

Durable Policy, Political Accountability, and Active Waste

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ABSTRACT

The policy choices of governments are frequently durable. From the building of bridges to the creation of social programs, investments in public infrastructure typically last well beyond a single electoral cycle. In this paper we develop a dynamic model of repeated elections in which policy choices are durable. The behavior that emerges in equilibrium reveals a novel mechanism through which durability interacts with the shorter electoral cycle and distorts the incentives of politicians. We find that a government that is electorally accountable nevertheless underinvests in policy, that it deliberately wastes investment on projects that are never implemented, and that the type of policy it implements is itself Pareto inefficient. The first two distortions match evidence from infrastructure policy in western democracies, and the third identifies a distortion that has heretofore not been explored empirically. Notably, these effects emerge solely due to the interaction of policy durability and political accountability, and not from corruption, poor decision making, or voter myopia.

Keywords: Durable policy; repeated elections; accountability; infrastructure

The policy choices of governments are frequently durable. From the building of bridges to the creation of social programs, policy choices often endure for many years and, sometimes, many generations. Durable policy encompasses a

*For helpful comments we thank Pablo Montagnes, Avi Acharya, Al Slivinski, Dave Baron, Galina Zudenkova, several seminar audiences, and a particularly helpful referee of this journal.

Online Appendix available from:

http://dx.doi.org/10.1561/100.00016120_app

MS submitted on 13 October 2016; final version received 20 March 2017

ISSN 1554-0626; DOI 10.1561/100.00016120

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broad set of important policy choices. From stand-alone investments to the infrastructure on which the operation of the economy and society more broadly rests, durable policies are critical to a country's welfare. In fact, one of the few non-controversial facts from macroeconomics is that a country's infrastructure is a significant predictor of economic growth and welfare (Aschauer, 1989a,b).

Despite the benefits, modern democracies are notorious for underinvesting in durable policies (Crain and Oakley, 1995). This is most clearly documented in terms of physical infrastructure. A damning report in the United Kingdom took pointed aim at the lackluster state of that country's infrastructure (LSE Growth Commission, 2013), placing particular emphasis on failings in transportation, energy, and housing, and called for an entirely new 'architecture' of infrastructure. Similarly, a 2013 report from the American Society of Civil Engineers documented decaying bridges that are on average 42 years old and water pipes up to 100 years old that yield 250,000 significant breaks a year.

That these failings are so numerous, and that they exist in otherwise successful democracies, raises the question of whether democracy itself is compatible with the efficient supply of durable policies. This question has only grown in relevance in recent decades with the rise of China and its astounding success — despite the absence of democratic accountability — in building infrastructure on a scale not previously seen. Indeed, China is not the only relevant example in this regard. The rapid development of the original Asian Tiger countries — Hong Kong, Taiwan, Singapore, and South Korea — was notable for the degree of state intervention in the economy and the absence of regular elections. This pattern gives rise to a surprising conjecture: Infrastructure policy succeeds not *despite* the absence of democracy but *because* of it. If true, this would bolster the prediction of commentators that liberal democracies will be left behind in the coming century.

The objective of this paper is to understand the puzzle of infrastructure and durable policy more generally. We build a formal model of repeated elections to explore the interrelationship between durable policy and democracy. We demonstrate a channel of influence through which the correlation between regular elections and inefficient policy investments is indeed causal. In particular, we show how the unique characteristics of durable policies interact perniciously with electoral accountability, leading to both the undersupply and to distortions in the type of policy itself.

The challenge in pursuing this question is to ensure that the formal model does not explain too much. Modern democracies may fail with durable policies, but they succeed, albeit imperfectly, with much else. Thus, any explanation of the underinvestment puzzle must turn on the durability of the policy itself. In the context of democracy, durability is of particular importance as it implies that the life span of investment is typically much longer than the time between elections, creating a mismatch between the planning horizon for durably policies and the length of the electoral cycle.

The existence of this mismatch is well-known, although by itself it is insufficient to explain the underlying puzzle.¹ We pursue a new explanation that builds upon a simple yet key observation: That the choice of durable policy today creates a *foundation* for policy choices in the future. For instance, if a government chooses to build a subway line rather than a freeway, this choice matters not just for today but it also matters for politics tomorrow. The existence of the subway line changes the public's preference over the level and type of subsequent infrastructure investment. The public now finds it more valuable to build another subway line as a second line complements the existing line, a preference that would not have existed had the government previously chosen instead to build a freeway. This dynamic dependence is natural and intuitive, yet it is absent from extant formal models of policymaking. It is appealing also as it by necessity generates a policy trajectory that is *path dependent* (Pierson, 2000, 2004). Path dependence is ubiquitous in verbal descriptions of politics yet appears frustratingly infrequently in formal modeling. We show that it is a natural implication of modeling policy as durable.

We then show how the path dependence of policy leads to distortions in policy choice. That tomorrow's preferences depend on today's policy choice creates an opportunity for an early office holder to strategically influence the path that policy takes, and to manipulate it in such a way that improves his own position. The early office holder constructs policy in this way not despite the ever-present shadow of political accountability but precisely because of it.

As our conception of policy durability is new to the formal literature, we begin with an informal introduction into how it is constructed, and the results and intuitions that are generated. We then contrast our theory with related literature, both formal modeling and otherwise, and only then do we delve into the model formalities.

Modeling Policy Durability

Our conception of durable policy possesses three key ingredients. First, and most obviously, investment is durable, lasting longer than a single electoral cycle. Second, policy can be improved and added to, accumulating over time. New freeways can be constructed to connect to new bridges, the water supply can be made even cleaner, and so on. Third, citizens have heterogeneous preferences over the type of policies implemented, and that durable policy projects can be tailored to these different interests. For example, constructing a highway system favors one set of constituents over another, just as investments

¹We discuss related literature, particularly on this point, momentarily.

in pollution abatement and wind power benefit disproportionately some groups in society over others.

With this conception of policy in hand, our model delivers three main results. First, and as mentioned, we provide a novel explanation why durable policies are under supplied in democracies. Our explanation depends neither on corruption, cognitive limitations, nor technological constraints. Rather, we show how a strategic office holder deliberately manipulates the path of policy to further his own electoral ambitions. By withholding policy investment, the office holder generates a preference for particular policies that, in turn, creates a preference among voters for his own reelection. Thus, it is the interaction of durable policy and political accountability that creates the incentive for a scheming government to *deliberately* undersupply policy.

Our second result is more subtle but no less important. We show that the distortion in durable policy is multi-faceted: Not only is the *level*, or quantity, lower than efficiency demands, but the *type* of policy supplied is also inefficient, failing to match the preferences of the citizenry. In the context of public transportation, this result says that not only are there fewer train lines built than are needed, but also that the train lines themselves are not laid out to go where the public most needs them to go. Another example comes from the infrastructure of energy generation; a conservative incumbent may not only underinvest in production capacity, but also choose a method — coal fired power plants — that is more polluting and less environmentally friendly than the public desires.

Our third result connects to the classic idea of government waste, in particular to the idea of deliberate waste. We show how the strategic manipulation of durable policy leads not only to undersupply, but also to the deliberate waste of investment. This waste takes the form of investment at a second project that, in equilibrium, does not deliver any benefit to even a single citizen. We refer to this intentional waste of investment as *active waste*.² The logic underlying our result provides a new interpretation for government waste, one based on the rational distortions of the political mechanism rather than due to the malice, ignorance, or outright corruption of politicians.

A key assumption in the model is that durable policies vary in type and that different types are more or less appealing to citizens who themselves vary in their taste for different projects. We model this heterogeneity in voter preference and policy type along the classic left–right dimension of politics. Although this feature is new in the study of infrastructure and public goods, it is standard in almost every other domain of policymaking that has been reached by formal modeling. The empirical relevance of preference differences to infrastructure policy is clear. In all its manifestations infrastructure benefits

²The terminology is due to Bandiera *et al.* (2009) and our usage is consistent with theirs, although the connection between the papers is otherwise minimal as their focus is an empirical study of the Italian bureaucracy.

some citizens more than others and frequently this divide matches standard political divides. This is nowhere more evident than in United States transportation policy. Suburban car owners have little interest in an urban subway system, just as urban dwellers see little (or even negative) utility in a broad freeway system. In a detailed account, Nall (2015) documents how preference differences over transportation infrastructure evolved into political differences as the geographic dispersion and clustering of Republicans and Democrats synchronized transportation policy preferences with the standard left-right political divide. Our model captures the joint evolution of infrastructure policy and political preference that Nall documents.

Beyond the normative implications of our theory, the formal results of the model carry direct empirical implications. Our findings of underinvestment and wasted investment in durable policies resonate with observations across many modern democracies. Our finding that the type of policy is also distorted is, to the best of our knowledge, new. Until now, measures of infrastructure have focused exclusively on the *level* or quantity of infrastructure supplied, and any inadequacy in the level has been taken as measuring the degree of inefficiency in infrastructure policy overall (see, for example, Crain and Oakley, 1995). Our results demonstrate the flaw in this approach. In not accounting for the *type* of infrastructure that is implemented, this approach is biased toward *understating* total inefficiency. Therefore, our results imply that to accurately measure distortions in infrastructure policy, empirical work must measure both the level and the type of infrastructure, matching the latter to the desires of the citizenry.

That it is preference heterogeneity that drives inefficiency in our model is important more broadly for the performance of democracy. The failings of infrastructure policy in democracies stand in contrast not only to the performance of non-democracies, but also to the history of the democracies themselves. The United States, despite its current failings, has succeeded with large infrastructure projects in the past, most famously evident in transportation achievements in the 19th and mid-20th centuries. Our theory predicts that the tension between infrastructure and political accountability grows with political polarization. This creates a causal connection between the polarization of the modern political environment and the present failings in infrastructure policy, providing a positive explanation for why the failings today are particularly acute.

Related Literature

The mismatch between the electoral cycle and the durability of policy is not itself a new observation. Early theorizing focused on the myopia of voters. Myopic voters fail to internalize the long-term benefits of infrastructure and under demand its supply (Cohen and Noll, 1990). Voter myopia plays no

role in our analysis. In our model voters are forward looking and they fully anticipate the effects of policy durability on future outcomes. The undersupply and distortions in infrastructure nevertheless emerge albeit through a distinct mechanism that we identify here.

A separate line of work has focused on the changing composition of government as an explanation for distortions in policy. The idea is that the inability of current majorities to bind — or tie the hands — of future majorities leads to weakened incentives to invest in public investment goods (Besley and Coate, 1998; Leblanc *et al.*, 2000). Central to these theories, however, is that the investment goods are rivalrous. That is to say, the investments produce a flow of benefits that are allocated by the government of the day. As such, a government may be reluctant to invest today if they are unsure they will be in power tomorrow to receive the benefits. This uncertainty creates an endogenous myopia in investment decisions and, thus, an undersupply of public investment goods. We depart from this literature in modeling non-rivalrous infrastructure. In practice subways, highways, a clean water supply is available to all, and this is captured by the formulation of our model. Moreover, in our model the identity of the government does not change on the equilibrium path yet we still obtain underinvestment in infrastructure. A second key departure is that we allow infrastructure to have a type, to favor one group in society over another (subways vs. freeways). In contrast, all previous papers on public investment have modeled the investment as akin to money, portable and equally attractive to all sides.

A third line of work has pursued the idea central to our paper that the incumbent distorts policy choice so as to enhance his own electoral prospects. That politicians do this deliberately has been argued in the political economy of developing countries since Bates (1981). Robinson and Torvik (2005) provide a formal theoretic basis for this behavior to explain, specifically, the preponderance of “white elephant” projects in developing countries that are inefficient both *ex ante* and *ex post*. Their argument is tailored to developing countries — their mechanism requires low marginal productivity of labor, a characteristic of developing countries — and relies on a subtle difference between economic efficiency and citizen utility. Specifically, they argue that the wages an economically inefficient project brings to a group of workers benefits those workers directly and also benefits indirectly their political patron through a “warm glow” effect. Their argument, in effect, is that Bates (1981) and his successors have erred in focusing on economic efficiency and that from a behavioral stand-point, the “white elephant” projects are actually efficient. Our model is substantively different. It applies to developed and developing countries alike, it does not require that projects are inefficient, economic or otherwise, nor does it turn on behavioral interpretations of utility. Our mechanism fits any policy that sits in the standard left–right political spectrum,

and adds a second dimension for the quality of implementation.³ Moreover, our results reveal inefficiency of a broader scale: Inefficiency in our model appears as underinvestment in infrastructure (contrasting with the overinvestment in the “white elephants” of Bates), distortions in the policy implemented, and wasted investment in decoy projects (active waste), inefficiency that has no parallel in the earlier work.

A second paper along these lines is Hodler *et al.* (2010). Their mechanism relies on incomplete information and the incumbent office holder uses the choice of an inefficient policy to hide his type from voters, obscuring voter learning so that they focus rationally on a dimension of policy more favorable to him. Aside from the choice of deliberately inefficient policy, the models are otherwise distinct. In our paper information is complete and the inefficiency is in stark relief for voters. Voters are displeased by the inefficiency, nevertheless they reelect the incumbent. In contrast, should the voters in Hodler *et al.* discover the inefficiency, they would remove the incumbent from office. Recent papers in this literature include Montagnes and Bektemirow (2016) who show how politicians may privatize public assets and infrastructure for political gain, as well as Prato (2016) who examines the political incentives to manipulate housing subsidies.

Our model also sheds new light on political accountability, demonstrating that the relationship between office holders and voters is particularly strained when policy is durable. Since at least the seminal work of Key (1966) it has been understood that forward-looking voters may nevertheless look backwards in formulating their beliefs and preferences. That is to say that *prospective* voting is facilitated by *retrospective* evaluations. This is often taken to imply that prospective voting is operationally equivalent to retrospective voting. Necessary to this logic, however, is that past performance is correlated with future performance and, thus, informative about future behavior. When this connection breaks down the logic of retrospective voting also breaks down. This is the fate of policymaking when policy is durable. Precisely because infrastructure is durable, the policy slate is not wiped clean between elections. Consequently, an enterprising office holder, aware that voters are forward rather than backward looking, will choose policies that create an edge for himself prospectively. He does this regardless of whether the policy itself is optimal and, therefore, retrospectively well regarded.

We show that this incentive is sufficiently strong so as to undermine the logic of rational retrospective voting. Our model explains the inadequacies of

³This combination, interpreted broadly as *valence*, has flourished in recent times. Aragonés and Palfrey (2002) and Groseclose (2001) were the first, albeit in models of electoral competition with valence set exogeneously. For models that endogenize valence/quality and that apply to policymaking more generally, see Ashworth and Mesquita (2009), Callander (2008b), Hirsch and Shotts (2015), Ting (2011), and Volden *et al.* (2008).

infrastructure policy in practice by showing that the durability of infrastructure is not just something to be managed by policymakers, but rather a strategic opportunity to be exploited for personal gain. It is notable that policy durability creates this “wedge” between voters and their elected officials in a setting of complete information, which contrasts with existing models in the literature that rely on the more standard problems of adverse selection or moral hazard (see Ashworth, 2012 for a review).

Our focus is on the persistence of policy due to the durability of policies themselves. To be sure, there are other reasons why policies persist — such as institutional constraints or the deliberate insulation of policy — yet these applications fall outside the domain of our paper (de Figueiredo, 2002; Glazer, 1989; Krehbiel, 1998). We return to the many and varied policy domains that fall into this category — including some beyond infrastructure — in the concluding discussion.

The Formal Model

We develop a model of repeated elections between two politicians, L and R . An election is held in each of T periods according to majority rule. There is an odd number of voters with the median voter denoted by M .

Policy is two dimensional. Each policy has a type and a quantity. The type of a durable project is modeled in the standard manner as a point in the real line, \mathbb{R} . Citizens (voters and politicians) possess ideal types — or ideal points — in this space and disagree over the type of policy they would like to see implemented. The second dimension of policy is the level of investment or quality of a policy. Investment is non-negative with the natural interpretation that higher levels of investment correspond to higher quality. The policy space is then $\mathbb{R} \times [0, \infty)$.

Each citizen possesses a most preferred, or ideal, type of policy. We denote the ideal policy by lower case, such that the ideal points for the politicians are l and r , with $l < 0$ and $r > 0$, and $m = 0$ for the median voter. These values capture the classic notion of a median voter in the middle with the two competing politicians to her either side. In contrast to most other models, we do not impose symmetry in the preferences of the politicians. Formally the preferences are over both type and level, although we adopt the convention of denoting an ideal point by the policy type alone (e.g., L 's ideal point is simply l).

The election is held at the end of each period and the winner controls government in the following period. The government makes two choices in each period: an investment schedule and the policy to implement. Investment can be allocated to as many (finite) policies as the incumbent wishes. Formally, the investment schedule in each period t is a function, $q_t(p)$, describing the amount allocated to each policy $p \in \mathbb{R}$.

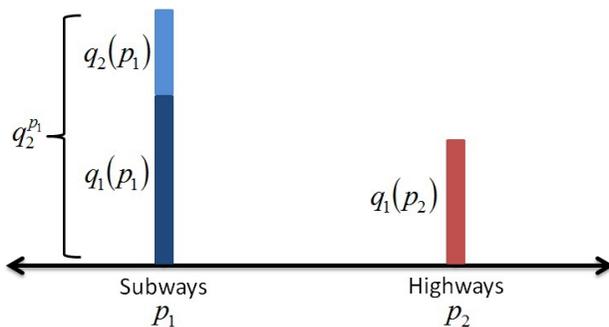


Figure 1: Durability and accumulation of policy.

The key novelty in our formulation is that investment is durable and cumulative. The cumulative investment in policy p at time t is the sum of investments across all periods until that time:

$$q_t^{p_t} = \sum_{s=1}^t q_s(p).$$

For simplicity, although without substantive import, we assume that the quality of policy does not depreciate over time.⁴ Figure 1 provides an illustration of the policy space and accumulation of policy over two periods. The history of policy at time t is denoted by $h_t = \{\{p_1, q_1(p)\}, \{p_2, q_2(p)\}, \dots, \{p_t, q_t(p)\}\}$, where p_t is the implemented policy and $q_t(p)$ the investment function.⁵

Policymakers face a limited budget with which to build policy. The total budget is given by B . These funds are available to be invested at any time. Thus, in each period the effective budget constraint is the amount of B that has not previously been invested. Once B is spent, no further policy investment is possible. The amount invested in period t is:

$$b_t = \sum_{p \in \mathbb{R}} q_t(p),$$

⁴We assume also that investments are non-transferable across policies. While this is surely an approximation of reality, it reflects the reality that investments are tailored to specific uses and that much investment is irreversible. A bridge cannot be moved easily to another river, and even less easily can its materials be repurposed into an office building. For our results to hold it is only necessary that investments be imperfectly transferable; we adopt the simplification of non-transferability for pedagogical reasons. This formulation follows that in Volden *et al.* (2008) and Hirsch and Shotts (2015) that interpret valence in an informational sense rather than as physical investment; Callander (2008a) provides an information-based microfoundation for imperfect transferability of policy knowledge.

⁵In a mild abuse of terminology, we refer to the *policy space* as both the set of policies available to an incumbent in period t and also the full space of realizable policies $\mathbb{R} \times [0, \infty)$.

and the budget constraint at period t is then:

$$\sum_{s=1}^t b_s \leq B \quad \text{or} \quad b_t \leq B - \sum_{s=1}^{t-1} b_s.$$

A possible interpretation of B is that it is total tax revenue raised over the T periods (with $\frac{B}{T}$ arriving each period) and the office holders are permitted to borrow from future revenue.⁶

The second choice made in each period by the incumbent is the policy to implement. This is the standard assumption in formal models of policymaking and it is this policy that all citizens derive utility from. An interpretation is that the government controls some amount of discretionary funds in each period — say, the funds to pay the bus drivers or the toll collectors to make the infrastructure usable — and the incumbent chooses to which policy to allocate these funds in each period. Our results hold regardless of how minimal these funds are and so we more directly assume that the incumbent chooses a policy that is implemented in each period, consistent with standard models. In our dynamic setting this assumption captures the reality that a first period office holder cannot — by fully investing funds B — fully determine policy outcomes forever more. Our assumption ensures that every officeholder has the ability to impact policy, as is the case in practice, even if that impact is arbitrarily small.

Citizens care about policy outcomes and are forward looking. They care about policy outcomes today as well as every day in the future. The per-period utility of citizen J in any period is given by u_J . For transparency, we assume that utility is separable across the type and level of the policy and linear in the level (i.e., utility is quasilinear). Specifically,

$$u_J(p_t, q_t^{p_t}) = -g(p_t - j) + q_t^{p_t},$$

where p_t is J 's implemented policy and $q_t^{p_t}$ the corresponding level of investment. We assume only that $g(\cdot)$ is symmetric and strictly increasing in the distance between the citizen's ideal point and the implemented policy (such that $-g(\cdot)$ is strictly decreasing), and we normalize $g(0)$ to 0. That is:

$$g(0) = 0, \quad g(z) = g(-z), \quad \text{and} \quad g'(z) > 0 \quad \text{for} \quad z > 0.$$

These restrictions are sufficient for our main results. Note, in particular, that we do not impose any restriction on the risk preferences of the players.

⁶We do not, however, model tax revenue as a function of the policy history, although this presents an interesting and obvious extension to our framework. We also do not explicitly model interest rates. Our results point to a desire to front-load investment and to invest inefficiently. A positive interest rate would lead to overborrowing and add an additional inefficiency to equilibrium behavior.

At several points it is illuminating to consider the role of risk preferences and at those points, and only at those points, we impose further restrictions on $g(\cdot)$. We will say that a citizen is risk averse/neutral/seeking if $-g(\cdot)$ is concave/linear/convex. We also assume that policy investments are not subject to diminishing returns.⁷

A citizen's total policy utility at time t is simply the sum of expected utility across the current and all future periods. For citizen J this is:

$$U_{Jt} = \sum_{s=t}^T \delta^{s-t} E[u_J(p_s, q_s^p)],$$

where $\delta \in (0, 1]$ is the discount factor; for simplicity we set $\delta = 1$.⁸

Voters are motivated solely by policy outcomes and U reflects their total utility. Politicians are, in addition, motivated by holding office. The per-period benefit of holding office is κ . Let $P(h_t)$ be the probability that L is elected in period t given history h_t . The probability that R is elected in period t is therefore $1 - P(h_{t-1})$. We suppose that the game begins with L in office in the first period, such that $P(h_0) = 1$. The total utility for L at period t is then:

$$V_L(h_t) = U_{L,t} + \sum_{s=t}^T E[P(h_{s-1})] \cdot \kappa$$

Similarly, total utility for R is:

$$V_R(h_t) = U_{R,t} + \sum_{s=t}^T [1 - E[P(h_{s-1})]] \kappa$$

As is standard, the politicians trade-off the utility from holding office with the policy outcome. More subtly, with many periods and a long horizon, the politicians in our model trade-off the stream of policy outcomes against the total sum of their time in office. We will mostly focus on the case in which κ is large and the desire to hold office dominates policy preferences. The inequality $\kappa \geq 2B$ is sufficient for all of our results and we impose this assumption hereafter. This requirement is almost everywhere overly strong for the needs of equilibrium, however, and we point out where appropriate how this requirement can be relaxed, often significantly so.

The election is held at the end of each period. The politicians do not have the ability to commit to policy investments; once in power, the winner is free to choose policy as he sees fit, subject to the budget constraint. As mentioned,

⁷This would be a logical extension, which might spread investments more evenly, but not substantively affect our results.

⁸Later in this paper we consider an extension of the model to an infinite horizon. For that version of the model discounting is necessary.

L begins in power in period 1, and we ignore the final election at the end of period T as it is redundant. When indifferent over politicians, the voter mixes equally, such that $P(h_t) = \frac{1}{2}$. The game is one of complete information and we characterize the set of subgame perfect Nash equilibria. The strategic focus here is on the politicians and for expositional simplicity we suppress notation for the strategy of the voters. The proofs of the Propositions are in the Appendix of this paper. The proofs of all other results appear in the online Appendix.

Results

A defining characteristic of infrastructure policy is that, unlike classic spatial models of elections, preferences are not purely adversarial. All citizens — politicians and voters alike — prefer more investment, and higher quality, to less. This common interest renders meaningful the question of efficiency. How should investment be allocated, and when should it be allocated, to ensure Pareto efficiency? These questions are answered in Lemma 1. It shows that in our setting *Pareto efficiency* requires very specific investment profiles. This result will serve as a benchmark to which to compare actual policy choices in equilibrium.

Lemma 1. *For risk neutral or risk averse politicians, Pareto efficiency requires that all investment be made in period 1 and at a single policy; i.e., $q_1(p^c) = B$ for some $p^c \in \mathbb{R}$. When politicians are sufficiently risk-seeking investment at two policies is possible if and only if both policies are implemented in equilibrium.*

Under the standard assumptions of risk neutrality or risk aversion, Pareto efficiency imposes two very specific requirements on policy choices. First, that all investment must be expended in the first period as, once built, a durable project delivers benefits thereafter.⁹ And, second, that all investment be focused on a single policy as that is the only way for all voters to benefit from all investment. Despite the simplicity of the dual demands of efficient policy choice, we will see that self-serving office holders generally fail on both of these objectives. Pareto efficiency allows more richness when politicians are risk seeking, permitting a form of a power-sharing arrangement in which the favored policies of each are implemented over time, although this is possible only if the degree of risk seeking is sufficiently great. However, the dispersion of investment we will see in equilibrium follows a very different logic.

Pareto efficiency is firm on investment levels but quiet as to the policy that is actually implemented. On this dimension preferences are largely adversarial,

⁹This property is made stark by assumption that infrastructure does not decay, although it does not depend upon it.

and without additional information about the distribution of ideal points of all the voters nothing can be said. Nevertheless, we have particularly interest in the welfare of the key players — the two politicians and the median voter — and we will take their ideal points as a proxy for the range of possible ideal points. For these key citizens Pareto efficiency imposes the additional requirement that $p^e \in [l, r]$.

Fixed Policies Regime

To grasp the forces at work in our setting, we analyze first a version of the game in which the type of policy that can be implemented is restricted. Specifically, we restrict the politicians to invest at only their own or the other politician's ideal point; i.e., at policies l and r . We refer to this as the *Fixed Policies Regime*. To ensure that each politician has a chance of winning office under this restriction, we limit the relative distance to the median voter of each politician's ideal point such that $g(l) - g(r) < B$.

Our first proposition fully describes equilibrium investment levels and electoral outcomes when there are only two periods. Investment is entirely allocated in the first period, as demanded by efficiency. However, the equilibrium is inefficient as the investment is not perfectly focused, rather it is spread across both of the policy positions.

Proposition 1. *For the Fixed Policies Regime with $T = 2$, in equilibrium L chooses $p_1 = l$ with investment levels described by two cases:*

(i) For $g(r - l) \leq B$,

$$q_1(l) = \frac{B}{2} + \frac{g(r - l)}{2}, \quad q_1(r) = \frac{B}{2} - \frac{g(r - l)}{2}.$$

(ii) For $g(r - l) \geq B$,

$$q_1(l) = B, \quad q_1(r) = 0.$$

L wins reelection with certainty, $P(h_1) = 1$, and in the second period, $p_2 = l$, $q_2(l) = q_2(r) = 0$.

The wasted investment of case (i) is striking as it occurs *despite* L winning election with certainty and remaining in power in both periods. The spread of funds is not due, therefore, to R winning office and switching policy in the second period to her own most preferred policy. The investment at policy r is pure waste and this waste affects L himself as, *ceteris paribus*, he too prefers that all investment be focused on the policy that is actually implemented. That he does not focus investment on his own ideal policy naturally leads one to ask why this waste occurs. The answer to this question provides the central insight of our model.

Understanding the deliberate waste requires that we examine it through the lens of the voters. A first observation is that the median voter is decisive at the election between the periods (with two periods the only meaningful election is between the periods). If she prefers candidate L , for instance, then all voters to her left will share her preference. Focusing on this voter, we seek to understand her calculations when casting a vote. At the time of the election, first period investments have been made and the entire budget completely exhausted. The voter's decision reduces, therefore, to simply deciding who she prefers to be the steward of these investments in the second period. L 's wasted investment is aimed at shaping this preference, and shaping it in a way that the voter chooses to reelect L .

The wasted investment shapes voter preference by creating a threat to the voter. A threat not about what L will do in office, but about what R would do should the voter elect her instead. Although the investment at r is wasted when L is reelected, it would not be wasted were R in power. The level of investment is just enough to tempt R into implementing her own ideal policy in the second period, trading off a lower investment level for a more attractive type of policy. This trade-off is depicted in Figure 2.

For the voter — with an ideal point between the politicians — this is an unappealing outcome. If R only weakly prefers that policy r be implemented rather than policy l , the voter then strictly prefers that policy l be implemented. By investing just enough at policy r to tempt R into making a different policy choice, the voter is given a real choice between the candidates, and this real

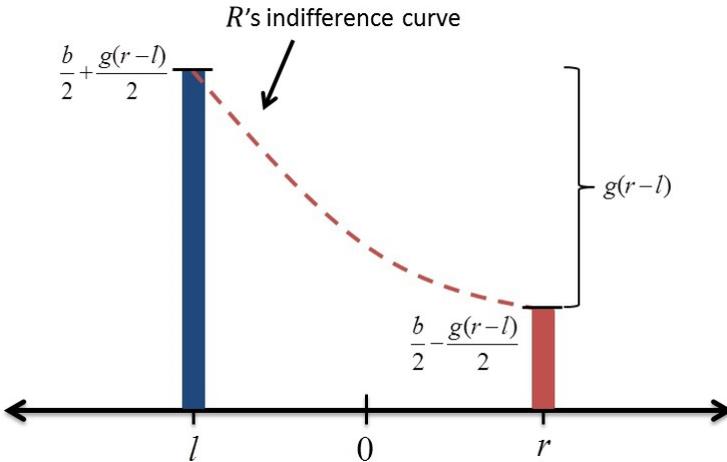


Figure 2: Equilibrium investment schedule.

choice favors L . Perversely, therefore, L is rewarded with reelection not despite the wasted investment but precisely because of it.

An interesting and atypical property of our equilibrium is that it is defined by the indifference condition of the politicians rather than the voters. Typically, policies are chosen such that the voter is indifferent between the politicians, leading to the unsatisfactory prediction that the voter flips a coin to determine the winner. In our equilibrium, the voter possesses a strict preference for one politician over the other and votes accordingly (her preference is always for the incumbent). Two further attractive properties follow from this strict preference. First, we do not require the standard — yet unrealistic — assumption that politicians ideal points are precisely symmetric around the median voter's ideal point. Second, the size of the winning majorities in equilibrium is larger than minimal winning. This is consistent with real elections yet distinct from most formal models where the election is typically tied with the winner determined by the toss of a coin by a single swing-voter.

The second case in the proposition deals with politicians' ideal points that are more polarized.¹⁰ When policy l is sufficiently distant from r , politician R prefers to implement her own ideal point with zero investment rather than imitate L . Thus, L does not need to waste any investment to ensure his own reelection. Ironically, therefore, greater polarization ensures Pareto efficient investment choices, albeit at the possible cost to the voter (and the other politician) of a more extreme type of policy.

Proposition 1 leaves open the question of how behavior is affected by a longer horizon. Our next proposition — and our main result for this section — demonstrates that the perverse investment behavior of Proposition 1 extends directly and immediately to horizons of any length. The decisiveness of the median voter also extends to the dynamic setting, and we hereafter focus on her vote choice.

Proposition 2. *The equilibrium of Proposition 1 exists and is unique for $T \geq 3$. That is, policy choice in the first period is the same as in Proposition 1 and for every subsequent period, $t \geq 2$, it is given by $p_t = l$, $q_t(l) = q_t(r) = 0$, with L reelected with certainty, $P(h_t) = 1$.*

The logic for this result is a direct extension of Proposition 1. By exhausting the entire budget in the first period, L not only locks-in his advantage in the second period but also in every subsequent period.¹¹ R has no wriggle room to change the balance of investments, and so by strategically investing funds

¹⁰Note that the condition imposed at the beginning of this section, $g(l) - g(r) < B$, requires that one politician is not too close to the median voter relative to the other politician and does not impose any restriction on their absolute distance from the voter.

¹¹This leads to an unassailable incumbency advantage. We discuss this property, and extensions of the model that weaken the advantage, in Discussion section.

in the first period, L is able to tempt R to implement policy r should she win office in the second period, and in every period thereafter. Thus, the voter prefers to reelect L to office in the second period and in every period thereafter.

The trade-off for L at the heart of this equilibrium is a less efficient policy for more time in office. Therefore, L 's preference for holding office clearly plays a role. However, the longer the horizon the less intense this preference needs to be to support the equilibrium. Our maintained assumption of $\kappa \geq 2B$ binds only for a two-period horizon. For three or more periods the requirement on κ is strictly weaker, decreasing in the length of horizon.¹² Specifically, the requirement is:

$$\kappa \geq [B - g(r - l)] \frac{T}{T - 1}.$$

As $T \rightarrow \infty$ this approaches $\kappa \geq B - g(r - l)$, with the right-hand side greater than zero only in case (i) of Proposition 1. For the more polarized politicians of case (ii), the equilibrium holds for all $\kappa \geq 0$ as in this case L obtains his maximal policy outcome in every period as well as certain reelection.

A formally-minded reader will have noted that the equilibrium in Proposition 2 is unique, whereas a uniqueness claim is absent in Proposition 1. Additional equilibria exist when $T = 2$ in which L delays investing some of the budget until the second period, all the while maintaining the crucial indifference for R between policies l and r . With only two-periods, the delay need only be for a single period as the final period is reached immediately and R 's indifference is no longer a concern (in these equilibria L invests the remaining funds at l in the second period). In the equilibrium in the propositions, L instead wastes investment at policy r as this relaxes R 's incentive constraint, allowing L to invest more at l . With a two-period horizon the different types of equilibria lead to exactly the same utility for L as the cost of lower delay today exactly matches the benefit of more focused investment later. With a longer horizon, however, the required delay is longer as full investment must be deferred to the final period, whereas the benefit remains the same. Thus, with a longer horizon, investing all funds today is the unique equilibrium. Given the fragility of the other equilibria to precisely a two-period horizon, we do not explore their properties any further.

We now turn to an examination of efficiency in the equilibrium of Proposition 2 and the comparative statics. The level of wasted investment depends on the relative proximity of the politicians' ideal policies, decreasing in the degree of polarization between them.

¹²In a two-period game, the utility of efficient investment is received in two periods at the expense of a single reelection. For a horizon of length T , efficient investment is received for T periods at the expense of $T - 1$ reelections, increasing the relative reelection cost and thereby lowering the κ threshold. For κ values below the threshold, L efficiently invests all funds at l in equilibrium and the voter randomizes between the politicians at each election.

Corollary 1. *For $g(r-l) < B$, the level of waste in the equilibrium is strictly decreasing in polarization, $|r-l|$, whether polarization is caused by an increase in r or a decrease in l .*

With a narrow focus of wasted investment, this says that more polarization is better. However, this benefit comes at the cost of a type of policy that is potentially more distant from — and less desirable to — other citizens. This is of no regard for Pareto efficiency, but is relevant for total societal welfare. The next result pursues this by characterizing the utility of the median voter.

Corollary 2. *The median voter's equilibrium per-period utility is:*

$$u_M = \begin{cases} -g(l) + \frac{B}{2} + \frac{g(r-l)}{2} & \text{for } g(r-l) \leq B \\ -g(l) + B & \text{for } g(r-l) \geq B. \end{cases}$$

The impact of greater polarization of ideal points depends on which politician it is that is polarizing. A more extreme R — with L 's preference constant — creates a chain of effects that benefit the voter: R finds it less enticing to implement L 's ideal type in the second period, which makes the voter less inclined to elect R to office, which in turn relaxes the constraint on how much L can invest at his most preferred type of policy. At the end of this chain, the voter gets the same policy implemented in each period with a higher level of investment and less waste, leaving her strictly better off. On the other hand, if it is L that polarizes with R 's preference unchanged, this sequence leads to a different conclusion: The level of investment increases and waste decreases in the same way. However, this comes at the cost of a more extreme type of policy implemented in each period. This creates, for the voter, a trade-off between the type and the level of policy, the resolution of which depends on the shapes of citizens' utility functions.

Corollary 3 provides a complete statement of this relationship, as well as for two other cases. Part (i) deals with the straightforward case when polarization is sufficiently high that investment is not distorted. Part (ii) deals with more moderate levels of polarization and analyzes individual polarization by each politician. Part (iii) also considers moderate polarization but supposes that polarization is symmetric with L and R moving away from the voter at the same rate. Not surprisingly, as this case includes L polarizing, the answer depends on the shape of utility, although the strength of the impact is sufficiently strong to permit firmer conclusions.

Corollary 3. *In equilibrium in the Fixed Policies Regime:*

$$(i) \ g(r-l) \geq B \text{ implies } \frac{du_M}{d|l|} < 0 \text{ and } \frac{du_M}{dr} = 0.$$

(ii) $g(r - l) \leq B$ implies $\frac{du_M}{dr} = \frac{g'(r-l)}{2} > 0$, and

$$\frac{du_M}{d|l|} = -g'(-l) + \frac{g'(r-l)}{2} \begin{cases} < 0 & \text{risk seeking} \\ < 0 & \text{when risk neutral} \\ \text{indeterminate} & \text{risk averse} \end{cases}$$

(iii) Fixing $r = -l$, $g(r - l) \leq B$ implies

$$\frac{du_M}{d|l|} = -g'(-l) + g'(2l) \begin{cases} < 0 & \text{risk seeking} \\ = 0 & \text{when risk neutral} \\ > 0 & \text{risk averse} \end{cases}$$

The most interesting result is the final property. It says that when citizens are risk averse, as typically assumed, the welfare of the median voter increases the more polarized are the politicians in their ideal points. This is particularly striking as, under the Fixed Policies Regime, the policy that is implemented must also be moving further away from the voter as polarization increases. This nevertheless works to the benefit of the voter as the worsening in the type of policy implemented is more than compensated by the increase in the level of investment at that policy as the need for L to strategically waste investment is reduced. Empirically, therefore, we arrive at the surprising conclusion that an infrastructure project less attuned to the desires of the electorate may actually be better for the voters.

Policy Choice and Wasted Investment

We now return to the full model in which the government chooses both the level and the type of a durable policy. We will see that the logic of the previous section carries over almost exactly to this setting. The difference is that pressures within equilibrium now have two release valves. In addition to strategic underinvestment, a policymaker may also distort the type of the policy itself. Strikingly, in equilibrium the distortion moves policy away from the preferences of the median voter. Thus, the combination of durable policy and reelection concerns cause politicians to move policy away, rather than toward, the preferences of the median voter. This stands in direct contrast to the classic intuition for elections. Proposition 3 begins by characterizing conditions that are sufficient for this distortion to occur. All results in this section hold for any number of elections, $T \geq 2$.

Proposition 3. *The equilibrium first period policy satisfies $p_1 < l$ when the following hold: preferences are risk averse, $2g'(0) < g'(r - l)$, and $l \in (l^*, 0)$, where $g(r - l^*) = B$.*

Thus, the policy choice is distorted away from the voter and opposing candidate when the politicians are not too polarized and citizens are risk averse. To provide greater insight into equilibrium behavior, we state the complete equilibrium for the case of quadratic-loss utility.¹³ We then have that $g'(0) = 0$ and the condition on g' in Proposition 3 is trivially satisfied.

Corollary 4. *With quadratic-loss utility, $l^* = r - \sqrt{B}$, and equilibrium is given by three cases:*

(i) $l \in (r - \frac{\sqrt{B}}{2}, 0)$. Then $p_1 = 2l - r < l$, with investment levels:

$$q_1(p_1) = \frac{B}{2} + 2(r - l)^2, \quad q_1(r) = \frac{B}{2} - 2(r - l)^2, \quad \text{and}$$

$$q_1(p) = 0 \quad \text{for all } p \neq p_1, r.$$

(ii) $l \in (l^*, r - \frac{\sqrt{B}}{2})$. Then $p_1 = r - \sqrt{B} < l$, with investment levels $q_1(p_1) = B$, and $q_1(p) = 0$ for all $p \neq p_1$.

(iii) $l < l^*$. Then $p_1 = l$ with investment levels $q_1(p_1) = B$, and $q_1(p) = 0$ for all $p \neq p_1$.

L wins reelection with certainty, $P(h_1) = 1$. For $t \geq 2$, $p_t = p_1$, with no further investment, and $P(h_t) = 1$.

For low and moderate levels of polarizations (cases (i) and (ii)), the first period incumbent distorts policy, choosing a p_1 to the left of his own ideal point. In case (i) he also distorts the level of investment, underinvesting at the implemented policy and wasting the remaining investment at a second policy. In case (ii) only the type of policy is distorted and investment is otherwise efficiently concentrated at a single policy. For larger degrees of polarization in case (iii), the incumbent implements his ideal point and efficiently concentrates the entire budget at that point. However, for all cases the election outcome is the same as in the Fixed Policies Regime as L is reelected with certainty in every period.

To understand the dual distortions in policy, we need only recall the logic of underinvestment in earlier results. In those results, the purpose of underinvestment was to deliberately create a base of policy at R 's ideal point to tempt R should she be elected to office, which in turn ensured the voter preferred to reelect L . The same logic applies here except that L now has two tools available with which to create a base of policy, and he chooses between them depending on their relative cost and benefit. When citizens are risk averse, it is profitable to distort the type of policy as the cost of the distortion

¹³The full statement of equilibrium is very similar although analytically less concise; the full equilibrium statement is presented in the Appendix.

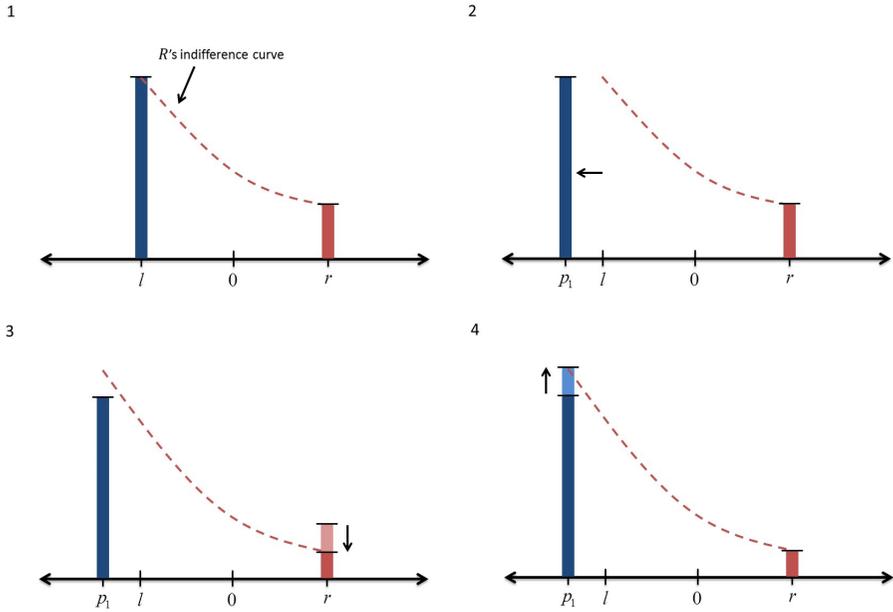


Figure 3: Distorting policy quantity and type.

to R is much greater than it is to L . Thus, a little distortion in policy type is almost without cost to L but imposes a substantial deterrent to R . For low levels of polarization, L deploys a combination of distortions in both the type and level of policy, whereas for moderate polarization he distorts only the type of policy. This is because the polarization itself provides a natural deterrent to R as imitating L 's preferred policy is then less attractive. For the larger levels of polarization in case (iii), the polarization itself is sufficient and no distortion in policy is necessary.

The logic of equilibrium is depicted in Figure 3. By distorting the type of policy to $p_1 < l$, L is able to increase the investment level at the implemented policy. This can be seen by proceeding from panel 1 through panel 4 in the figure. Significantly, despite distorting the policy that is implemented, the decoy policy that receives investment remains exactly at R 's ideal point. This reflects a continuation of the equilibrium logic: L seeks to make policy p_1 less attractive to R relative to the alternative, and, thus, he seeks to make the alternative as attractive to R as possible. The irony, of course, is that the policy project that receives investment and actually reflects the preferences of one of the candidates is the exact one that is never implemented.

The above results deal only with risk aversion, raising the question of how, and whether, the type of policy is distorted with other risk profiles. With risk seeking, or even risk neutral, preferences, the cost of distorting the type of policy impacts L at least as much as it impacts R and is no longer profitable. This does not imply, however, that L moves policy in the other direction, toward the voter and R . Rather, L still wishes to make the implemented policy unattractive to R , and he achieves this by locating at this own ideal point and underinvesting. This emphasis on the ideal points of L and R renders the game equivalent to the Fixed Policies Regime and, in fact, the equilibria are exactly identical.

Proposition 4. *For risk seeking or risk neutral preferences, the equilibrium is exactly as in Proposition 2.*

The remaining case is for mixed preferences that are neither perfectly risk averse, risk seeking, or risk neutral. In this case the equilibrium depends on the precise shape of the utility functions and the degree of polarization. Whether this produces distortions in the type of policy in addition to the investment levels is unclear. What is clear is that the logic of Proposition 4 carries through and the type of policy that is implemented never converges toward the median voter, remaining either at L 's ideal point or diverging to the left.

Corollary 5. *Regardless of risk preferences, the policy implemented in every period satisfies $p_t \leq l$.*

Put together, the results imply that the appeal of policy to the median voter remains forever capped. Regardless of the investment levels, the type of policy that is implemented is always at least a distance l from the voter's ideal point. This eliminates any hope that, by allowing policymakers to choose the type of policy, the inefficiency evident in earlier results is alleviated. Rather, the freedom to choose policy only provides policymakers another tool with which to achieve their own ends.

The dual distortions in policy are used by L to maximize his own utility and to deter R . Whether the use of two tools rather than one comes at the expense of the voter is unclear and depends on the trade-off between the type and level of investment. Corollary 6 resolves this question and characterizes median voter utility when the policy type in equilibrium is to the left of L 's ideal point; when policy equals L 's ideal point, voter utility is as in the Fixed Policies Regime (and given by Corollaries 2 and 3).

Corollary 6. *For quadratic-loss utility, the per-period utility for the median voter in equilibrium is:*

$$u_M = \begin{cases} r^2 - 2l^2 + \frac{B}{2} & \text{(i) } l \in \left(r - \frac{\sqrt{B}}{2}, 0\right) \\ -r(r - 2\sqrt{B}) & \text{for (ii) } l \in \left(l^*, r - \frac{\sqrt{B}}{2}\right). \\ -l^2 + B & \text{(iii) } l < l^* \end{cases}$$

The variation of voter utility in r is straightforward: utility increases in r within ranges (i) and (ii) as this frees L to invest more at the implemented policy and to distort policy less; beyond the boundary of case (iii) R is sufficiently polarized so as to not impose a constraint on L 's policy choice, and further polarization in r has no impact on the voter.

The variation of voter utility in l is more interesting. Voter utility decreases in $|l|$ initially in case (i), then is independent of $|l|$ in case (ii), before decreasing again in case (iii). The independence of case (ii) is surprising. In this region L relies exclusively on distortion in the type of policy to deter R , and this distortion is a function of r and independent of l .

This case is of particular interest when the polarization is symmetric (with both l and r moving away from the voter simultaneously) as it generates a non-monotonicity in voter utility, as depicted by the solid line in Figure 4. The equilibrium comparative statics are described in Corollary 7.

Corollary 7. *Fixing $r = -l$ for quadratic-loss utility, the cases in Corollary 6 give: (i) $\frac{du_M}{dr} = -2r < 0$, (ii) $\frac{du_M}{dr} = -2r + 2\sqrt{B} > 0$, (iii) $\frac{du_M}{dr} = -2r < 0$.*

The symmetric polarization of the politicians initially hurts the voter as L uses distortion in the type of policy to deter R from imitating his policy. This distortion actually increases in polarization, increasing at a faster rate than the polarization itself. However, upon reaching the point at which further distortion in type is unnecessary, the voter's utility then actually increases in polarization as the need for L to distort the investment level is relaxed. At the point at which neither distortion is necessary utility is maximized. Thus, the voter strictly prefers a moderate degree of polarization between the politicians. This preference is bounded, however, as any further polarization from this point only lowers her utility as the implemented policy of L 's ideal is ever more distant.

Also depicted in Figure 4 — by the dashed line — is voter utility for the Fixed Policies Regime (from Corollaries 2 and 3). The maximum voter utility is common across both settings as in this situation the entire budget is invested at L 's ideal point. The settings differ for lower levels of polarization and, surprisingly, the voter obtains more utility in the Fixed Policies Regime. Therefore, the restriction on policymakers to only distort policy levels actually

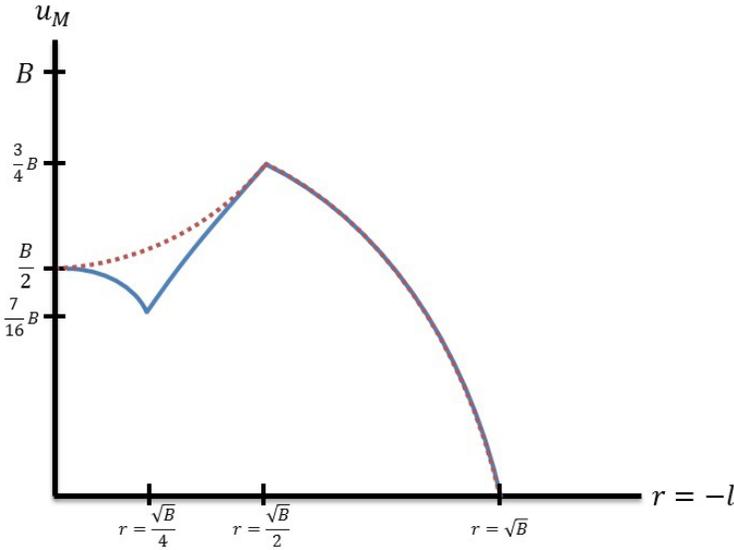


Figure 4: Non-monotonic voter utility: Full model (solid line), Fixed Policy Regime (dashed line).

improves voter utility. Thus, endowing policymakers with greater freedom not only allows them to distort policy at the expense of their opponent, but also at the expense of voters.

An Infinite Horizon

Until now we have presumed a fixed budget size and a finite number of periods. One may wonder whether either of these features is driving our results. We show in this section that this is not the case. In fact, we find that a larger budget and a longer horizon only increase the distortion perpetrated by the incumbent government, to the extent that the fraction of investment devoted to active waste approaches one half of the entire budget as time goes on.

For pedagogical and space reasons, we extend to an infinite horizon within the Fixed Policies Regime.¹⁴ We present two results. In our first result we change only the horizon, retaining the finite budget B . Proposition 5 shows that only extending the horizon in this way has no impact on equilibrium behavior.

¹⁴The same logic holds in the full model; details are available from the authors upon request.

Proposition 5. *For $T = \infty$ the equilibrium is identical to that with T bounded in Proposition 2.*

The logic is a straightforward extrapolation from earlier results. By spending all of the money strategically in the first period, L is able to lock in his advantage in period 2, 3, and so on. Without new investment funds ever appearing, there is no limit to how long this advantage lasts and the proposition establishes that it can, in fact, extend into perpetuity.

Perpetuity is, of course, a long time. One may reasonably expect that investment funds arrive over time. Our operating assumption has been that these funds can be borrowed against and, thus, accessed in the first period. An infinite horizon — and a corresponding infinite pool of investment funds — stretches this assumption to the limit and beyond. To capture constraints on borrowing, we now suppose that a budget b^* is available in each period and that these investment funds can be deferred but not brought forward to earlier periods.¹⁵

The trickle of investment funds in each period makes L 's intention of locking-in his electoral advantage more difficult. Nevertheless, it does not make it impossible and, in equilibrium, L secures reelection indefinitely.

Proposition 6. *Set $T = \infty$ for the Fixed Policies Regime. Let t^* be the time period such that: $(t^* - 1)b^* \leq g(r - l) \leq t^*b^*$. In equilibrium L implements $p_t = l$ in each period with investment levels:*

$$\begin{aligned} q_t(l) &= b^*, & q_t(r) &= 0 & t < t^* \\ q_t(l) &= \frac{1}{2}b^* + \frac{g(r-l)-(t^*-1)b^*}{2}, & q_t(r) &= \frac{1}{2}b^* - \frac{g(r-l)-(t^*-1)b^*}{2} & \text{for } t = t^*. \\ q_t(l) &= q_t(r) = \frac{1}{2}b^* & & & t > t^* \end{aligned}$$

L wins reelection with certainty; $P(h_t) = 1$ in every period.

To gain his advantage over R , L must not make his own policy so attractive that R imitates him. With a fixed budget in each period, this does not become an issue until period t^* is reached. Until then L is able to invest all funds at his own ideal policy type. After period t^* , L must balance his desire to improve the quality of his implemented policy with the need to keep R at bay and ensure his own reelection. Strikingly, this balance can only be maintained by allocating investment exactly equally across the two policy types and this balance must be retained into perpetuity. This result highlights that L 's advantage is maintained by a difference in the *absolute* level of investment at each policy rather than a difference in the *relative* levels. An immediate

¹⁵Formally, we are eliminating borrowing on future funds altogether. We could have instead imposed a limit on the amount of funds that can be borrowed against, although this would not substantively affect the results.

implication, therefore, is that as the budget expands, the fraction of investment funds that are actively wasted approaches $\frac{1}{2}$!

The dynamic allocation of funds in Proposition 6 creates an interesting dynamic in project efficiency. Initially the project appears to do well with all funds efficiently allocated to the implemented project with zero waste. Eventually, however, a critical point is reached at which waste begins to creep in. The waste gets worse as time goes on, and ultimately as much money is wasted as is spent on the implemented project. This dynamic matches what is often observed in practice. Whereas waste in practice is typically blamed on lax oversight or corruption, our theory suggests that substantial waste can be induced by the deliberate, active effort of the incumbent to secure his own electoral advantage.

Discussion

The behavior in our model and the policies it gives rise contact at several points broader issues in the study and practice of politics. We briefly discuss several touchpoints of particular interest.

Incumbency Advantage

The advantage that L creates for himself in equilibrium is, in effect, an unbeatable incumbency advantage. Unlike the leading explanations offered in the formal literature, this advantage accrues not because the incumbent has conveyed that he is of a superior type or a harder worker than his potential replacement. Rather, the incumbent in our model has no superior traits other than sharing a policy preference with the median voter given the investments undertaken. Indeed, the truly incendiary aspect of this situation is that it is created deliberately by the incumbent for his own benefit and at the expense of policy efficiency. Our results cast a far more negative light on the incumbency advantage than typically perceived in the literature.

This logic is sufficiently solid in the model that the incumbent is never defeated, benefitting from an infinite incumbency advantage. This does not match practice, of course, where incumbents are sometimes, if rarely, defeated, yet this dissonance is more due to the parsimony of the model than an issue with underlying the mechanism. A natural extension of the model is to add shocks that can shift preferences and this can be enough to dislodge an incumbent and weaken the incumbency advantage. The standard approach is to add shocks (or uncertainty about) the preferences of the voters. Our model is robust up to moderate such shocks for, as noted early, our equilibrium is atypical in not being defined by indifference of the median voter. Instead, the

smallest shocks that can upset our equilibrium — and dislodge an incumbent — are shocks to the preferences of the *opposing* candidate.

Beyond the occasional defeat of an incumbent, transitions of power impose a unique policy cost when policy is durable. The perverse construction of policy that served the original office holder, now works against him and everyone as his successor must work with a severely underfunded policy base. Should the original office holder care enough about policy, and the probability he is thrown from office sufficiently high, then he may be tempered in his initial distortions of policy with an eye to the future after he leaves office.¹⁶ This sort of insurance logic underlies the equilibrium policy moderation in Glazer (1989). The difference between the models turns on how much politicians weigh holding office versus policy outcomes and how stable is the political environment. Our results fit a world in which politicians are more motivated by holding office than policy outcomes per se. In that case our equilibrium persists even if an incumbent can be thrown out as the potential incumbency advantage delivered by distorting policy outweighs the cost should he lose office.¹⁷ On the other hand, the insurance logic of Glazer (1989) fits a world in which politicians are predominantly motivated by policy outcomes directly and for whom the long-term sequence of policy is more important than whether they hold office.

Bureaucratic (In)Efficiency

Another connection is to the idea of strategic inefficiency in the bureaucracy (Moe, 1989). Although this idea has obtained prominence in the field of public administration, it has yet to appear in the study of elections. The wasted investment that appears in our model can be thought of as strategic inefficiency, although the logic is distinct from that in the bureaucracy literature. There the inefficiency arises from attempts to insulate policy choices of one government from meddling by future governments. In our model, on the other hand, the waste creates a threat point, making change less costly rather than more costly, thereby enshrining the hold on power of the current government.

Decreasing Returns to Scale

An assumption of our model is that policy investment delivers linear and unbounded returns. In practice it is likely that returns vary with the scale of investment, arguably with greater returns for the initial investment. It is also likely that returns ultimately dissipate — how many freeways can one city build? — such that even a car-loving politician would be inclined to switch investment to a subway system. A suspicion may be that this feature

¹⁶We thank an anonymous referee for bringing this possibility to our attention.

¹⁷This requirement is evident in our maintained assumption that $\kappa \geq 2B$.

undermines our equilibrium as voters will inevitably switch preference from the car-loving politician to the subway-loving politician once the freeway system is sufficiently built out, thereby disrupting the power of incumbency. However, this logic is true *only* if the incumbent chooses to fully build out the freeway system. Rather, the intuition from our model suggests that an officeholder will distort down investment, and potentially waste greater investment, in a setting with decreasing returns to ensure that the preferences of the opposing candidate and the median voter continue to diverge, maintaining the advantage of the incumbent.

Valence and Common Policy Preferences

Investment in a durable policy is assumed to deliver benefit to all voters and policy quality can, therefore, be interpreted as a valence dimension. A common observation in that literature is that this may not match preferences in practice, even on policies typically thought to be public goods. Perhaps, the argument goes, a right-wing citizen actually prefers less public parks to more, or a left-wing voter prefers less investment in military capability than more. Although such heterogeneity is surely extant, for the critique to have bite the heterogeneity must upend the equilibrium logic. And on that score, the impact is tempered. In typical models the preferences of partisans matter none as with a pivotal median voter it only matters that she values valence positively whether it appears to her left or to her right. Our model is atypical in that the indifference condition rests instead with the opposing candidate. If this candidate values valence less on the opposing flank the underlying logic would be strengthened that the incumbent can ensure reelection through strategic policy investment, although the need to underinvest to ensure the challenger's indifference would be tempered. Indeed, left-wing voters' dislike of right-wing valence would be enhanced indirectly as the median voter's preference for it ensures that the left-wing candidate is forever kept out of office and their preferred policy never implemented.

Polarization

Our model also speaks to contemporary debates over polarization, particularly among elites. Our results suggest that elite polarization directly impacts policy choices, even when control of government is unchanging. Moreover, as Corollaries 6 and 7 demonstrate, the welfare implications of polarization depend on which side of politics it is that is polarizing. If, as some scholars suggest, it is the Republicans alone that are becoming more extreme then polarization will improve the efficiency of policies adopted by Democrats above and beyond the electoral impact of this polarization. If, on the other hand, it is both parties that are polarizing then the welfare implications are less

clear-cut. Studies of polarization have focused on whether it exists and how large is the effect, and less so on the policy implications. Our model provides the bridge from careful measurement of preferences to the implications for policy choice.

Durable Policy in Practice

The intuition for our model is easiest to see in terms of physical infrastructure, yet it applies more broadly, underlying policy debates and political preferences in some unexpected domains.¹⁸ Take, for instance, the evolution of the Iraq war. The decision to invade Iraq in 2003, taken by George W. Bush, was very much irreversible and one that required continued investment over time. After some initial success, the policy did not go well. So much so, that by the 2004 election, a majority of Americans thought the decision to invade was a mistake.

Intuitions from standard models of political accountability suggest that this policy choice should have been held against Bush and cost him reelection. However, the irreversibility of policy, and the path dependence of voter preferences, did not work against the president, and arguably worked in his favor. In polls in October 2004, 59% of respondents believed that the U.S. would be victorious in Iraq if Bush were reelected, whereas only 39% predicted victory if John Kerry became president.¹⁹ What standard models miss about this example, and that our model is able to capture, is that the decision to invade irrevocably changed the policy landscape going forward, such that whilst voters had changed their preference over whether to invade, reversing the decision was not possible, and they had no choice but to deal with the facts-on-the-ground, so to speak. Moreover, though the blame for the war lay with George W. Bush, looking prospectively, voters determined the candidates would respond differently to the policy landscape as it lay, and that they favored how Bush would handle it. Furthering this interpretation, the Bush administration worked assiduously to promote the policy differences between the candidates on how to respond to the current situation.²⁰

A similar logic arose in response to the Affordable Care Act — aka Obamacare — in the 2012 presidential election. The size of the reform necessitated

¹⁸Although fitting the model precisely to practice is complicated by the reality that politicians who follow the logic of our model do not, for good reason, promote their Machiavellian motivation.

¹⁹See Carroll (2004) for the Gallup poll conducted from Oct 1 to 3, 2004. Other polling questions support this view: On the question of which candidate would better handle the situation in Iraq, support for Bush consistently exceeded that for Kerry an average 6.4% throughout the run-up to the election (Newport and Moore, 2004). The Iraq war also was listed high on voters' rankings of issue importance, implying that these differences in evaluation carried weight in the voting decision (Jones, 2004).

²⁰The focus of these efforts was on John Kerry's statements that the 9/11 terrorist attacks necessitated a response more akin to a police action than a military one.

a delay in implementation while the infrastructure to support it was put in place. Electorally this delay was important as it made abandonment of the policy altogether more feasible. Obama's opponent in 2012, Mitt Romney, vowed to repeal Obamacare should he win the presidency, thereby creating a divide between the candidates. Moreover, despite voters being ambivalent about the law itself, they possessed a significant preference for Obama over Romney on health care policy, an issue that was ranked high in their priority.²¹

Obama won reelection against Romney benefitting from this difference with his opponent. Obama's success in health care reform can be contrasted against that of his predecessors in the Democratic party in the 1960s who passed the Medicare legislation. After the legislation passed in 1965 — with overwhelming popular support — Democrats were rewarded with big midterm losses in 1966 and Republicans won the White House in five of the next six presidential elections. The difference between Medicare and Obamacare's history (at least until now) is that the strength of the program led Republicans to adopt it, despite it being distant from their ideological preference. In fact, in 1972 Richard Nixon not only failed to repeal the Medicare program but instead chose to expand it, building further on the investments already made in the program.²²

The forces we identify in our model are not unique to two-party political competition or, indeed, limited to formal democratic politics at all. One recent episode that particularly illuminated the off-equilibrium-path threat that is central to our analysis is the experience of Egypt and its transitions in, out, and, potentially, back into democracy. For many years, a puzzling aspect of Hosni Mubarak's rule was his active support and cultivation of the Muslim Brotherhood, despite his administration declaring the group to be illegal (for instance, the Brotherhood typically sent a large delegation to the Egyptian parliament, although they were elected as independents as the movement itself was illegal and could not register as a party). One interpretation of Mubarak's nominal duplicity is that he was strategically creating an alternative to his government that provided a threat to those seeking to topple him. This threat was, in particular, useful to deter opposition within his own Nationalist movement. Potential opponents from this side knew that in the chaos from any overthrow attempt, a significant probability existed that the Brotherhood would assume power, and that their rule would be marked by much less attractive policies. As Walsh (2003, p. 35) remarked and presciently predicted:

²¹For instance, in Gallup polls conducted May 10–13, 2012 (see Saad, 2012), U.S. adults cited the cost of health care as the number one issue facing the country. In the same poll Obama was perceived as better able to handle the health care issue (by 7%) over Romney.

²²Following the logic of our model, therefore, leads to the prediction that Obamacare, as it becomes established, Republicans will no longer vow to repeal it. Consequently, the issue will recede as a political issue and, very possibly, be adopted by Republican presidents who will take steps to strengthen the program as Richard Nixon did with Medicare.

“In a completely free election, the Brotherhood would carry the country in a landslide. The question becomes whether the Brotherhood would uphold democracy in Egypt after its hypothetical rise to power.” This, indeed, was how history played out when Mubarak did fall. Although tellingly, his downfall came from the direction of the more radical Islamists, with the secularists forced to step in and put a halt to democracy when the Brotherhood sought to consolidate power. The military is now in the process of doing what Mubarak chose not to do — destroy the Brotherhood — removing an immediate threat. Less clear is how the absence of this threat will affect Egyptian politics going forward.

Conclusion

It is often said that politics is about resolving divides. In this paper we demonstrate that creating divides can be just as valuable for politicians. We show how the durability of policy leads an incumbent office holder to deliberately and strategically distort policy choice to create a divide between the parties, all in an effort to increase his own electoral standing. This result is of interest because of the direct inefficiency it identifies, and also because of how it reframes our understanding of government waste and political accountability. We provide a rationale — if not a defense — for active government waste, and we identify conditions when retrospective evaluations are not predictive of future performance, severing the link between retrospective and prospective voting.

One may seek comfort from these results by presuming that durable policy issues will not rise to prominence and salience in politics. We suggest the opposite may in fact be true. Given a choice, an office holder will seek out policy issues that are durable, aiming to elevate such issues to salience as they offer the hope of locking-in an incumbency advantage. We have provided examples, from a variety of policy domains, that fit this dynamic, although clearly more and tighter empirical work is required before this link is confirmed. It is indeed possible that issues of durable policy are the important issues of our time, and that an understanding of modern politics requires one to understand the incentive that democratically elected governments have to seek out and elevate the exact policy divides of the type that we analyze here.

Appendix

Proof of Propositions 1 and 2: First we deal with $g(r - l) \leq B$. We do this by backwards induction.

Consider the final period. In the proposed equilibrium, all the budget is spent and so the politician only has the ability to choose which policy/type is implemented.

If L is in power, his payoff to choosing l is $\frac{B}{2} + \frac{g(r-l)}{2}$, whereas his payoff from choosing r is $\frac{B}{2} - \frac{3}{2}g(r-l)$. So L prefers to implement l .

If R is in power, her payoff to choosing l is $\frac{B}{2} - \frac{g(r-l)}{2}$, whereas her payoff from choosing r is $\frac{B}{2} - \frac{g(r-l)}{2}$. Thus she is indifferent, so we resolve her indifference in favor of her choosing her ideal policy r .

Generally either politician optimally will spend the remaining budget (if any) in the final period. L will spend the remainder at l if and only if $g(r-l) > q_{T-1}^r - q_{T-1}^l$, whereas R will spend the remainder at r if and only if $g(r-l) > q_{T-1}^l - q_{T-1}^r$.

Consider the final election. In the proposed equilibrium, the voter observes the accumulated policy $q_{T-1}^l = \frac{B}{2} + \frac{g(r-l)}{2}$ and $q_{T-1}^r = \frac{B}{2} - \frac{g(r-l)}{2}$. Based on the analysis of the final period, if the voter elects L , her payoff (in the final period) will be $-g(l) + \frac{B}{2} + \frac{g(r-l)}{2}$. If the voter elects R , her payoff will be $-g(r) + \frac{B}{2} - \frac{g(r-l)}{2}$. This is where we need the assumption that $l < 0 < r$. This ensures that even though R is indifferent between l and r , the voter is not indifferent preferring policy l since her ideal point (i.e., 0) is closer to l than R 's ideal point.

Consider the second-to-last period where a politician is in power. Both politicians are aware that in the final election L will be elected with certainty, and thus given that they inherit accumulated policy of $q_{T-2}^l = \frac{B}{2} + \frac{g(r-l)}{2}$ and $q_{T-2}^r = \frac{B}{2} - \frac{g(r-l)}{2}$, and no budget is available the actions chosen in this period have no bearing on the remainder of the game. So both politicians will behave so as to maximize their current period payoff if elected. This implies that they will behave as if this were the final period of the game: L will choose l and R will choose r . Given that the voter understands this, she would prefer to elect L to maximize her current period payoff.

Now consider the period before the second-to-last period. The same reasoning applies, in that the current period's choice has no bearing on the remainder of the game. So if elected L will choose l , R will choose r , and the voter will elect L . All the periods in which no budget remains unravel in this fashion.

Consider the first period. The proposed strategy calls for the incumbent politician L to invest $q_1^l = \frac{B}{2} + \frac{g(r-l)}{2}$ at his ideal policy, and also $q_1^r = \frac{B}{2} - \frac{g(r-l)}{2}$. As we have seen above, beyond the first period this strategy results in L being elected in every period for the remainder of the game. The question is, is this specific allocation of investments optimal at the beginning of the game?

So let's suppose L deviates and invests ϵ less at both policies, so that first period investments are $q_1^l = \frac{B}{2} + \frac{g(r-l)}{2} - \epsilon$ and $q_1^r = \frac{B}{2} - \frac{g(r-l)}{2} - \epsilon$. In that

case now 2ϵ of budget remains available. If L wants to invest the remainder at his ideal point, he must wait till the final period to do so, otherwise the difference between q^l and q^r will exceed $g(r-l)$, and R will prefer to choose policy l . And so the payoff to L along this path would be:

$$\begin{aligned} (T-1) \left(\frac{B}{2} + \frac{g(r-l)}{2} - \epsilon \right) + \frac{B}{2} + \frac{g(r-l)}{2} \\ = \frac{T}{2}B + \frac{T}{2}g(r-l) - (T-1)\epsilon \end{aligned}$$

By contrast, the payoff to L from the proposed path would simply be $\frac{TB}{2} + \frac{T}{2}g(r-l)$. Thus any lowering of the initial investments (whilst constrained to ensure reelection) will lower the payoffs to L .

Even less optimal would be for L to lower the first period investment in l while keeping investment at r as $q_1^r = \frac{B}{2} - \frac{g(r-l)}{2}$, as this would result in L lowering his own current payoff, without increasing future payoffs beyond what they would otherwise be without this change to investment.

This gives that spending the entire budget in the first period is the unique optimal strategy.

Now consider the case when $g(r-l) \geq B$. In that case the entire budget b is spent in the first period at l . This is optimal, and results in L being elected in every period if the voter prefers l to r with the investment. The voter condition is:

$$\begin{aligned} -g(l) + B &\geq -g(r) \\ B &\geq g(l) - g(r) \end{aligned} \quad \square$$

In this Appendix we provide the full statement of the equilibrium for Proposition 3. The proposition stated in this paper is a direct corollary of the following proposition.

Full Statement of Proposition 3 Equilibrium

The equilibrium first period policy satisfies $p_1 < l$ when the following hold: preferences are risk averse, $2g'(0) < g'(r-l)$, and $l \in (l^, 0)$, where $g(r-l^*) = B$.*

In particular, for some $\hat{l} \in [l^, 0]$, the following two cases fully describe the equilibrium:*

(i) $l \in (\hat{l}, 0)$. $p_1 < l$ and $g'(r-p_1) = 2g'(l-p_1)$, with investment levels:

$$\begin{aligned} q_1(p_1) = \frac{B}{2} + \frac{g(r-p_1)}{2}, \quad q_1(r) = \frac{B}{2} - \frac{g(r-p_1)}{2}, \quad \text{and} \\ q_1(p) = 0 \quad \text{for all } p \neq p_1, r. \end{aligned}$$

(ii) $l \in (l^*, \hat{l})$. $p_1 = l^* < l$, with investment levels $q_1(p_1) = B$, and $q_1(p) = 0$ for all $p \neq p_1$.

L wins reelection with certainty, $P(h_1) = 1$. For $t \geq 2$, $p_t = p_1$, with no further investment, and $P(h_t) = 1$.

Proof of Proposition 3: For L to be reelected for the final period, two constraints need to be satisfied. First, the voter must be willing to elect L , given the quality of policy:

$$\begin{aligned} -g(p_L) + q_{T-1}^{p_L} &\geq -g(p_R) + q_{T-1}^{p_R} \\ \Leftrightarrow q_{T-1}^{p_L} - q_{T-1}^{p_R} &\geq g(p_L) - g(p_R) \end{aligned}$$

where p_L and p_R denote the policies that L and R will implement if elected.

Second, R must not be willing to imitate L 's policy:

$$\begin{aligned} -g(r - p_L) + q_{T-1}^{p_L} &\leq -g(r - p_R) + q_{T-1}^{p_R} \\ \Leftrightarrow q_{T-1}^{p_L} - q_{T-1}^{p_R} &\leq g(r - p_L) - g(r - p_R) \end{aligned}$$

Satisfying these two constraints guarantees the election of L , so beyond that L 's objective is to maximize his policy payoff which is (assuming all the money is spent in the first period):

$$F = -Tg(l - p_L) + Tq_1^{p_L}$$

Here the T appears in the payoff to reflect the T periods of policy payoffs.

It is safe to assume that L will spend all the budget in the first period, given that (if he satisfies the above constraints) he will be elected in every period. Delay in spending will not allow him to spend more later, and doing so will lower immediate payoffs.

Assuming that all of the budget is spent in the first period yields the additional constraint that $q_1(p_L) + q_1(p_R) = B$. Since L 's payoff is increasing in q_L we expect that a constraint restricting q_L would be binding. The non-imitation constraint is the one, so we expect that:

$$q_1(p_L) - q_1(p_R) = g(r - p_L) - g(r - p_R)$$

Substituting into it the budget constraint, we get:

$$2q_1(p_L) - B = g(r - p_L) - g(r - p_R)$$

So this becomes the equality constraint function:

$$G(p_L, p_R, q_1) = 2q_1(p_L) - B - g(r - p_L) + g(r - p_R) = 0$$

So to solve this constrained optimization problem we need $\nabla F = \lambda \nabla G$. Computing we get:

$$\nabla F = \begin{bmatrix} -Tg'(l - p_L) \\ 0 \\ T \end{bmatrix}$$

and,

$$\nabla G = \begin{bmatrix} -g'(r - p_L) \\ g'(r - p_L) \\ 2 \end{bmatrix}$$

Using the third rows of the gradients, we see that $T = \lambda 2$, so that $\lambda = \frac{T}{2}$. From the second rows, we get:

$$\begin{aligned} 0 &= \frac{T}{2}g'(r - p_R) \\ \Leftrightarrow 0 &= g'(r - p_R) \\ \Leftrightarrow p_R &= r \end{aligned}$$

From the top rows, we get:

$$\begin{aligned} -Tg'(l - p_L) &= -\frac{T}{2}g'(r - p_L) \\ \Leftrightarrow -2g'(l - p_L) &= -g'(r - p_L) \end{aligned}$$

It is from here that we get the condition in the Proposition, since $p_L = p_1$, because L will select the same policy in all periods he holds office. This condition also implies that $p_1 < l$ (where possible), since if instead $p_1 = l$ then $2g'(0) = g'(r - l)$, which violates the condition in the Proposition.

Using $p_R = r$, in the equality constraint G gives us $q_1(p_1)$:

$$\begin{aligned} 2q_1(p_1) - B &= g(r - p_1) - g(r - p_R) \\ \Rightarrow 2q_1(p_1) - B &= g(r - p_1) \\ \Leftrightarrow q_1(p_1) &= \frac{1}{2}B + \frac{1}{2}g(r - p_1) \end{aligned}$$

Finally, we use the budget constraint to solve for $q_1(r)$:

$$q_1(r) = \frac{1}{2}B - \frac{1}{2}g(r - p_1)$$

These investment levels only work if $\frac{1}{2}B \geq \frac{1}{2}g(r - p_1)$. This yields the condition:

$$\begin{aligned} \frac{1}{2}B &\geq \frac{1}{2}g(r - p_1) \\ \Leftrightarrow B &\geq g(r - p_1) \end{aligned}$$

which defines l^* in the Proposition.

Now if L moves p_1 any lower than l^* , his payoff is not improved because wasted investment at r is no longer being transferred to p_1 (because waste is now zero). So L will stop at $p_1 = l^*$, for l close to l^* .

Lastly, if l is sufficiently distant from zero, such that $g(r - l) \geq B$, then L can invest the entire budget at l without R wanting to imitate. So L will do this so long as the voter will elect him, which is the condition that $B \geq g(l) - g(r)$. Otherwise L needs to move p_1 closer to zero, such that $B \geq g(p_1) - g(r)$ is satisfied. \square

Proof of Proposition 4: $g(\cdot)$ concave (risk seeking or neutral) implies that if $x > y$, then $g'(x) \leq g'(y)$. Since $r - p_1 > l - p_1$ we know that $g'(r - p_1) \leq g'(l - p_1)$, which implies that $-g'(r - p_1) > -g'(l - p_1)$. Furthermore, this implies that $-g'(r - p_1) \geq -2g'(l - p_1)$. So this violates the condition in Proposition 3, needed for $p_1 < l$. So it must be that $p_1 = l$ (it cannot be that $p_1 > l$), and the remainder of the proof of Proposition 3, demonstrates that the equilibrium is as in Proposition 2. \square

Proof of Proposition 5: The proposed equilibrium is exactly as in Proposition 2. We check the single-deviation property, for the case of $g(r - l) < B$

(i) L in office, $t > 1$: By this point in the game, the entire budget is spent, so L must choose only whether to implement ideology l or r .

The payoff to choosing l is:

$$\left(\frac{1}{1-\delta}\right) \left(\frac{B}{2} + \frac{g(r-l)}{2}\right)$$

whereas the payoff to choosing r is:

$$-g(r-l) + \left(\frac{B}{2} - \frac{g(r-l)}{2}\right) + \left(\frac{\delta}{1-\delta}\right) \left(\frac{B}{2} + \frac{g(r-l)}{2}\right)$$

so the payoff to choosing l dominates choosing r .

(ii) R in office, $t > 1$: If for some reason R holds office, she will be indifferent between choosing l or r , so we resolve her indifference in favor of choosing r .

(iii) Voter: The voter needs to choose which politician to elect.

The payoff to electing L is:

$$\left(\frac{1}{1-\delta}\right) \left(-g(l) + \frac{B}{2} + \frac{g(r-l)}{2}\right)$$

The payoff to electing R is:

$$\left(-g(r) + \frac{B}{2} - \frac{g(r-l)}{2}\right) + \left(\frac{\delta}{1-\delta}\right) \left(-g(l) + \frac{B}{2} + \frac{g(r-l)}{2}\right)$$

However, since

$$-g(l) + \frac{B}{2} + \frac{g(r-l)}{2} > -g(r) + \frac{B}{2} - \frac{g(r-l)}{2}$$

the voter prefers to elect L .

(iv) L in office, $t = 1$: As in Proposition 2, the non-imitation constraint is the critical condition, as it ensures that L will be elected in every period. The non-imitation constraint works as it did before, except it is multiplied by a constant (for discounting):

$$\left(\frac{1}{1-\delta}\right) \left(-g(r-l) + \frac{B}{2} + \frac{g(r-l)}{2}\right) \geq \left(\frac{1}{1-\delta}\right) \left(\frac{B}{2} - \frac{g(r-l)}{2}\right)$$

The discounting terms fall out, so the non-imitation condition is the same as in Proposition 2.

The payoff to L from choosing l and investment $q_1(l)$ is:

$$\left(\frac{1}{1-\delta}\right) q_1(l)$$

so, once again, L 's objective is to maximize $q_1(l)$ subject to the non-imitation condition. As in Proposition 2, this is maximized when $q_1(l) = \frac{b}{2} + \frac{g(r-l)}{2}$.

The case for $g(r-l) \geq b$ is analogous, where all that changes is that in the first period L can invest the entire budget at l (as in Proposition 2). \square

Proof of Proposition 6: This investment schedule has L spending the entire budget b^* in each period. In all periods before t^* , politician L will spend the entire budget at his own ideal point l . This is fine because the non-imitation constraint is satisfied. In period t^* politician L begins to waste some of the budget at r so that difference between accumulated investment across the policies is exactly $g(r-l)$ (i.e., the non-imitation constraint is satisfied). Finally, in periods after t^* , in order to keep R from wanting to imitate, politician L spends the budget equally at r and l .

We verify that the single-deviation property holds, along the path given by L 's investment.

- (i) Consider the voter. In order for the voter to want to deviate by electing R , her intermediate payoff (i.e., the one-period payoff from electing R) must be higher than the intermediate payoff from electing L . In order for the intermediate payoff from electing R to be higher, it has to be that

the accumulated policy at r is higher than at l (since $l = -r$, ideological distant does not play a role). But, since the above investment schedule of L ensures that for any t , that $q_t^l > q_t^r$, the voter never wishes to deviate by electing R .

- (ii) If R is in office, can she do better than to maximize her policy payoff subject to non-imitation? If we make the assumption that $t^* > 1$, then R is never in a position in which she can overtake L in investment in a single period. This ensures that no single-period action is available that would allow her to violate the non-imitation constraint. This means that, with certainty, no matter what R chooses to do the voter will not reelect her. Given that the voter won't reelect her, it is in R 's best interest to spend the entire budget at r .
- (iii) If L is in office, it is easy to see why the above investment schedule satisfies the single-deviation property. It maximizes the policy payoff in every period, subject to the non-imitation constraint.

□

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