Policy Decay and Political Competition*

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Abstract

Modern political systems exist not in a vacuum but in a world of continuous technological, social, and economic change. This change means policies designed for today's world will fit only imperfectly tomorrow, a phenomenon we refer to as *policy decay*. In principle, policymakers could legislate to remove decay and restore the status quo. In practice, however, the need for "something to be done" creates opportunities for the majority party to leverage their proposal power and for the minority party to obstruct. We show that these incentives fundamentally change the logic of political competition and legislative policy making. Decay induces frequent policy change, in contrast to the notion of legislative gridlock. Legislative agreements do not always imply the majority party benefits, however, in contrast to the standard logic of agenda-setting power. We show that the value of proposal power is weakened by political competition and, at times, reversed, what we refer to as *negative leverage*. Moreover, competition causes decay to persist and accumulate in equilibrium, leading to inefficiently frequent turnovers in political power.

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1 Introduction

Change is a constant of our economic and social environment. As time passes, populations grow, age, and evolve. Social networks form and fray. New technologies are developed, and economies evolve in structure and scope.

Policymaking is not immune from this reality. As the world changes, so too do the consequences of government policy. A policy written for today will not fit as well tomorrow, and as the fit of policy worsens, so too does the quality of outcomes it produces. Copyright laws written in the 20th century, for example, are ill-suited to govern the use of copyrighted material to train large language models; antitrust laws designed to limit the growth of 19th century trusts have been ineffectual in reining in modern tech giants. We refer to this process as *policy decay*. Policy decay is akin to entropy in physical systems. It is inevitable and inexorable, and, left unchecked, generates growing inefficiency.

Nevertheless, policy decay on its own need not pose a threat. By passing new legislation, policymakers can counter the effects of decay and restore efficiency in policy implementation.[1] That they can do this does not mean that they will do it. Decay occurs in a strategic environment, and the very fact that new legislation must be passed presents policymakers with an opportunity to exploit decay for their own advantage.

This opportunity is most evident when decay is large. By imposing pain on policymakers, decay creates a threat-point that an agenda setter can *leverage* for her own benefit. This incentive was famously captured by Rahm Emanuel, then White House chief of staff, when he quipped: " You never let a serious crisis go to waste. And what I mean by that [is] it's an opportunity to do things you think you could not do before."[2] By threatening to leave decay in place — by not updating legislation — the agenda setter can extract policy concessions that, as Emanuel acknowledges, wouldn't otherwise be possible.

The opportunity created by decay is, however, not one-sided. Decay imposes pain on voters as well as policymakers, and if voters respond to this pain — as it is well-documented that they do — by punishing the majority party for not doing something about it, then an opposition can benefit by obstructing efforts to remove decay. Rahm Emanuel's pleasure in crisis was, in fact, a reaction to obstruction of this sort. John Boehner, Speaker of the House, described his approach to Obama's legislative agenda as follows: "We're going to do everything — and I mean everything — to kill it, stop it, slow it down, whatever we can."[3]

[1] Our notion of efficiency is the best-known, rather than best-possible, implementation of a given policy, and thus can accommodate the possibility that policymakers may not have complete knowledge of the mapping between implementation choices and outcomes.

[2] Interview with the *Wall Street Journal*, November 19, 2008. https://www.youtube.com/watch?v=_mzcbXi1Tkk

[3] Interview with Sean Hannity, October 28, 2010. https://www.politico.com/story/2010/10/

Mitch McConnell, the Republican leader in the Senate, made clear the electoral and policy logic behind this approach when he boasted, "The single most important thing we want to achieve is for President Obama to be a one term president,"[4] later adding that "One of my proudest moments was when I looked Barack Obama in the eye and I said, 'Mr. President, you will not fill the Supreme Court vacancy.' "[5]

The dual incentives of leverage and obstruction work in opposing directions, and the interaction between them give rise to a rich dynamic and a set of subtle strategic choices. How should the agenda setter leverage decay? When should the opposition obstruct? What do these choices imply for political behavior and policy outcomes?

The answers to these questions are not straightforward. One possible strategy for the agenda-setter is to let decay accumulate, exploiting it only when it grows large through one big legislative push. This strategy was, in fact, endorsed by President Trump, arguing via tweet: "As I have always said, *let ObamaCare fail* and then come together and do a great healthcare plan. Stay tuned!"[6] By allowing decay to accumulate, this logic goes, the ever-greater need for "something to be done" will deliver greater leverage to Trump to shape healthcare policy in his favor.

The soundness of this logic is unclear, however, when we consider the opposition's incentives for deliberate obstruction. Should the Democrats obstruct Trump, the need for something-to-be-done will remain and, indeed, grow. If obstruction delivers agenda setting power to the Democrats, then Trump's strategy could be used against him.

What, then, are the optimal legislative strategies? The answer to this question is crucial to understanding legislative behavior in an evolving world. In this paper, we develop a novel model of policymaking to find an answer, and we explore what it means for policy outcomes, political transitions, and the life and death of governments.

A Modeling Approach

To capture these ideas formally, we build upon the canonical "setter" model of Romer and Rosenthal (1978) in which one policymaker is endowed with agenda setting power and proposes a take-it-or-leave-it offer to a second policymaker. To this structure, we add two elements.

First, we add the possibility of policy decay. Decay arrives exogenously and stochastically

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[4]Interview in the National Journal, October 23, 2010. https://www.washingtonpost.com/news/fact-checker/wp/2017/01/11/when-did-mitch-mcconnell-say-he-wanted-to-make-obama-a-one-term-president/

[5]Speech to supporters in Kentucky, August 2016. https://www.npr.org/2018/06/29/624467256/what-happened-with-merrick-garland-in-2016-and-why-it-matters-now. Lest there be any doubt of the intent of this strategy, Mitch McConnell titled his 2016 memoirs, "The Long Game."

[6]https://twitter.com/realDonaldTrump/status/887280380423938048

in each period. Decay can be large, small, or even zero, and regardless of size, decay lowers the quality of the policy that is in place. Unless actively removed by new legislation, decay remains in place and accumulates over time. Formally, this requires that we add an efficiency dimension to the traditional ideological dimension of policy in the setter model and that we extend the model dynamically over time.

A second novelty is our modeling of obstruction and political transitions. Although a common tactic in practice (Wawro and Schickler, 2007, 2010), electorally-oriented obstruction of the sort we describe does not appear in formal models of policymaking.[7]

We represent obstruction in the literal sense of rejecting or blocking a policy proposal, and reward the obstructor with improved electoral prospects. To focus on the electoral rewards of obstruction, we analyze the limit case in which the failure to remove decay leads with certainty to the transition of power, implying that obstruction is maximally effective and, conversely, that political power is maximally fragile.

Overview of Results

The inclusion of decay has a stark effect on policymaking. A classic concept in legislative policymaking is that of the gridlock interval, that once a policy enters between the ideal points of the legislative pivots, policy is unchangeable. With decay, this no longer is the case. Even when policy is within the classic gridlock interval, decay greases the wheels for action and creates a common interest for its removal. As a result, decay renders policymaking more fluid and dynamic than traditional accounts of gridlock would suggest.

A second classic concept of legislative policymaking is that of proposal power: the ability of the policymaker with agenda setting power to shape policy in her favor, pulling policy toward her own ideal point. That decay creates a need for "something to be done" does deliver leverage to the agenda setter, even when, as just noted, policy would otherwise succumb to gridlock. We show, however, that political competition limits that leverage.

In fact, we show that the agenda setter's power is so constrained that in many situations that it is reversed. For relatively small decay, the agenda setter has *negative leverage*. Not only is she unable to pull policy toward her own ideal, but rather she proposes a policy closer to her opponent's ideal. Negative leverage runs counter to the standard logic of agenda-setting power and casts a new light on the day-to-day logic of political bargaining, suggesting that, in fact, it is the nominally weaker party that often benefits from policy compromise.

[7] The closest connection is Jeon and Hwang (2022) that endogenizes voter weights and recognition probabilities in a dynamic model of divide-the-dollar bargaining. Their model does not have decay and their focus is very different to ours (on the emergence of oligarchies).

The power of this logic implies its own limit, however. If the agenda-setter were always burdened with negative leverage then holding political power would itself have negative value, and the agenda-setter could simply sabotage his own hold on power and switch to be the opposition. To be effective, therefore, obstruction can only be used judiciously, and to such a limited extent that holding power remains, on net, a positive.

The competing forces of leverage and obstruction require a delicate balance to obtain in equilibrium and we show how this balance depends on both the ideological location of policy and the amount of decay that has accumulated. A key part of our result is to show that the benefit of leverage grows faster than that of obstruction as decay increases. This implies that obstruction has the upper-hand only when decay is small, and it is in this case that the threat to obstruct causes the agenda-setter's leverage to turn negative.

The balance between these incentives gives rise to a rich policy dynamic in which policy flows back and forth across the policy space depending on the size of decay that occurs. For small decay the agenda-setter compromises, conceding ideological ground to the opposition, whereas for large decay she applies her leverage to extract policy concessions of her own. These movements are asymmetric such that the trajectory of policy is marked predominantly by small concessions by the agenda-setter interspersed with large leaps of policy in the opposite direction toward the agenda-setter's ideal point. On net, these larger jumps dominate the small concessions, and the average movement of policy is toward the agenda setter's ideal point, representing the net benefit of holding political power.

This delicate balance between leverage and obstruction represents bargaining success. The policymakers are able to balance their respective powers and come to a deal that satisfies both. Remarkably, this implies that despite power being maximally fragile—a single obstruction can fell a government—political power is nevertheless persistent and can last for arbitrarily long periods of time. Nevertheless, we show that the efficiency of legislative bargaining has its limits, and that obstruction emerges as an equilibrium action and is not merely an off-path threat. When obstruction occurs, the government falls and power transitions.

Transitions of power in our model represent a failure in bargaining. The logic for why power transitions derives from the the logic of negative leverage. When decay is small, the proposer concedes ideologically on policy as doing so allows it to retain power. This requires, however, that the proposer *can* concede on ideology. When policy is already close to the opposition's ideal policy, the scope for concession is limited. In this case, the opposition may reject a proposal—even if the proposal is its own ideal point—as doing so induces a transition of power, delivering the benefit of agenda-setting to the opposition. This represents a novel reason for bargaining failure, both within politics and in other settings in economics. The failure is due to the dual features of political bargaining—that power cannot be easily shared and that policy itself is a bargaining chip. This reinforces how political bargaining is different from bargaining in other contexts.

The possibility for power to transition speaks to long-standing questions on the life and death of governments, why they persist, why they fall, and why they last as long as they do. We show that governments fall not when there are few remaining policy gains to be had—when they are 'out of ideas,' so to speak—but rather in the opposite situation when governments are weak on policy and potential policy gains are at their greatest. We report numerical results on these properties, showing that the hazard rate of a government falling decreases the more successful it has been in drawing policy toward its own ideal point.

Policy Decay and Political Competition in Practice

Putting the pieces together, our model presents a new perspective on policymaking and legislative behavior. In our account, decay is central to politics, providing a constant fuel for strategic behavior and legislative action. This contrasts sharply with the traditional view of gridlock and inaction in legislative policymaking. In our telling, policymaking is inherently dynamic, tumultuous, and, at times, inefficient. Decay is not merely noise that washes out, but rather it is the driving force around which politics rotates. This account resonates more closely with the practice of politics than do traditional accounts. Despite the ironclad logic of gridlock, legislatures do enact new policies, and they do so frequently and repeatedly. Rather than being frozen by gridlock, each US Congress passes dozens of laws, including many that are substantive and significant. This legislative flow must address some need. Our contention is that that need is policy decay, and that the demand "for something to be done" in response to decay is what drives much of everyday political conflict.

The model we develop represents the strategic interaction of policymakers in reduced form, stripping away much of the institutional structure to focus on two specific forces, namely decay and competition. This abstraction has the benefit of broad applicability. Our model applies with equal effect to bargaining in a presidential system as it does to bargaining in a parliamentary system. In the US system, the most natural interpretation is bargaining within Congress between the majority party and the out-party that controls the filibuster pivot and whose support must be gained for passage of legislation. Another natural interpretation is of a president negotiating with an opposition in Congress. Our model also applies to bargaining in parliamentary democracies. Viewed through this lens, the transition rule for who holds proposal power captures cleanly the vote-of-confidence procedure commonly used that can cause a government to fall. None of these applications fit perfectly, of course. Our aim is the more modest one of capturing an underlying strategic tension that resonates in a variety of policymaking contexts.

Related Literature

The literature on legislative policymaking is large and diverse. The setter model has been extended and applied broadly to a variety of contexts. Our work is distinguished from this literature in the inclusion and treatment of decay. The notion of decay first appeared in Callander and Martin (2017) for a much simpler policymaking environment. In that paper, agenda setting power is fixed with one of the policymakers and transitions of political power are not possible. This limits the strategic options or political competition. It precludes the possibility of political turnover, undermining the possibility of meaningful obstruction. Allowing for obstruction and political turnover enriches the policy dynamic and changes considerably political behavior and policy outcomes. The simple possibility for political turnover gives rise to negative leverage and preemptive policy compromise, a non-monotonic policy trajectory that lacks a steady-state, the emergence of obstruction as an equilibrium phenomenon, and insight into the life and death of political power.[8]

An emerging strand of the literature on bargaining with an endogenous status quo does allow for exogenous changes to policy, although in the existing literature the change is conceived of as shocks that shift policy to the left or to the right in a standard ideological policy space (see, for instance, Callander and Krehbiel (2014), Dziuda and Loeper (2016), Buisseret and Bernhardt (2017), and Chen and Eraslan (2017)). Horizontal ideological shocks like this—what Callander and Krehbiel (2014) refer to as policy *drift*—differ substantively from the quality impact of decay in our model. In particular, horizontal shocks do not change the fundamental logic of gridlock. In those papers, legislative action can only occur when shocks are big enough to move policy outside the classic gridlock interval, and, typically, the bigger the shock the greater the shift of policy back inside the gridlock interval such that further change is even less likely to occur.

The structure of parliamentary democracies has given rise to a large literature on transitions of political power and the life and death of governments. This largely empirical literature has sought to identify variables that explain government dynamics and outcomes. In a pathbreaking set of papers, Dewan and Myatt (2010, 2012) provide a formal understanding of the mechanics behind the dynamics and unearthed new insights. This literature, both empirical and theoretical, has focused on characteristics of the government itself; for instance, the time in office, the number of scandals and ministerial dismissals, etc. To this list we add the role of policy. In our model, governments fall from the cut of too many

[8]Independently, Parihar (2023) extends Callander and Martin (2017) with an alternative transition rule, a different conception of decay, and in which policymakers operate with limited foresight.

policy concessions. There is only so much policy a government can concede, and when a government is out of policy to concede, its proposals go nowhere and it falls. This possibility resonates with the popular notion that a government falls when it is "out of ideas" —there is simply no legislation that can be written to win legislative support—yet, in our telling, this failure is more likely to occur when a government has achieved very little than when it has achieved all of its policy aims.

2 The Model

In each period $t = 1, 2, 3, ...$, two policymakers, L (him) and R (her), bargain over policy. The policy space is two-dimensional. The first dimension is the standard left-right ideological continuum represented by the real line, $\mathbb{R}$. The second dimension captures the quality of policy. Each policy has a maximum quality that we set to be zero and quality is unbounded below. Thus, the policy space is $\mathbb{R} \times \mathbb{R}^-$, as depicted in Figure 1.

Policymakers have a common preference over quality but differ in their ideological preferences. In the ideological space, L's ideal point is 0 and R's is π, such that their ideal policy positions in the two-dimensional space are $(0, 0)$ and $(\pi, 0)$, respectively. We assume that per-period utility is separable across dimensions, linear in quality, and quasiconcave in ideology. A common functional form that satisfies these requirements is quadratic-loss utility over policy, as given in Equation 1 for policy (x_t, q_t).

$$u_L\left(x_t, q_t\right) = -\alpha_L x_t^2 + q_t, \quad \text{and} \quad u_R\left(x_t, q_t\right) = -\alpha_R\left(x_t - \pi\right)^2 + q_t \ . \tag{1}$$

Policymakers discount utility over time at common rate $\delta \in (0, 1)$ and, thus, total utility is given by $\sum_t \delta^t u_L(x_t, q_t)$ and $\sum_t \delta^t u_R(x_t, q_t)$, respectively.

Decay is an exogenous force that arrives each period in amount λ_t, where λ_t is drawn independently from an exponential distribution F_λ with rate parameter r and support $[0, \infty)$.[9] If not removed, decay lowers the quality of policy by λ_t, such that policy (x_t, q_t) decays to $(x_t, q_t - \lambda_t)$.

At the beginning of each period, a status quo policy is in place, denoted by (x_t, q_t), and one of the policymakers is designated to be the Proposer, $P_t \in \{R, L\}$, and the other policymaker is the opposition, or what we will refer to as the Receiver. The policy formation process in each period is as follows.

[9] The exponential assumption simplifies the analysis, but the key properties of F_λ are finite expectation, strict monotonicity, and $F_\lambda\left(\frac{\delta}{1-\delta}\max[\alpha_R, \alpha_L]\pi^2\right) < 1$, which requires that the support of F is sufficiently broad in a sense that will become clear later. In the Appendix we show that the equilibrium characterization is very similar if we replace the exponential with a lognormal or uniform distribution with the same mean.

Figure 1: The policy space, and ideal points of the policymakers.

Timing of Policymaking at Each t:

1. Decay λ_t is realized and observed by both policymakers (but not yet experienced).

2. The Proposer may make a proposal $(x_P, 0)$.

3. The Receiver accepts $(x_P, 0)$, which becomes the new status quo, or rejects the proposal, in which case the previous status quo remains and decays to $(x_t, q_t - \lambda_t)$.

4. Utility is realized.

5. Agenda setting power transitions if, and only if, the new status quo quality $q_{t+1} < 0$.

Without loss of generality we set R to be the Proposer for the first period. We further suppose that at the beginning of play the status quo is efficient with maximum quality and ideological location between the policymakers' ideal points; thus, $x_1 \in [0, \pi]$ and $q_1 = 0$. The assumption that decay can be removed before rather than after utility is realized is made solely for pedagogic transparency and analytic simplicity; the assumption carries no substantive importance.

The assumption that proposals must be at the frontier — that is, that they have the form $(x_P, 0)$ — ensures existence of an optimal proposal for any status quo, which is not guaranteed otherwise (a consequence of the discontinuity of the transition rule at $q = 0$). Substantively, this assumption implies policymakers have a binary choice on the quality dimension: fix the accumulated decay, or leave it in place. We think this assumption is substantively close to the real-world situation, and technically leaves sufficient flexibility to still capture interesting strategic dynamics.

This assumption does not mean that decay is never experienced. Rather, it means that when decay does appear it emerges from nature and persists because of a failure of policymaking. A motivation for our work is to understand how decay caused by a changing world feeds into policymaking. To focus on this interaction, we set aside the possibility for strategic policymakers to induce decay deliberately.[10]

An observation on the model: The formulation of our model is intended to lay bare the impact of decay. Without decay, strategic behavior mirrors the classic logic of gridlock. Specifically, the classic gridlock interval is the interval between the ideal points of the policymakers $[0, \pi]$ that lies on the efficient frontier (in which quality is maximized at zero). Our assumption that the status quo policy initially lies within this interval implies that, in the absence of decay, the equilibrium would be trivial and immediate: nothing happens. Any legislative activity that emerges with the addition of decay is attributable, therefore, to decay itself.

We also suppose that policymakers can change policy costlessly and immediately. We abstract, therefore, from informational and technical constraints that, in practice, might hinder the ability of policymakers to remove decay. This focuses attention on the interaction of decay and legislative bargaining and implies, consequently, that any persistence of decay in equilibrium necessarily reflects political rather than technical failure.

3 Equilibrium

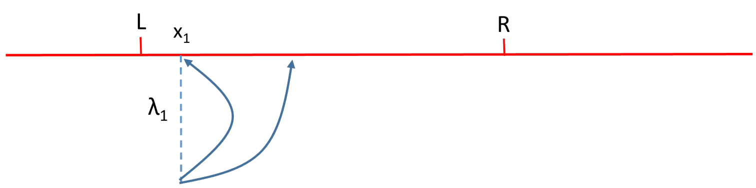


Figure 2: The Leverage from Decay.

The strategic opportunities that policy decay gives rise to are most clearly seen visually. Consider the situation in Figure 2 in which the status quo, x_1, is to decay by amount λ_1 and policymaking is for a single period. Removing decay and returning policy to the status quo would benefit both policymakers, and should R propose this, her offer would surely be accepted by L. The opportunity of decay is that the proposer needn't share all of the surplus with her opponent. Her control of the agenda means that she can leverage decay—specifically, the removal of decay—to extract policy concessions and move policy toward her own ideal point, as shown by the second arrow. The Receiver, L, accepts this proposal as long as he is left no worse off than rejecting the proposal and living with the decay. In this

[10]The interaction of deliberate inefficiency with decay is, nevertheless, an interesting open question although beyond the scope of the present paper.

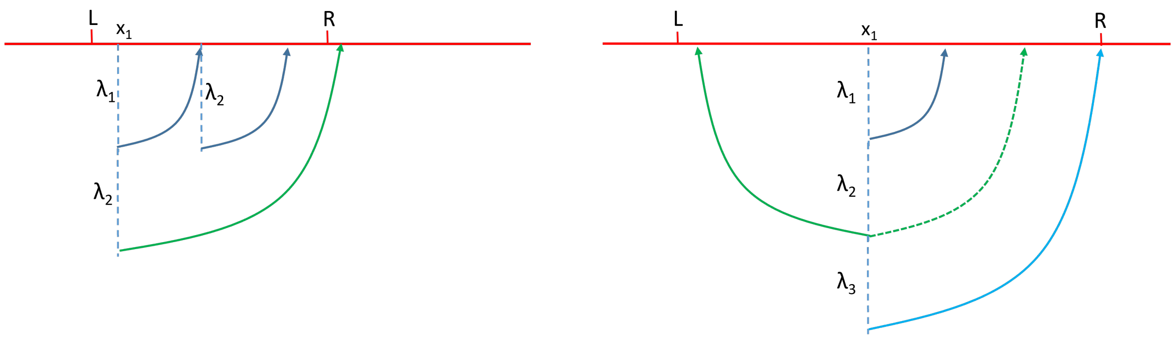


Figure 3: Strategic Possibilities of Decay: the timing of leverage (left) and reversing leverage (right)

way decay generates legislative action and ideological movement of policy even within the classic gridlock interval.

If decay were a one-off event this would be the extent of the analysis. As time continues, and decay continues to emerge, this opportunity recurs over and over again. This recurrence leads to the additional strategic consideration of *when* the proposal should leverage decay. Should she do it immediately, as given by the smaller arrows in the left panel of Figure 3, or should she let it accumulate and swing for one large jump in policy, as in the larger arrow in the figure?

Complicating the strategic possibilities even more is the possibility that L will obstruct, leading power to potentially transition. This is depicted in the right panel of Figure 3. If decay is not removed in the first period, leverage increases in the second period with the arrival of more decay, yet power transitions as a result and this increased leverage now accumulates to L, who can use it to move policy toward his own ideal point to the left. Of course, this is not the end of the analysis as, once out of power, R can turn around and obstruct L's agenda, and return triumphantly to power in the third period with even more leverage, and so on *ad infinitum*.

How does this process end? Does the opposition gain the upper hand through the threat of obstruction? Or does the Proposer retain leverage? Is policymaking efficient or does decay persist on the equilibrium path? In the following sections we work through the strategic possibilities and build progressively to answers to these questions. We begin with the benchmark case in which power is fixed throughout with R and power cannot transition.

3.1 Benchmark: No Transitions of Power

Without the worry of losing power, the Proposer's choice reduces to whether to leverage decay today or let it accumulate until tomorrow and, when she does use her leverage, the

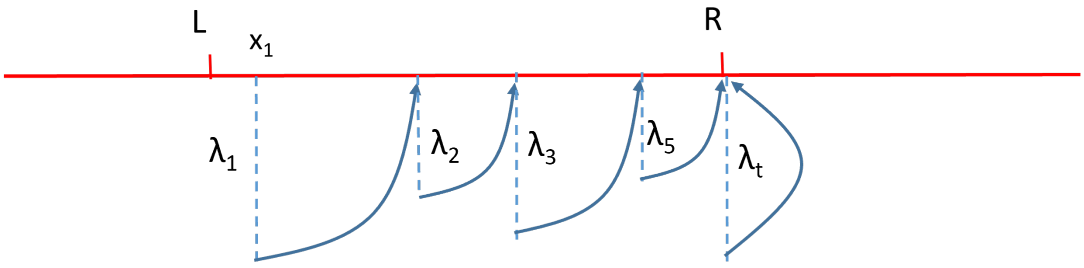


Figure 4: Equilibrium Path of Policy Without Transitions of Power.

policy concessions to extract. Proposition 1 characterizes the equilibrium for this case.[11]

Proposition 1. *Fix R as the Proposer in every period. In the unique subgame perfect equilibrium, R offers a proposal in each period, and L accepts, where the proposal is:*

$$x_t^* = \min\left(\sqrt{x_{t-1}^2 + \frac{\lambda_{t-1}}{\alpha_L}}, \pi\right) \text{ and } q_t^* = 0.$$

Policymaking in this setting exhibits a "no delay" property. In every period the policymakers strike a deal to return to the efficient frontier, regardless of the amount of decay or the location of the status quo. Thus, decay is never experienced on the equilibrium path as it is removed as soon as it appears.

The legislative deal that is struck always favors the proposer, R. The proposer's leverage means that policy is always pulled toward her ideal point and the policy dynamic exhibits a monotonicity, as depicted in Figure 4. Ultimately, policy reaches R's ideal point, and with no more benefit to extract, R simply proposes her ideal point each time decay appears. In effect, therefore, and despite constant legislative updating, policy stabilizes at a single point.

Although obstruction never occurs on the equilibrium path, it nevertheless plays an important role in the equilibrium. If R attempts to move policy too fast to the right, L can reject the proposal and keep the status quo, albeit with decay. Thus, the threat of obstruction constrains R's leverage, although only to a limited degree as policy inevitably converges on R's ideal point.

In a similar vein, the option to let decay accumulate, while not played in equilibrium, also affects the size of R's leverage. If the pain of large decay is so high that R's leverage is enhanced tomorrow, then the threat of letting decay accumulate is sufficient to increase R's leverage today, allowing her to extract more policy concessions than a myopic evaluation of today's decay may suggest. This threat is not only one-sided, however, as if the pain of future decay is actually lower, L's threat to reject today's proposal and let decay accumulate

[11] This case is that analyzed in Callander and Martin (2017). See that paper for further details.

will lower R's leverage today.

The speed at which policy moves across the policy space in equilibrium depends on all of these factors. The faster that decay arrives, the more leverage the proposer obtains and the faster policy moves. However, the rate at which that decay translates into policy movement depends upon the global utility functions of policymakers and not simply their disutility from today's decay.

The remarkable feature of the equilibrium, given all of these considerations, is that a legislative deal can always be struck such that policy remains on the efficient frontier. This efficiency is, however, only in a static sense. For policymakers with concave utility (such as the canonical quadratic loss utility in Equation 1), the stuttered progressive path of policy in equilibrium is dynamically inefficient. Policymakers would be better off if policy could be fixed at some intermediate point and remain there regardless of decay. The problem for policymakers is that such a deal cannot be struck. As soon as L agreed to the compromise, R would resume leveraging policy toward her own ideal point. Anticipating this, L refuses to concede on policy initially. The reason for this policy failure is a lack of commitment power. Without the ability to commit over time, the deal necessary to obtain dynamic efficiency is not time consistent.[12] This implies a striking distinction between the short and long term efficiency of legislative bargaining in this setting. Within period, the policymaking process provides sufficient flexibility to always obtain efficiency, but long term, decay and the inability to commit ensure that dynamic inefficiency is inevitable.[13]

Policymaking in this benchmark setting is simple and intuitive. Four properties stand out:

Benchmark Properties:

- **#1:** The proposer's leverage is always positive.
- **#2:** Policy remains on the efficient frontier.
- **#3:** Policy ultimately stabilizes at a single point.
- **#4:** Policy is dynamically inefficient.

Although intuitive, we will see that three of these properties fail, and the fourth is attenuated, once power transitions are allowed. The four properties, thus, are not constants of legislative bargaining, but rather implications of fixed agenda control. We turn to the analysis of the full model now.

[12] Equilibrium uniqueness is ensured by the fact that should decay grow too large, L strictly prefers R's ideal point to leaving decay in place. This creates a bound on behavior that feeds back into behavior at the frontier and pins down equilibrium.

[13] McCarty (2004) provides an early exploration of the role of commitment or lack thereof in dynamic policymaking environments.

3.2 Obstruction and Transitions of Political Power

The core fact running through the equilibrium of the benchmark model is that the more decay that appears, the greater the leverage of the proposer. This leverage comes from the Proposer's threat to leave decay in place. That threat is still true in the general model, and if the Receiver rejects a proposal, he must live with the decay that arrives. However, this pain now brings the gain of political power, such that the Receiver becomes the Proposer, and the decay that has accumulated becomes his cudgel to threaten the original Proposer.

This creates a trade-off for the Receiver: Accept the disutility of decay today and gain political power tomorrow, or accept what the proposer offers. Central to equilibrium behavior, therefore, is how the relative costs and benefits of these choices compare as decay increases. Does the pain of decay today dominate the additional leverage gained tomorrow or vice versa? Complicating matters further is that any gain in power is potentially ephemeral as the original Proposer can turn around and obstruct when she is out of power, beginning the logic all over again.

Proposition 2—our main result—resolves the circularity of this logic. It shows that for any degree of forward looking behavior, decay now emerges on the equilibrium path and power transitions between the policymakers at some status quo policies. Moreover, for sufficiently far-sighted behavior, the Proposer's leverage disappears with positive probability, either reversing or causing her to lose power, for *any* status quo policy.

Proposition 2. *For a status quo $(x, 0)$ with $x \in (0, \pi)$, obstruction occurs and decay is experienced in equilibrium with positive probability for all $\delta > 0$ if x is sufficiently close to the Receiver's ideal point. Further, for any x, either decay occurs or the Proposer concedes on policy with positive probability when δ is sufficiently close to* 1.

An example of the equilibrium is given in Figure 5 for when R is the proposer.[14] The equilibrium is defined by thresholds. When current-period decay is large enough, the Proposer has positive leverage, and can extract policy concessions from the Receiver in exchange for avoiding decay today.

When current-period decay is small enough, however, the threat of decay is not enough to outweigh the potential gain to the Receiver from obstructing. To be accepted, the Proposer

[14] The figure obtains from a numerical solution to the model; see the following section for further exploration. The general formulation of the model does not permit a complete analytic characterization of the equilibrium regions; specifically, whether the regions are separated by a single threshold. The equilibrium structure depicted emerges in the numerical solution to the model for all parameter values that we ran, with the specific curvature of the thresholds varying in the shape of the policymakers' utility functions and the decay function.

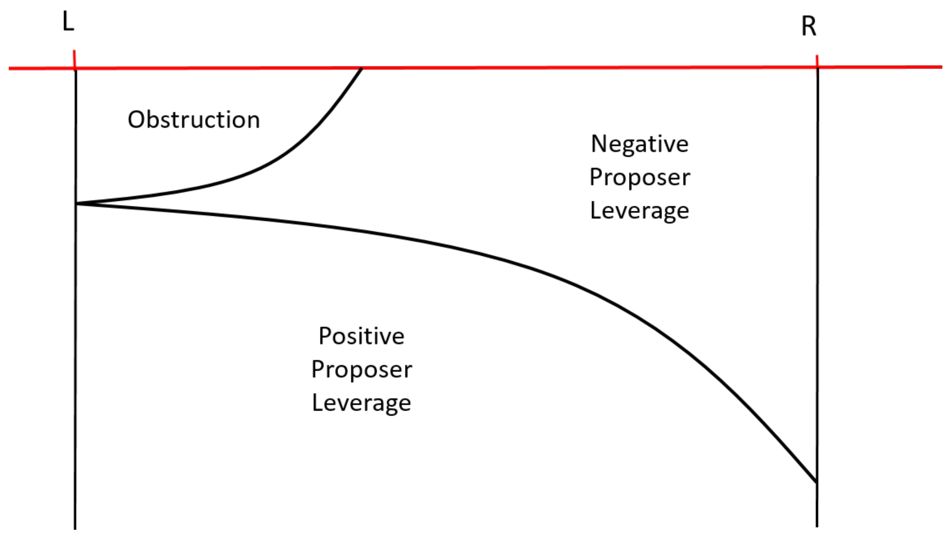


Figure 5: Equilibrium Regions when R is the Proposer.

must offer a policy that cedes ideological ground to the Receiver. Above the threshold, therefore, the Proposer's leverage is negative.

When the current status quo policy is close enough to the Receiver's ideal point in addition to decay being small, there is no offer that is attractive enough to the Receiver to induce him to accept. In this region, obstruction occurs, power transitions, and decay persists on the equilibrium path.

Observe that this behavior violates the first two properties of the benchmark model. Proposal power does not always lead to ideological gain, even when an offer is accepted by the opposition, and inefficient policy outcomes can occur. The latter property represents a bargaining failure, showing the limits of legislative dealmaking when who gets to make a proposal is itself part of bargaining.

To understand why proposal power is sometimes negative and why, even then, legislative deals can be rejected, we must understand how decay and power transitions are connected.

Negative proposer power can be understood as the price to be paid to hold onto power. By conceding on policy, the Proposer "pays" the Receiver enough in policy terms to have him accept and allow the Proposer to retain agenda-setting power. Another way to see why this is necessary is to imagine were it not true. If the Proposer always gained on policy, policy would inevitably converge on the Proposer's ideal point and remain there, as in the benchmark model. This is clearly unappealing to the Receiver. Consequently, for decay small enough, the Receiver would prefer to deviate, reject the proposal and suffer the disutility of decay, but gain power and the policy benefits that come along with it.

Equilibrium requires, therefore, that holding power not be so valuable. One way to weaken proposer power is for it to transition more frequently. Transitions are inefficient, however, as the policymakers must live with decay for one to occur. Negative proposal power is the efficient resolution to this bargaining problem. By conceding on policy, the Proposer increases the cost of obstruction (the Receiver has to reject a better policy!) and, simultaneously, lowers the benefit of holding office, such that a legislative deal is possible that ensures policy remains on the efficient frontier.

The logic of negative proposal power also implies its own limit. To be effective, the Proposer has to have ideological ground she can concede. To put it another way, the Proposer can only afford to pay the Receiver if she has the "currency" to do so. When policy is close to her own ideal point, she has lots of policy space to concede and the price is within her budget, so to speak. If, however, policy is already close to the Receiver's ideal, her policy budget is exhausted, and the Receiver will prefer to reject her proposal, live with decay, and obtain political power in the next period.

Negative proposal power is also limited in its size. To see why, note that if the Proposer were compelled to concede so much ideological ground that she would prefer to not be the Proposer, she can always sabotage her own hold on power by making an offer so unattractive that the receiver would not accept. Key to establishing the equilibrium in Proposition 2 is to show that the gains of positive leverage outweigh the losses of negative leverage, such that, on net, the value of proposal power is always positive.

The equilibrium produces a rich policy dynamic in which policy flows around the policy space, inching away from the Proposer's ideal point as she concedes ideological ground when decay is small, only to be overcome by jumps back in the opposite direction when decay is large and the Proposer has positive leverage. This flow is broken up only by the occasional obstruction that causes power to transition and the pattern of flow to reverse itself. Proposition 2 establishes that the policy flow in equilibrium has full support on the efficient frontier (i.e., across the interval between L's and R's ideal points) and it follows that policy flows repeatedly across the entire space over time, never stabilizing at a single point. (We will depict the flow of policy in the next section.)

This constant dynamic contrasts to the benchmark setting in which policy ultimately settles at the Proposer's ideal point. Thus, Benchmark Property #3 is violated. The constant flow of policy does imply, however, that Benchmark Property #4 is retained. Policymaking remains dynamically inefficient as all policymakers would be made better off if policy were fixed at a single point in the middle of the ideological space, even aside from the inefficiency of power transitions. Yet, the flow of policy in the full model attenuates the dynamic inefficiency. Surprisingly, policymaking is more efficient dynamically when it is less stable. The reason is that the flow causes policy to repeatedly crossover the center of the policy space, lowering the total ideological cost, rather than converging and settling on the ideal point of the Proposer.

To summarize, policymaking in the presence of decay *and* transitions of power upends three of the four properties of the benchmark model, and the fourth property is attenuated. We conclude by restating the properties as amended to capture the effect of power transitions on policymaking with decay.

Properties with Decay *and* Power Transitions:

- **#1:** The proposer's leverage can be positive and *negative*.
- **#2:** Policy *sometimes* departs from the efficient frontier.
- **#3:** Policy *never* stabilizes at a single point.
- **#4:** The dynamic inefficiency of policy is *attenuated*.

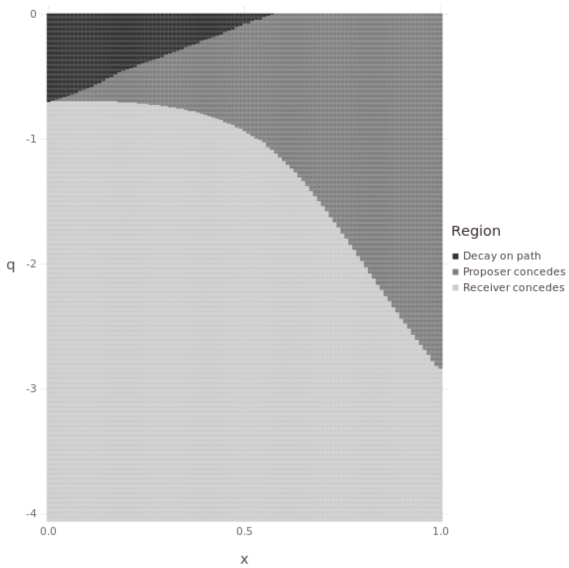
3.3 The Dynamic Flow of Policy

To dig more deeply into equilibrium behavior and understand comparative statics of the model parameters, we solve numerically for the equilibrium value functions, using a finite-grid approximation and an iterative algorithm.[15] Our baseline parameters are as follows. Utility of the policymakers is quadratic-loss as given in Equation 1, with ideal points 0 and $\pi = 1$, $\alpha_L = \alpha_R = 1$, and discount rate $\delta = 0.9$. Decay is drawn from the exponential distribution with mean 1.

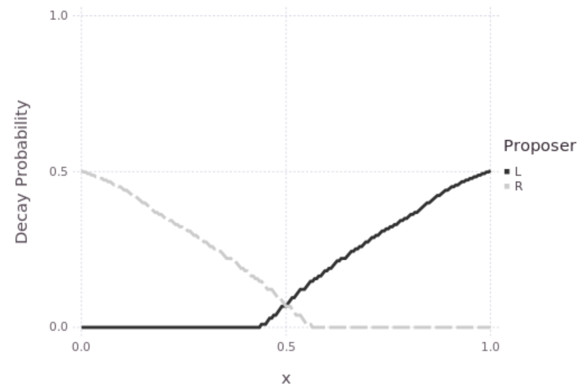
The equilibrium for this example when R is the Proposer is given in Figure 6. Panel (a) shows the equilibrium regions. Panel (b) shows the probability that decay is realized in equilibrium for each possible status quo x. This reflects the obstruction region in panel (a) (the darkest shaded area) and that more values of decay lead to obstruction for policies closer to L's ideal point (when R is the Proposer). Panel (c) shows the contours of the value function for L (top plots) and R (bottom plots) when L (left plots) or R (right plots) are in the Proposer role. These show that higher decay is valuable when a policymaker is the Proposer but costly when she is the Receiver. Panel (d) shows the slice of R's value functions along the frontier ($q = 0$), illustrating their monotonicity in x and the fact that proposal power is always valuable: $V_R(x, 0, R) > V_R(x, 0, L) \; \forall \; x$.

Obstruction. The first observation to make is that the obstruction region is not insignificant. At the boundaries of the policy space the probability of obstruction reaches 50%.

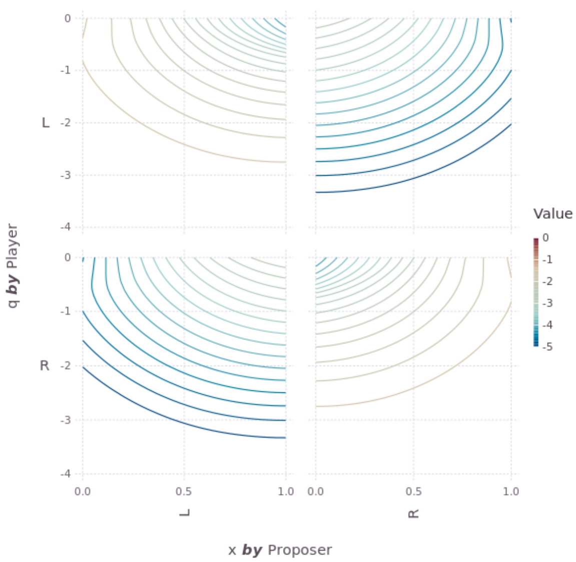
[15] Specifically, we initialize the value function on the grid, compute equilibrium proposals at each point given those values, and then update the value functions, repeating until convergence. Code that implements the value function iteration in the Julia language is available from `https://code.stanford.edu/gjmartin/policy-decay-and-political-competition`.



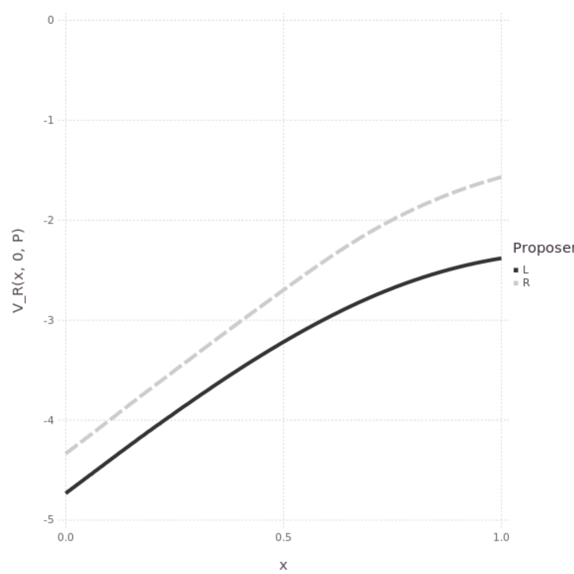
(a) Equilibrium regions.



(b) The likelihood of decay given x.



(c) Contours of V_R and V_L.



(d) V_R along the frontier ($q = 0$).

Figure 6: Numerical solution, with parameters $\alpha_L = \alpha_R = 1, \pi = 1$, $\delta = 0.9$, $E[\lambda] = 1$.

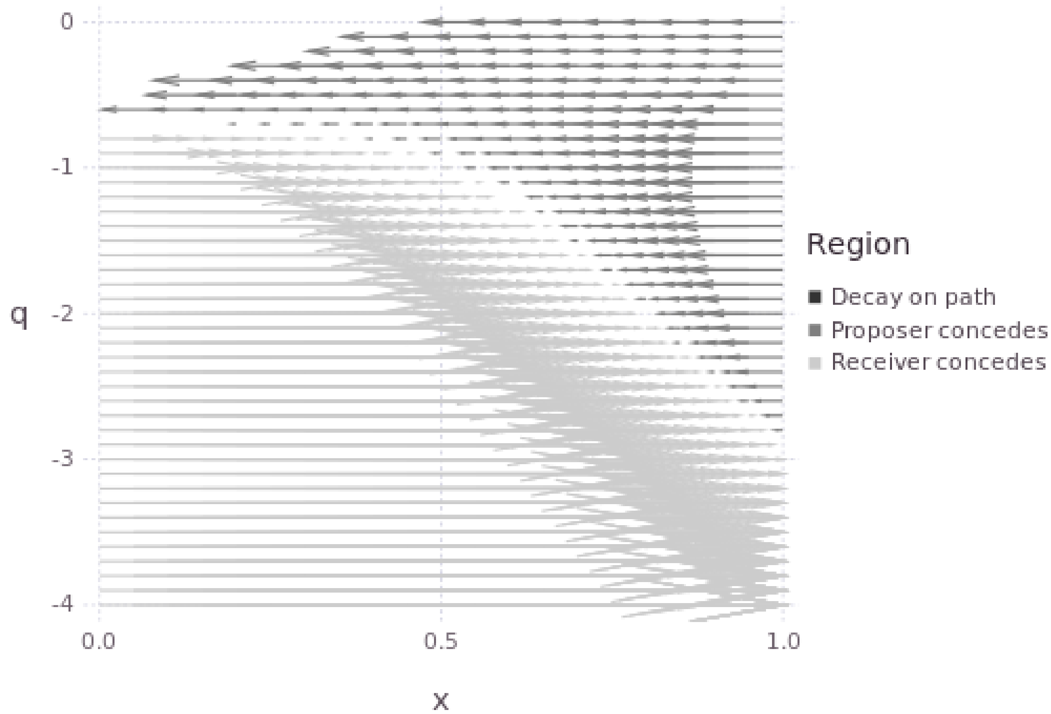


Figure 7: Policy flow when R is Proposer.

Ideologically, the obstruction region stretches past the middle of the policy space, encompassing substantial amounts of decay for many policy positions. Specifically, for our baseline parameters the obstruction region has one end at policy 0.57. Thus, even when policy is moderate, the out-party will obstruct for sufficiently small decay.

Moreover, this implies, by symmetry, that the obstruction region when L is the Proposer overlaps this region, and thus transitions of power can occur in consecutive periods when policy is moderate and decay is small in both periods. This region of overlap is evident in Figure 6b.[16]

Policy Flow. The likelihood of decay, and whether it occurs with more frequency at moderate or extreme policies, depends on the flow of policy and which policy positions are more likely to occur in equilibrium. To understand transitions of power, therefore, we must understand the flow of policy within the space. The policy flow in equilibrium is depicted in Figure 7, with the size and direction of the arrows representing the direction of policy movement when R is the Proposer. The area with no arrows is the obstruction region, where L rejects R's proposal, decay persists, and power transitions.

[16]We compute this by evaluating the probability that the realization of decay in a given period is small enough to stay inside the obstruction region for each x.

The asymmetry of policy movements is evident. The movement of policy is marked by small, incremental concessions by the Proposer (dark arrows) combined with large, dramatic policy jumps back toward the Proposer's ideal point (light arrows). As can be seen, the Proposer's leverage is significant at levels of decay only slightly beyond the boundary separating the Proposer-conceding and Receiver-conceding regions. However, this leverage accrues to the Proposer only occasionally.

In contrast, the likelihood that the Proposer concedes on policy can be substantial. Indeed, at the right-most boundary (in line with R's ideal policy), the probability that the Proposer's leverage is negative and he concedes on policy exceeds 94%![17] Legislative bargaining is better understood, therefore, as a series of concessions by the Proposer, interrupted occasionally by larger gains in the opposite direction. Hence, taking a slice of everyday policymaking will be misleading to an outside observer as the party that benefits is very likely to in fact be the weaker of the parties.

3.4 The Distribution of Policy Outcomes

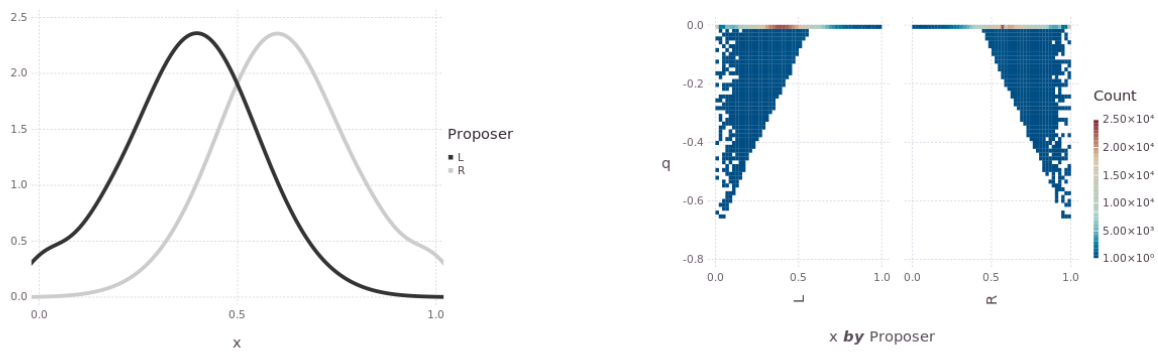
Figure 7 implies that all points on the x axis, and at least some below it, will be visited in equilibrium. That the Proposer is more likely to concede on policy the closer policy is to her ideal implies a moderating effect on policy in equilibrium. When policy is close to the Proposer's ideal, the Proposer is very likely to concede ideologically. Whereas when policy is close to the Receiver's ideal, The Proposer either extracts policy gains, or loses power to a new Proposer now likely to have to concede ideologically herself. Thus, policy spends relatively little time at the peripheries of the policy space.

To evaluate the distribution over policy locations that these forces induce in equilibrium, we simulated 1000 paths of 1000 periods each, randomly drawing realizations of decay and allowing both policymakers to play optimally given the solved value functions. The resulting marginal distribution over x is shown in Figure 8a, and the joint distribution over (x, q) in Figure 8b, depicting the policy positions visited in equilibrium when each policymaker is the Proposer. The distributions overlap substantially, with the great bulk of time spent at moderate policy locations.[18] This supports the conclusion that dynamic efficiency is improved when power transitions are possible.[19] What is surprising is that while this moderation comes, in part, from actual changes in political power, it emerges predominantly from the

[17] The Proposer concedes at values of λ as high as 2.83 at this point, and $F_\lambda(2.83) \approx 0.9409$ for the exponential distribution with mean 1.

[18] The bump at the boundary values is due to the fact that Proposers want to pull policy no further than their ideal points, thus generating a cluster at these locations.

[19] For sufficient patience (high δ) it is straightforward to show that total utility is higher with power transitions than in the benchmark case of fixed proposal power.



(a) Marginal distribution over x.

(b) Joint distribution over (x, q).

Figure 8: Density of Policies Visited in Equilibrium.

Proposer willingly moderating policy. Nevertheless, as noted, these concessions are limited in their ability to ensure agreement is reached, and costly decay and political transitions do occur on the equilibrium path.

Also evident in Figure 8a is that, on net, proposal power is valuable. The densities are overlapping, but imperfectly so, and each leans toward the Proposer's ideal point. Proposal power remains valuable, therefore, despite the modal outcome requiring that the Proposer concede ground on policy.

Although bargaining can fail, in the majority of periods, the policymakers do strike a deal and restore policy to the frontier. This is evident in Figure 8b from the large mass of points on the efficient frontier. This is striking, as power is maximally fragile in our model. All it takes for power to transition is for a single proposal to fail. Despite this fragility, power transitions only occasionally. This does not imply, of course, that transitions are not important at all times. Rather, it shows that the threat of obstruction is sufficient in most situations for the opposition to extract the benefit, and so obstruction needs to be carried out only infrequently.

The Life and Death of Governments. Figure 8b shows that conditional on the policy, a transition is more likely to occur at an extreme policy than at one that is moderate. This does not imply, however, that transitions are more likely to be observed at extreme policies. In fact, the opposite is true and transitions occur more frequently at more moderate policies. This is because moderate policies are more likely to be observed, thus more transitions happen at moderate policies despite the lower probability of one happening in any single period.

Regardless of where policy is when power transitions—when a new government is formed—the probability the government survives is decreasing the further policy is from the govern-

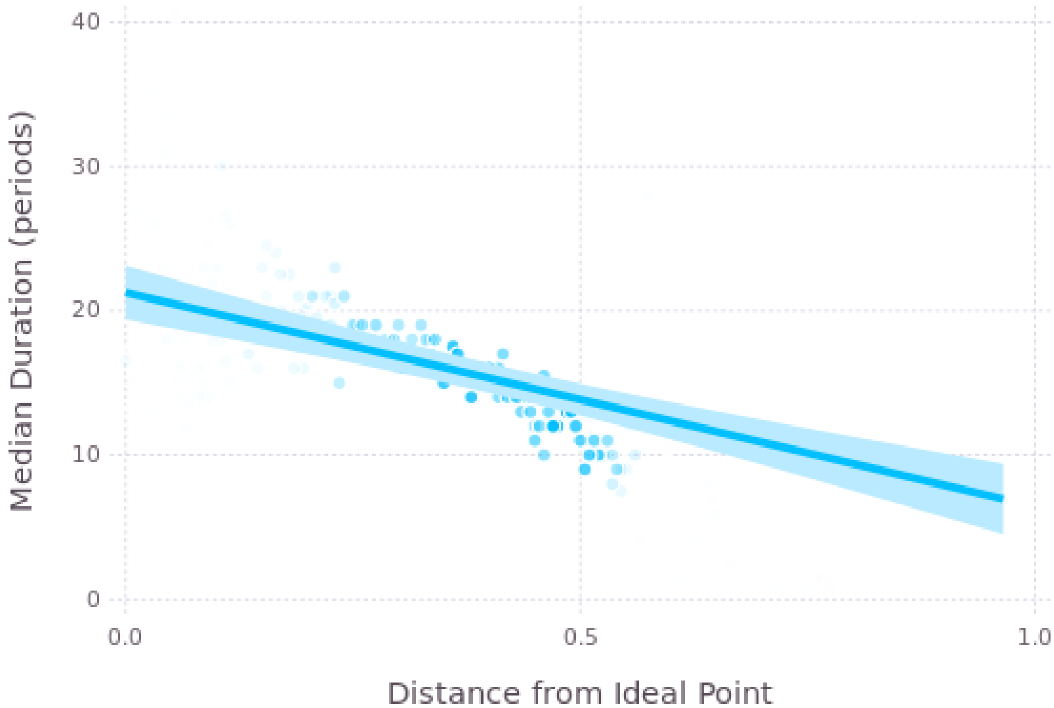


Figure 9: The Life and Death of Governments.

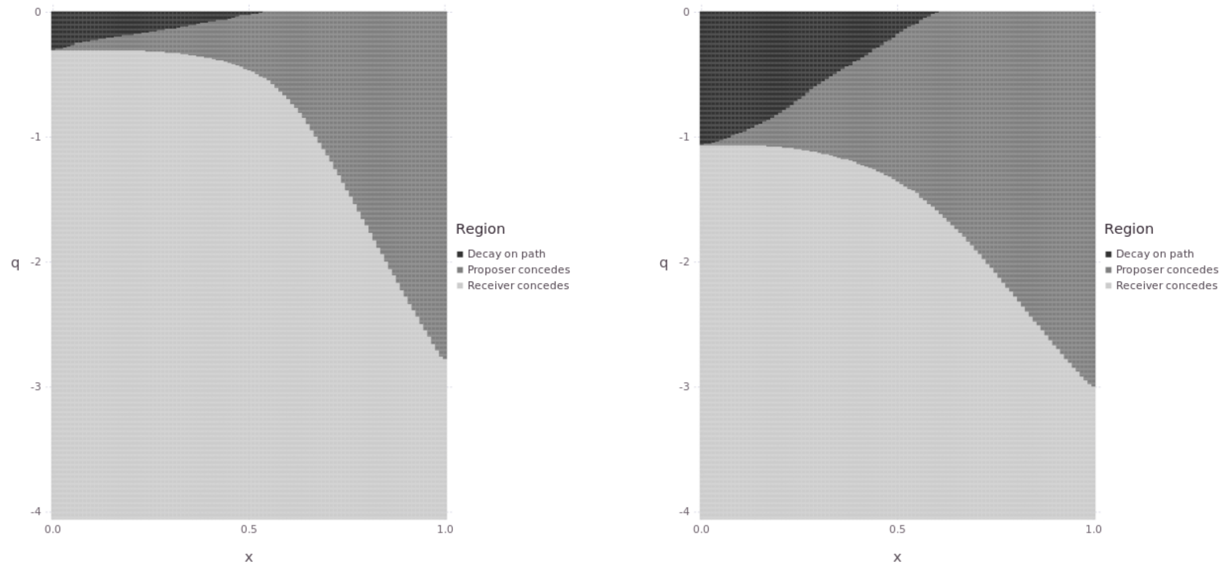
ment's ideal point. Thus, a government is more likely to fall not when it has exhausted all policy gains, but rather when the possible policy gains are at their greatest.

Figure 9 depicts this relationship. It plots the expected duration of a Proposer holding power as a function of the location of policy when he or she initially takes power. The points are shaded in proportion to the number of simulated paths where the Proposer takes power at a given distance from his or her ideal policy.

The lifetime of a government can be be significant, reaching a median length of 20 periods close to a policymaker's ideal and with much longer durations possible. Even at the right boundary, where the government falls with 50% chance in each period, a government's expected lifespan can be considerable as a large amount of decay can arrive that allows it to pull policy back toward the middle of the space where turnover is less likely.

3.5 Comparative Statics

To gain further insight into the model, we explore how the equilibrium regions vary in two key parameters of the model. The first is the exponential rate parameter for the decay distribution $E[\lambda]$. Varying $E[\lambda]$ changes the variability of the decay that appears, elucidating



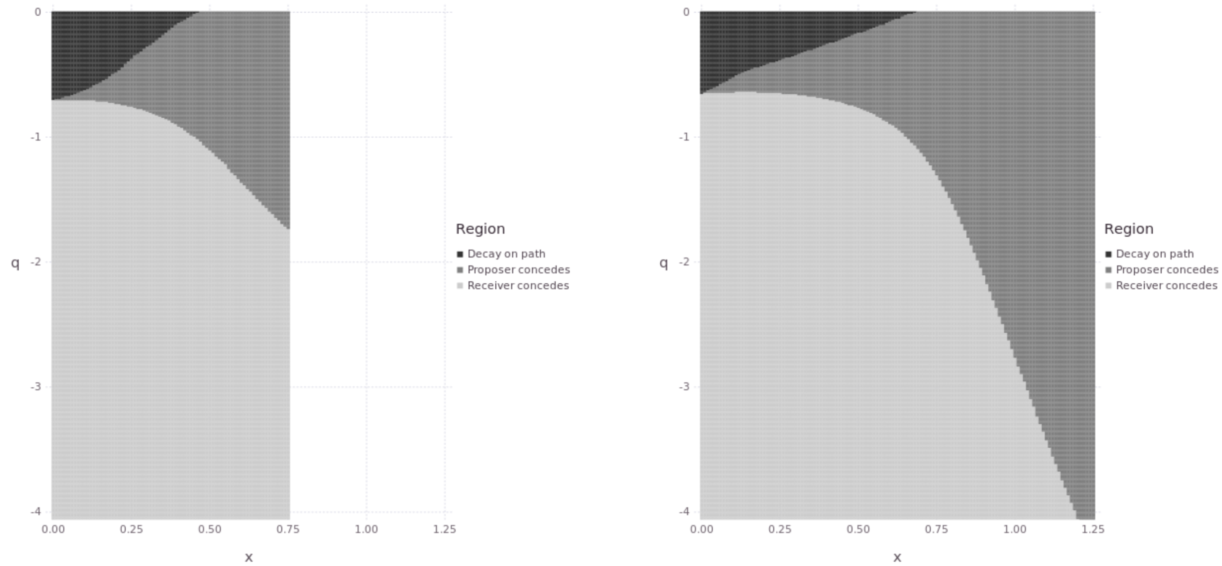
(a) $E[\lambda_t] = 0.5$ (b) $E[\lambda_t] = 1.5$

Figure 10: Equilibrium regions as the distribution of decay varies. Fixed parameters are $\alpha_L = \alpha_R = 1, \pi = 1, \delta = 0.9$.

the difference between situations where decay is routine and more-tolerable, versus non-routine and less-tolerable. The second parameter we vary is the R's ideal point π. This illustrates the effect of smaller or larger polarization between the pivotal players in the policymaking process. We first describe the equilibrium effect of varying both parameters before turning to the welfare implications.

Decay Variance. Figure 10 shows what happens to the equilibrium regions when we decrease the exponential mean parameter to 0.5 (panel a) or increase it to 1.5 (panel b). The contrast between the figures is illustrative. An initial conjecture may be that less expected decay (from 1 to 0.5) is a boon to the Receiver as it is for larger decay that the Proposer gains leverage. This direct effect, however, is tempered by the equilibrium effect as both the obstruction region and the negative-leverage region get smaller. In contrast, both regions grow when the mean of decay rises (from 1 to 1.5) and for a larger range of decay the Receiver is the one with the leverage. The reason for this is that, in equilibrium, the value of proposal power decreases as the mean of the distribution of decay decreases. A lower value of proposal power, in turn, gives the Receiver less incentive to obstruct and, knowing this, the Proposer is less willing to concede on policy.

Policy Polarization. Figure 11 shows what happens to the equilibrium regions when the policy distance between the two policymakers' ideal points varies. Conventional wisdom



(a) $\pi = 0.75$ (b) $\pi = 1.25$

Figure 11: Equilibrium regions as the policy polarization between policymakers rises. Fixed parameters are $\alpha_L = \alpha_R = 1, E[\lambda] = 1, \delta = 0.9$.

from classical static models of gridlock would suggest worse bargaining performance (more failures of agreement) the more polarized parties are. Indeed, in our dynamic model it is true that greater policy divergence leads to a larger value of proposal power and hence greater incentives for obstruction.

Once again, however, this logic is tempered by the equilibrium effect within the model. To see why, recall that legislative agreement requires the policymakers to have sufficient policy "currency" to find a mutually agreeable deal. Counterintuitively, the more the policymakers disagree over policy, the more "currency" they have available to negotiate with. This means obstruction needs to be deployed less often in equilibrium and, thus, that the inefficiency of decay is reduced. This is evident in Figure 11 as at the left boundary the obstruction boundary is lower (-0.7 vs. -0.65) when polarization is lower (panel a) than when polarization is greater (panel b). The obstruction region is, in an absolute sense, larger for $\pi = 1.25$, yet this is due to the larger relevant policy space when the policymakers are more polarized. Decay is experienced less frequently the greater the polarization and, as we will see momentarily, this leaves both policymakers relatively better off.

Welfare comparisons. To assess whether policymakers are overall better or worse off as these parameters change and subsequent equilibrium behavior changes, we evaluate each player's average utility across all of our simulated rounds in each case. The results are shown in Table 1. The first column in this table shows the efficient benchmark: average utility that

Scenario	Efficient Benchmark	L Mean Utility	R Mean Utility
Baseline	-0.25	-0.297	-0.298
$E[\lambda] = 0.5$	-0.25	-0.263	-0.264
$E[\lambda] = 1.5$	-0.25	-0.330	-0.333
$\pi = 0.75$	-0.14	-0.197	-0.195
$\pi = 1.25$	-0.39	-0.423	-0.426

Table 1: Average utility in baseline and comparative statics scenarios.

would result if policy remained on the frontier at the midpoint of both policymakers' ideal points for the entire history of the game. The second and third columns show the average realized utilities for L and R respectively in all one million rounds of the simulation we computed.[20]

The net effect of increasing the typical size of the decay shocks is to reduce utility for both policymakers. The additional leverage gained when in the Proposer role is outweighed by the loss of policy influence when in the Receiver role, along with the on-average greater decay experienced on path.

Increasing polarization between the policymakers also has the effect of reducing utility for both. However, this is entirely due to the fact that with more space between them, a moderate policy is worse for both. Relative to the efficient benchmark, policymakers actually do relatively *better* in the higher-polarization cases (i.e., the difference with the efficient benchmark is smaller). Surprisingly, the more polarized are the policymakers, the more effectively they are able to bargain, and the less welfare is wasted due to obstruction and decay.

4 Conclusion

Policy decay is an unavoidable and recurring presence in the politics of modern democratic societies. Its appearance, and the anticipation of its future appearance, shape interactions between actors in government in surprising and profound ways. We show that, even in a frictionless world of perfect information, farsighted actors, and no technical constraints on the ability of policymakers to optimally implement desired policy outcomes, decay is the force that drives policymaking or lack thereof. The frictionless character of our model is chosen not for its realism but because it is the best-case scenario for the preservation of

[20]As the simulation setting is perfectly symmetric, the difference in utility between L and R is due only to the particular sequence of random draws we used, and thus represents a measure of the uncertainty due to simulation error.

policy on the frontier through efficient compromise. The fact that actors in our model cannot avoid decay in equilibrium implies that their real-world counterparts, who face incomplete information about the state of the world, uncertainty about their opponents' preferences and motivations, and incomplete knowledge of the mapping from policy to outcome have little hope of doing so.

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