and, in the reverse direction, the deprivation of freedoms through the use of Torture and a scaled estimation of the government's use of political terror (PTS).

Freedom of Assembly decreases dramatically as a leader's time in office increases. The same is true of press freedom. Leaders significantly add restrictions on the press the longer they are in power. Torture, as well, finds significantly more use as a leader gets deeper into the political life cycle. Again, we see that cross-sectional effects dominate temporal effects in terms of predicting the provision of freedoms. Directionally, the same is true when abuse of subjects is measured using the Political Terror Scale but for PTS the effect of the life cycle is statistically insignificant. For our Freedom of Assembly variable, moving from a coalition size of $W_{t-1} = 0.4$ to $W_{t-1} = 0.8$ increases the provisions of freedoms by 1.2 standard deviations of our measure, while increasing tenure from 1 to 10 years decreases the freedom of assembly by about 20% of a standard deviation. While the impact of tenure is small relative to the impact of coalition size, the theoretically-derived expectations regarding the existence and impact of a leader life cycle are strongly supported by the empirical evidence.

	Assembly Goods (1)	Restricting Press (2)	Torture (3)	PTS (4)
Log(Tenure)	-0.018***	0.877**	0.019***	0.004
	(0.004)	(0.386)	(0.004)	(0.027)
W_{t-1}	0.674***	-43.4***	-0.625***	0.896***
	(0.044)	(5.10)	(0.046)	(0.268)
Log(GDPpc_{t-1})	-0.001	-2.21	-0.016	0.278**
	(0.014)	(2.21)	(0.018)	(0.116)
Log(Population_{t-1})	-0.088***	2.96	0.036	-0.589***
	(0.025)	(3.49)	(0.026)	(0.172)
Growth	-0.0002	-0.020	-0.0005	0.006**
	(0.0003)	(0.041)	(0.0003)	(0.003)
Resource Rents	-0.0008	0.030	0.001	-0.005
	(0.0005)	(0.044)	(0.0007)	(0.003)
Observations	6,938	3,615	6,938	5,888
R^2	0.891	0.935	0.887	0.702
Within R^2	0.441	0.153	0.412	0.047
Country fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

Standard errors clustered by country
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Results on Freedoms

5.3 Robustness

As robustness tests, we repeated all analyses excluding observations that contained instances of leader change since one might legitimately argue that such observations should be coded as the first year of a new leader, rather than the last year of the departing leader (as we coded it). Further, we repeated all the policy analyses excluding economic growth as a control, since a leader's policies might partially determine growth. The results were very similar to those reported in the text. We also replicated our analyses using Polity's democracy minus autocracy as an alternative measure of institutions (Marshall and Gurr, 2020) and obtained similar results. Additionally, the analyses were repeated using leader fixed effects. Given that the average tenure is around four years, such analyses are extremely demanding in terms of degrees of freedom. The assembly and torture results remained significant. However, for the other policy results, the directional predictions remained the same, but statistical significance dropped below conventional levels.

As an additional test of our hypothesis regarding the provision of public goods, we look at alternative indicators of their provision using the World Bank's data on health expenditures as a percentage of GDP and equivalent variables for education and defense spending. Unfortunately, the interpretation of the effects of leader tenure on these variables is questionable for three reasons. First, spending measures are inputs, not outputs. A government might spend huge amounts on education, but the question central to this study is does such spending improve education across the board (a public goods focus) or is it used to provide such private benefits as subsidies for the foreign education of the children of elites or to fund bloated procurement contracts for shoddily built or under-utilized schools (Keefer and Knack, 2002)? As Keefer and Khemani (2005, 3) argue, "[A] large and disproportionate share of expenditures in health and education typically flows to salaries of teachers and health workers, yet absenteeism and shirking are rampant, so that no effective services are provided in many cases." Similar problems seem reflected in defense spending as we see from Russia's poor performance in the war against Ukraine despite its massive military expenditures. Second, the World Bank covers significantly fewer observations than V-Dem over the same span of years, and third, the missing World Bank data are strongly associated with smaller coalition systems (Hollyer, Rosendorff and Vreeland, 2014). That is, in terms of what we are

investigating, the missingness introduces a bias by excluding smaller coalition regimes where leader tenure is likely to be long.

Of course, we are also mindful that the V-Dem indicator used to assess public goods provision may have problems as well. Specifically, it measures the extent to which access to public services is distributed by political group or is available to everyone equally (*v2peapspol*). This variable captures the equity or breadth of governments' policy provisions and relates to the central theoretical idea that governments choose a policy focus between rewarding everyone or the politically important subset. However, the V-Dem variable *v2peapspol*, while capturing the equitableness of access to public goods, could have a high value if everyone, for instance, is given very few public benefits.

To address our concerns with the World Bank's expenditures data while recognizing the limitations of the public goods variable on which we focus, we present two alternative sets of tests in the appendix (Tables 4 and 5). First, we replicate the test of the hypothesis concerning the provision of public goods over a leader's life cycle using the World Bank's expenditure data on health, education, and national defense. Overall, these measures show the same directional predictions as those reported in our main text, but are not statistically significant. Second, we create three new variables that multiply each World Bank expenditure variable by the V-Dem equity indicator. By doing so, we ensure that high values on these multiplicative variables only arise when both the quantity of spending and the equity of access are high. Again, tenure is negatively associated with the dependent variable, as hypothesized.

To the best of our knowledge, the findings that we document are both theoretically and empirically novel. However, we are aware of at least two natural alternative explanations for our findings. One possibility is that the coalition is initially oversized and as the incumbent becomes more confident about survival, is diminished to its equilibrium size. While our tests control for the size of the winning coalition over time, other investigations have examined endogenous coalition change and its effects on the provision of benefits and leader survival (Bueno de Mesquita et al., 2003, 122-126); Bueno de Mesquita and Smith, Forthcoming). A second explanation is that the coalition seeks to ascertain the leader's quality over time. In such an account, a winning coalition may at first be uncertain about an incumbent's value over replacement. Consequently, newer in-

cumbents, worried about a revolution, might provide additional public goods to buy off the masses. Over time, competent leaders are more likely to survive, and so the pool of incumbents should be better at producing public goods, all else equal. This may be an alternative mechanism affecting the temporal distribution of benefits. In the appendix, we examine this alternative explanation by using a leader-specific measure of growth as a measure of competence. We find this conjecture receives no support.

6 Conclusion

We have proposed a revision of selectorate theory in which leaders gradually replace coalition members as they learn which of their supporters have low affinity. The revised theory, which also allows for some tradeoff between raising survival prospects and securing greater control over discretionary revenue, leads to several novel hypotheses regarding policy mixes and policy consequences. Three of the novel hypotheses are tested here and are found to be strongly supported by data for 165 countries spanning the years from 1970-2019.

The theory indicates and the evidence shows that there is a pro-public goods bias when leaders initially come to power and that bias fades the longer they are in office. The evidence also demonstrates that total resource allocations intended to maintain coalition loyalty decrease with the leadership life cycle even as coalitional loyalty to the incumbent increases due to the decreased risk of being replaced by the incumbent in the future. The shifting provision of benefits leads to an indeterminate effect on the quantity of private rewards given to coalition members but to a predicted – and observed – increase in the coalition's private goods relative to public goods rewards.

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Online Appendix for: Political Life Cycles

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Proofs of Formal Results

In the exposition of the game we describe the actions of the coalition as if the coalition is a unitary actor; linguistically easy, but not strictly true. There is a mass of individuals within the coalition and the coalition's action is the aggregate of their choices. To formalize this simply, suppose that the coalition's action depends upon the majority's choice; i.e., the leader is deposed if at least $W/2$ mass of supporters defect and the revolution is suppressed if at least $W/2$ mass of supporters choose to suppress. Since there is a mass of supporters, no individual is pivotal in deciding the coalition decision. By the restriction to weakly undominated strategies, every supporter's choice is their most preferred outcome. Since all coalition members are ex ante identical, all coalition members pick the same action and so the coalition members act in consort. In the main text we spoke of the coalition taking a coordinated action, and, in weakly undominated subgame perfect strategies, the equilibrium behavior of the coalition members is to all act identically.

Proof of Proposition 1: Follows directly from Bayes's Rule. ■

Since the following proofs are messy we will suppress the dependence of t and introduce the following abbreviated notation to simplify the statement of first and second order conditions. Let $u_z = u_z(g,z) = \frac{du(g,z)}{dz}$, and $u_g = u_g(g,z) = \frac{du(g,z)}{dg}$ which, by additive separability, also equals $\frac{du(g,0)}{dg}$.

Proof of Proposition 2: The proof follows from the maximization of equation 8 with respect to the leader's policy choice's g_t and z_t. We show the details for case 1. Case 2 is analogous. Equations 9 and 10 are rearrangements of the First Order Conditions: $\frac{d\mathcal{L}}{dz} = 0$ and $\frac{d\mathcal{L}}{dg} = 0$.

$$\frac{\partial \mathcal{L}}{\partial z} = -W + \Psi u_z \left(\underbrace{F'(\hat{\theta}) - (F'(\hat{\theta}) - F'(\tilde{\theta}))(H(\bar{k}) + H'(\tilde{k})\tilde{k})}_{X_1 > 0} \right)$$

$$\begin{aligned}\frac{\partial \mathcal{L}}{\partial g} &= -p + \Psi u_g \left(\underbrace{F'(\hat{\theta}) - (F'(\hat{\theta}) - F'(\tilde{\theta}))(H(\tilde{k}) + H'(\tilde{k})\tilde{k})}_{X_1>0} \right) \\ &+ \Psi u_g \left(\underbrace{(F(\hat{\theta}) - F(\tilde{\theta}))^2 H'(\tilde{k})}_{X_2>0} \right)\end{aligned}$$

where the extra term X_2 arises from the differentiation of the $(c_m - u(g,0))$ term in $\tilde{k}$. Note that the terms related to affinity do not appear in these first order conditions because they are not a function of the leader's policy choices. The second order conditions (SOC) are

$$\begin{aligned}\frac{\partial^2 \mathcal{L}}{\partial z^2} &= \Psi u_{zz} X_1 + \Psi u_z^2 X_3 \\ \frac{\partial^2 \mathcal{L}}{\partial g^2} &= \Psi u_{gg} (X_1 + X_2) + \Psi u_g^2 (X_3 + 2X_4 + X_5) < 0 \\ \frac{\partial^2 \mathcal{L}}{\partial z \partial g} &= +\Psi u_z u_g (X_3 + X_4) < 0 \\ \frac{\partial^2 \mathcal{L}}{\partial z \partial y} &= \Psi u_z (X_3) < 0 \\ \frac{\partial^2 \mathcal{L}}{\partial g \partial y} &= \Psi u_g (X_3 + X_4) < 0\end{aligned}$$

where

$$\begin{aligned}X_3 &= F''(\hat{\theta}) - (F''(\hat{\theta}) - F''(\tilde{\theta})) \left(H(\tilde{k}) + H'(\tilde{k})\tilde{k} \right) \\ &- (F'(\hat{\theta}) - F'(\tilde{\theta}))^2 (c_M - u(g,0)) \left(2H'(\tilde{k}) + H''(\tilde{k})\tilde{k} \right) < 0 \\ X_4 &= (F(\hat{\theta}) - F(\tilde{\theta}))(F'(\hat{\theta}) - F'(\tilde{\theta})) \left(2H'(\tilde{k}) + \tilde{k}H''(\tilde{k}) \right) < 0 \\ X_5 &= -(F(\hat{\theta}) - F(\tilde{\theta}))^3 H''(\tilde{k})\end{aligned}$$

Note that if we assume H is the uniform distribution then $H'' = 0$ and so $X_5 = 0$. For F is the exponential distribution, $\Delta = F(\hat{\theta}) - F(\tilde{\theta}) = F''(\hat{\theta}) - F''(\tilde{\theta}) = -(F'(\hat{\theta}) - F'(\tilde{\theta})) > 0$ and therefore $X_4 = -2X_2$. Further, note that for the uniform distribution, $H(\tilde{k}) = H'(\tilde{k})\tilde{k}$, we can write $X_3 + 2X_1 = F'(\widehat{\theta}) - \Delta H(\tilde{k}) - \Delta H'(\tilde{k})\tilde{k} = F'(\widehat{\theta}) > 0$.

The determinant of the Jacobian is

$$|J| = \begin{vmatrix} \frac{d^2\mathcal{L}}{dg^2} & \frac{d^2\mathcal{L}}{dgdz} \\ \frac{d^2\mathcal{L}}{dgdz} & \frac{d^2\mathcal{L}}{dz^2} \end{vmatrix}$$

$$= \Psi^2 \left(u_{gg} u_{zz} X_1 \left(X_1 + X_2 \right) + u_{gg} u_z^2 \left(X_1 + X_2 \right) X_3 + u_g^2 u_{zz} X_1 \left(-4X_2 + X_3 \right) - 4 u_g^2 u_z^2 X_2^2 \right) > 0.$$

Given the SOC, $\frac{d^2\mathcal{L}}{dg^2} < 0$, $\frac{d^2\mathcal{L}}{dz^2} < 0$ and $|J| > 0$, for all (g, z). Hence, L's optimization problem is globally concave and the FOC characterize unique globally optimal policies. ■

For case 2, $r_W > c_W - \eta/2$, the relevant FOC that characterize optimal policies are

$$\frac{W}{u_z(g,z)\,\Psi} = \underbrace{F'(\hat{\theta}) - H(\overline{k}) \left(F'(\hat{\theta}) - F'(\overline{\theta}) \right) - \left(F(\hat{\theta}) - F(\overline{\theta}) \right) H'(\overline{k}) \left(F'(\hat{\theta}) \left(c_M - u(g_t, 0) \right) - F'(\overline{\theta}) \left(r_M - u(g_t, 0) \right) \right)}_{X_6} \quad (11)$$

and

$$\frac{p}{u_g(g,z)\,\Psi} = X_5 + \left(F(\hat{\theta}) - F(\overline{\theta}) \right)^2 H'(\overline{k}) \quad (12)$$

and proof is analogous.

Comparative Statics

Proof of Proposition 3: Via Cramer's rule,

$$\begin{aligned} \frac{dg}{dy} &= -\frac{\left| \begin{pmatrix} \frac{\partial^2 \mathcal{L}}{\partial g \partial y_W} & \frac{\partial^2 \mathcal{L}}{\partial g \partial z} \\ \frac{\partial^2 \mathcal{L}}{\partial z \partial y_W} & \frac{\partial^2 \mathcal{L}}{\partial z^2} \end{pmatrix} \right|}{|J|} \\ &= -\frac{\Psi^2 u_g \overbrace{\left(u_{zz} X_1 \left(X_3 + X_4 \right) \right)}^{+}}{|J|} \end{aligned}$$

Hence g is decreasing in y.

$$\frac{dz}{dy} = -\frac{\left| \begin{pmatrix} \frac{\partial^2 \mathcal{L}}{\partial g^2} & \frac{\partial^2 \mathcal{L}}{\partial z \partial y_W} \\ \frac{\partial^2 \mathcal{L}}{\partial g \partial z} & \frac{\partial^2 \mathcal{L}}{\partial z \partial y_W} \end{pmatrix} \right|}{|J|}$$

$$= -\frac{\Psi^2\left(\overbrace{u_{gg}u_z\left(X_1+X_2\right)X_3}^{+}+\overbrace{u_g^2u_z\left(X_3X_5-X_4^2\right)}^{-}\right)}{|J|}$$

However we cannot unambiguously sign $\frac{dz}{dy}$ because the numerator contains both positive and negative terms. Substantively these competing terms correspond to the leader cutting back on coalition rewards as y increases, while also substituting away from public goods towards a private goods focus.

However, we can show that the level of immediate coalition rewards decreases in y.

$$\begin{aligned}\frac{du(g,z)}{dy} &= \frac{-u_g\left|\begin{pmatrix}\frac{\partial^2\mathcal{L}}{\partial g\partial y_W} & \frac{\partial^2\mathcal{L}}{\partial g\partial z}\\ \frac{\partial^2\mathcal{L}}{\partial z\partial y_W} & \frac{\partial^2\mathcal{L}}{\partial z^2}\end{pmatrix}\right| - u_z\left|\begin{pmatrix}\frac{\partial^2\mathcal{L}}{\partial g^2} & \frac{\partial^2\mathcal{L}}{\partial z\partial y_W}\\ \frac{\partial^2\mathcal{L}}{\partial g\partial z} & \frac{\partial^2\mathcal{L}}{\partial z\partial y_W}\end{pmatrix}\right|}{|J|}\\ &= \frac{\Psi^2\left(-u_{gg}u_z^2\left(X_1+X_2\right)X_3-u_g^2u_{zz}X_1\left(X_3+X_4\right)+u_g^2u_z^2X_4^2\right)}{\Psi^2\left(u_{gg}u_{zz}X_1\left(X_1+X_2\right)+u_{gg}u_z^2\left(X_1+X_2\right)X_3+u_{zz}u_g^2X_1\left(X_3+2X_4\right)-u_g^2u_z^2X_4^2\right)}\end{aligned}$$

Note that every term in the numerator appears in the denominator so $\frac{du(g,z)}{dy}$ takes the form of $-\frac{Z_1}{Z_1+Z_2}$ where Z_1 and Z_2 are positive groups of terms. Hence $-1 < \frac{du(g,z)}{dy} < 0$, such that in response to increases in y the leader reduces the immediate rewards, but by less than the amount that y increases, such that the sum $u(g,z)+y$ increases in y. Since cutoffs $\hat{\theta}_t$ and $\tilde{\theta}_t$ are in linear in $u(g_t,z_t)$ and y_t, $\hat{\theta}_t$ and $\tilde{\theta}_t$ are increasing in y_t. An analogous argument shows $\tilde{k_t}$ is decreasing in y_t. ■

To proceed examine the continuation value at the beginning of period t:

$$\begin{aligned}Y_t &= \int_0^{\tilde{\theta}_t}(u(g_t,z_t)+y_t-\theta-\eta H(\tilde{k_t}))f(\theta)d\theta\\ &+ (1-H(\tilde{k_t}))\int_{\tilde{\theta}_t}^{\hat{\theta}_t}(u(g_t,z_t)+y_t-\theta)f(\theta)d\theta + H(\tilde{k_t})(F(\hat{\theta}_t)-F(\tilde{\theta}_t))(c_W-\frac{\eta}{2})\\ &+ (1-F(\hat{\theta}_t))c_W, \qquad (13)\end{aligned}$$

where by differentiation of equation 13, $\frac{dY_t}{dy_t} \in (0,1)$.

Since $y_t = \delta(1-\rho_t)Y_{t+1} + \delta\rho\gamma$, and $\frac{dy_t}{dY_{t+1}} = \delta(1-\rho_t)$, $\frac{dy_t}{d\rho_t} = -\delta(Y_{t+1}-\gamma) < 0$. Therefore, $0 < \frac{dY_t}{dY_{t+1}} < \delta(1-\rho_t) < 1$, and $0 > \frac{dY_t}{d\rho_t} > -\delta(Y_{t+1}-\gamma)$.

Lemma 1 *For any Y_{t+1} and ρ_t there is a unique solution for Y_t.*

Proof of Lemma 1: Consider the RHS of equation 13. The RHS is increasing in Y_{t+1}. As $Y_{t+1} \to -\infty$, the coalition always deposes the leader so $RHS \to c_W$. As $Y_{t+1} \to \infty$, then coalition always stays loyal so $\frac{RHS}{Y_{t+1}} \to \delta$. Hence the RHS crosses the 45 degree line. Further, since $0 < \frac{dY_t}{dY_{t+1}} < \delta(1-\rho_t) < 1$, the crossing can occur only once. ■

Proof of Proposition 4: There is a lower bound on Y_t of c_W because the coalition could always depose the leader and obtain payoff of c_W. Via Proposition 1, as $t \to \infty$, $\rho_t \to 0$ so $y_t = \delta Y_{t+1}$ and $Y_{t+1} \to Y_t$. As $t \to \infty$, Y_t is defined recursively as the unique solution to

$$\begin{aligned}
Y_t &= \int_0^{\tilde{\theta}_t} (u(g_t, z_t) + \delta Y_{t+1} - \theta - \eta H(\tilde{k}_t)) f(\theta) d\theta \\
&+ (1 - H(\tilde{k}_t)) \int_{\tilde{\theta}_t}^{\hat{\theta}_t} (u(g_t, z_t) + \delta Y_{t+1} - \theta) f(\theta) d\theta + H(\tilde{k}_t)(F(\hat{\theta}_t) - F(\tilde{\theta}_t))(c_W - \frac{\eta}{2}) \\
&+ (1 - F(\hat{\theta}_t)) \left(c_W - H(\tilde{k}_t) \frac{\eta}{2} \right) \\
&= (u(g_t, z_t) + \delta Y_{t+1}) \left(F(\tilde{\theta}_t) H(\tilde{k}_t) + F(\hat{\theta}_t)(1 - H(\tilde{k}_t)) \right) \\
&- F(\tilde{\theta}_t) E[\theta | \theta < \tilde{\theta}_t] - (F(\hat{\theta}_t) - F(\tilde{\theta}_t))(1 - H(\tilde{k}_t)) E[\theta | \hat{\theta}_t > \theta > \tilde{\theta}_t] \\
&+ c_W \left(1 - F(\tilde{\theta}_t) H(\tilde{k}_t) - F(\hat{\theta}_t)(1 - H(\tilde{k}_t)) \right) \\
&- H(\tilde{k}_t) \eta \frac{1 - F(\tilde{\theta}_t)}{2} \\
&= \frac{1}{1 - \delta \left(F(\tilde{\theta}_t) H(\tilde{k}_t) + F(\hat{\theta}_t)(1 - H(\tilde{k}_t)) \right)} \Big[u(g_t, z_t) \left(F(\tilde{\theta}_t) H(\tilde{k}_t) + F(\hat{\theta}_t)(1 - H(\tilde{k}_t)) \right) \\
&- F(\tilde{\theta}_t) E[\theta | \theta < \tilde{\theta}_t] - (F(\hat{\theta}_t) - F(\tilde{\theta}_t))(1 - H(\tilde{k}_t)) E[\theta | \hat{\theta}_t > \theta > \tilde{\theta}_t] \\
&+ c_W \left(1 - F(\tilde{\theta}_t) H(\tilde{k}_t) - F(\hat{\theta}_t)(1 - H(\tilde{k}_t)) \right) - H(\tilde{k}_t) \eta \frac{1 - F(\tilde{\theta}_t)}{2} \Big] \qquad (14)
\end{aligned}$$

Such a unique solution exists via Lemma 1. Further, for any Y_t, there exists a unique $Y_{t-1} < Y_t$. Since Y_t increases in t and ρ_t decreases in t, $y_t = \delta \rho_t \gamma + \delta(1 - \rho_t) Y_{t+1}$ is increasing in t. Via proposition 3, $\hat{\theta}_t, \tilde{\theta}_t$ and $\bar{\theta}$ increase in t and g_t and z_t decrease in t. ■

The proof of Proposition 4 did not explicitly examine how bias changes over time, a topic we now address.

Proof that *bias* decreases in t: $bias = \frac{p}{u_g(g,z)} / \frac{W}{u_z(g,z)} = \frac{X_1 + X_2}{X_1}$. As a simple proof we utilize the

distributional functions and write $X_2 = \left(e^{-\hat{\theta}} - e^{-\tilde{\theta}}\right)^2 H'(\tilde{k})$ and writing the uniform distribution $H(\tilde{k})$ as $\tilde{k}H'(\tilde{k})$, $X_1 = e^{-\hat{\theta}} + 2\left(c_M - u(g_t, 0)\right) H'(\tilde{k}) \left(e^{-\hat{\theta}} - e^{-\tilde{\theta}}\right)^2$. As t increases, $\hat{\theta}$ and $\tilde{\theta}$ get larger and $(c_M - u(g_t, 0))$ increases. The $\left(e^{-\hat{\theta}} - e^{-\tilde{\theta}}\right)^2$ terms get small faster than $e^{-\hat{\theta}}$, so X_2 gets smaller faster than X_1. As a result, the bias ratio moves towards 1. ■

Supplemental Tables

Table 4 replicates the analyses in the main text looking at alternative measures of public goods provisions. The first column replicates the Public Goods result in the main text. Columns 2-4 examine Health, Education, and National Defense Spending as a proportion of GDP using data from World Bank (2022*a*). Winning coalition size is associated with more public goods spending and transparency; however the significance is below standard levels. The negative coefficient estimates on Log(Tenure) indicate that as tenure increases leaders move in the direction of less spending on these policies, but again these results are insignificant.

Table 4: Effects of Tenure on Public Goods Measures

	Public Goods (1)	Health Spending (2)	Educ Spending (3)	Defense Spending (4)
Log(Tenure)	-0.011***	-0.030	-0.015	-0.068
	(0.003)	(0.061)	(0.051)	(0.058)
W_{t-1}	0.215***	1.47	0.031	0.119
	(0.035)	(0.956)	(0.460)	(0.686)
Log(GDPpc$_{t-1}$)	0.024*	-0.916**	0.446*	-0.476
	(0.013)	(0.375)	(0.236)	(0.310)
Log(Population$_{t-1}$)	-0.018	-1.68***	-0.007	-1.38**
	(0.024)	(0.556)	(0.452)	(0.635)
Growth	0.0005**	-0.025***	-0.023***	-0.020***
	(0.0002)	(0.008)	(0.007)	(0.007)
Resource Rents	-0.001**	-0.020**	0.007	0.013
	(0.0005)	(0.008)	(0.013)	(0.012)
Observations	6,929	3,324	4,004	5,886
R^2	0.925	0.885	0.645	0.747
Within R^2	0.182	0.046	0.017	0.029
Country fixed effects	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓

Standard errors clustered by country

Table 5: Effects of Tenure on Equity × Spending Measures

	Health Spending × Public (1)	Educ Spending × Public (2)	Defense Spending × Public (3)
Log(Tenure)	-0.043	-0.023	-0.063**
	(0.034)	(0.035)	(0.030)
W_{t-1}	1.54***	0.751*	0.636*
	(0.516)	(0.388)	(0.366)
Log(GDPpc_{t-1})	-0.857***	0.303*	-0.159
	(0.250)	(0.169)	(0.168)
Log(Population_{t-1})	-1.59***	-0.151	-0.442
	(0.422)	(0.357)	(0.357)
Growth	-0.018***	-0.016***	-0.007
	(0.005)	(0.005)	(0.004)
Resource Rents	-0.015**	0.001	0.003
	(0.006)	(0.008)	(0.006)
Observations	3,324	4,003	5,879
R^2	0.946	0.804	0.783
Within R^2	0.076	0.026	0.022
Country fixed effects	✓	✓	✓
Year fixed effects	✓	✓	✓

Standard errors clustered by country
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	Total Rewards	Public Goods	$\frac{\text{Private}}{\text{Private + Public}}$
	(1)	(2)	(3)
Log(Tenure)	-0.019***	-0.011***	0.008***
	(0.006)	(0.003)	(0.002)
W_{t-1}	0.834***	0.215***	-0.101***
	(0.076)	(0.035)	(0.024)
Log(GDPpc_{t-1})	-0.001	0.023*	-0.021**
	(0.021)	(0.013)	(0.008)
Log(Population_{t-1})	-0.043	-0.019	0.025
	(0.036)	(0.024)	(0.017)
Leader Growth	-0.0003	0.0002	-0.0003
	(0.002)	(0.0007)	(0.0004)
Resource Rents	-0.001	-0.001**	0.0009***
	(0.0010)	(0.0005)	(0.0003)
Observations	6,929	6,929	6,929
R^2	0.860	0.925	0.941
Within R^2	0.349	0.180	0.124
Country fixed effects	✓	✓	✓
Year fixed effects	✓	✓	✓

Standard errors clustered by country
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Alternative Explanations: Leader Growth (Competence)