Federalism and Ideology*

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Abstract

Classic arguments about federalist governance emphasize an informational or learning role for decentralizing policy authority, but in practice ideological outcomes frequently motivate this choice. We examine the role of ideology in the allocation of policy-making power by modeling an infinite horizon interaction between an elected central executive and two local governments. Decentralization reduces the executive's ability to set policy and control externalities, but potentially insures against future policy reversals. In this environment, partial decentralization is a common outcome. Complete decentralization arises when executives are unlikely to be re-elected, party polarization is high, and institutional hurdles to policy-making are big. These results help to clarify existing cross-national empirical findings on the determinants of centralization. The model also shows that a welfare-motivated constitutional designer may not want to allow politicians to re-allocate policy-making power over time.

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1 Introduction

Writers of regulations, laws, and constitutions have long prioritized the issue of centralization versus decentralization. The concern is natural, as the assignment of authority is obviously consequential for policy outcomes across geographical units and over time. Many of the trade-offs are by now familiar. Decentralization can encourage the discovery of good policies and adaption to local conditions, while centralization can control externalities, implement best practices, and prevent a wasteful "race to the bottom."

The stakes of centralization choices are evident in the evolution of some of the most important policy arenas. As an example, the Clean Air Act of 1970 and its amendments provide the foundation for air quality regulations in the United States. Two provisions pertaining to automobile emissions are of particular interest. Section 209(a) of the law *preempted* state-level regulations; in other words, it centralized authority at the federal level by superseding state standards. Section 209(b) gave California the power to adopt standards at least as stringent as prevailing federal standards. This decentralizing exemption allowed California to address long-standing air quality issues in an aggressive manner, and other states could choose whether to adopt California or federal standards. The Trump administration rescinded (i.e., centralized) this authority in 2019, but in 2022 the Biden administration restored the long-standing status quo. Other rollbacks of decentralization include state-level preemptions of paid sick leave and minimum wage laws in cities such as Austin, Birmingham, and Oklahoma City. Figure 1 shows that these preemptions have occurred predominantly in states governed by unified Republican control over the legislature and the governorship.

One often articulated rationale for centralization or decentralization is quality: centralization allows the imposition of better policies, while decentralization may aid in their discovery. A productive literature in theoretical political economy has characterized incentives for policy learning and diffusion in federal systems (e.g., Kollman, Miller, and Page 2000, Strumpf 2002, Cai and Treisman 2009, Callander and Hårstad 2015, Cheng and Li 2019). In these models,

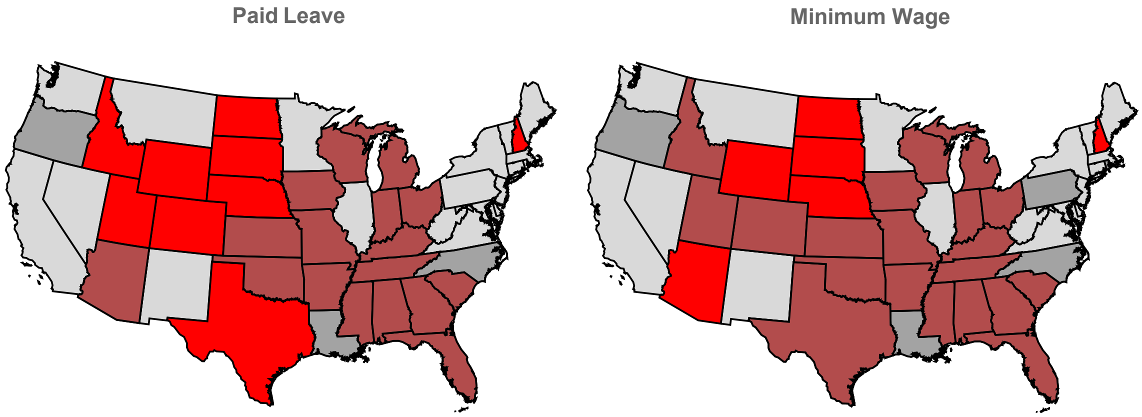


Figure 1: Preemption and GOP Trifectas. Darker shades denote the presence of preemption laws for municipal paid leave and minimum wage ordnances. Red shades denote Republican control of all legislative chambers and the governorship in 2017. Neither Alaska nor Hawaii had unified Republican control or preemption laws. Source: von Wilpert (2017).

policy trials can produce useful information for future politicians, and thus centralization choices are driven by their equilibrium information-revelation properties.[1]

Yet the above examples strongly suggest that the achievement of ideological outcomes rather than quality is often the central driver of centralization choices. The rationale for reducing California's 209(b) authority has seemingly little to do with revealed policy failures. If anything, the adoption of California's standards by 15 other states is evidence of the opposite. Likewise, the preemption of common and generally popular local sick leave and minimum wage laws was perfectly consistent with the well-established policy views of the governing party. Both examples also highlight the fact that changes in political preferences over time can affect the allocation of policy authority. Accordingly, forward-looking politicians must anticipate the durability of their chosen arrangements.

This paper develops a theory of the role of ideology in the centralization or decentralization of policy-making powers. It accounts for the observed variation in centralization structures by asking how a politician assigns authority across levels of government in the face of uncertainty

[1] Supreme Court Justice Louis Brandeis' famous 1932 quotation in *New State Ice Co. v. Liebmann* about each state acting as a potential "laboratory" for democracy (which need not be repeated here) is a staple in this literature.

over the preferences of future policy-makers. While a few other models have considered the role of ideology in various ways (Volden, Ting, and Carpenter 2008, Crémer and Palfrey 1999, 2000), our focus on electoral uncertainty is to our knowledge both unique and empirically well-grounded.

Our model features policy-making in two localities over an infinite horizon. Policies are located on a unidimensional ideological policy space, and one locality is right-leaning while the other is left-leaning. Policies can have spillovers that induce some benefit from coordination. In each period, a national-level or "federal" politician may centralize or decentralize each locality's policy-setting. We refer to this politician as the *executive*. Executives care about social welfare but also belong to either a right or left party and are therefore biased in favor of one locality. Their preferences may be more or less ideologically extreme than those of their local allies, and so the distance between left and right executives is a measure of national-level polarization. Under centralization, the executive chooses policy, while under decentralization, the locality chooses. Notably, full centralization does not bind the executive to choose the same policies across both localities, and the executive can choose a mix of centralization and decentralization. The model suppresses uncertainty over the quality of policies, and thus in contrast with much of the existing literature, learning plays no role.

Before each period, an election determines the executive's party. Newly elected executives can be re-elected at most once and care about policies in their second period of life even if they lose. Thus, as is standard in models of federalism, executives have a two-period time horizon. A key parameter in the model is institutional *rigidity*, which produces inertia in centralization decisions. With some probability, executives cannot change the polity's profile of centralization and decentralization, and policy-making proceeds according to the previous period's arrangement. As the trifecta examples suggest, resolving fundamental (and perhaps constitutional) questions about the allocation of political authority requires strong political consensus. Rigidity thus captures the idea that opportunities for addressing centralization arrangements are rarer than those for conventional policy choices. High rigidity might correspond to strong checks and balances systems, while Westminster parliamentary systems might have lower rigidity.

Electoral uncertainty and rigidity produce the central tension in the model. Centralization allows an executive to impose policy and internalize policy externalities. It is, therefore, a clear choice for a re-elected executive. For a newly elected executive, the choice depends on rigidity. With high rigidity, centralization raises the risk of centrally-mandated policies set by the opposition. A less risky option is to centralize the ideologically distant locality while decentralizing the closer locality. This provides some insurance in the event of inertia and a bad electoral outcome. The reverse pattern of centralizing the closer locality and decentralizing the more distant one is never optimal. The least risky option is complete decentralization, which insulates policy completely from national election outcomes.

The model shows that the conjunction of rigidity, polarization, and political competition produces greater decentralization. Generally, electorally secure incumbents adopt higher levels of centralization. Complete decentralization occurs only under both high rigidity and high polarization. In equilibrium, the executive will often centralize the ideological opponent and decentralize the ideological ally. This prediction is consistent with the introductory examples and, more generally, with the common U.S. practice of selectively granting state waivers for implementing alternatives to federal programs. Recent examples of such waivers include education and work requirements for recipients of the Medicaid health insurance program in Republican-governed states during the Trump administration (Richardson 2019).[2] This contrasts with many existing models of federalism, which either assume that complete centralization or decentralization are the only policy options, or derive conditions for the optimality of such arrangements.

Our results have implications for the constitutional allocation of authority across levels of

[2] The Obama administration did not allow such exemptions, and the Biden administration rescinded the waivers in 2021.

government. As a final step, we consider the decision problem of a constitutional designer who maximizes citizen welfare. Due to the complexity of the problem, the analysis is necessarily numerical. The main implication is that the designer may not want to allow ideologically motivated politicians to adjust the level of centralization. Centralization is welfare enhancing when policy spillovers are large and executives are not too polarized relative to the localities. Yet, when elite polarization is high, centralization allows executives who face positive electoral prospects or a term limit to implement policies that are too extreme. Hence, in equilibrium, partial and complete centralization can arise even if full decentralization is socially optimal. Allowing executives to centralize or decentralize over time can thus reduce welfare relative to a fixed institutional arrangement.

The model contributes to the extensive empirical literature on federalism by suggesting two ways to sharpen tests of the roles of electoral prospects, polarization, and institutional rigidity. First, there has been little work linking ideological polarization with decentralization, but studies of ethnic fragmentation, which may play a similar role in policy-making, have produced mixed results (Treisman 2006, Blume and Voigt 2011, Spina 2013). Our model predicts that polarization or fragmentation can cause decentralization, but only when the incumbent's electoral prospects are poor and institutional rigidity is high.

Second, several studies support the notion that decentralization can insure against policy reversals when national-level politicians expect to lose power. To our knowledge, O'Neill (2003) was the first to link decentralization to political turnover, positing that "[p]arties that find themselves in the executive of a strong, centralized government may rationally choose to decentralize power if they do not expect to retain the executive indefinitely..." (O'Neill 2005, pp. 16-17). She finds that incumbents in Bolivia, Colombia, Ecuador, Peru, and Venezuela were more likely to implement major decentralization reforms when their party's national vote share decreased or the number of subnational electoral contests won by their party increased. **??** summarizes related work on the topic, and shows that most of the evidence for this mechanism stems from Latin American countries with presidential systems, which plausibly fit our notion of rigidity. Our model predicts that no such relationship would exist in non-presidential systems, where ruling parties face fewer constraints on implementing their preferred policies.

Our paper joins a growing body of academic and policy analyses of the roles of various aspects of ideology in policy centralization decisions (e.g., Bulman-Pozen 2014, von Wilpert 2017). On the theoretical side, Volden, Ting, and Carpenter (2008) include ideology in a model of policy learning but focus primarily on the classic question of the adoption of high-quality policies as opposed to ideologically close policies. Somewhat closer in spirit to this paper, Crémer and Palfrey (1999) model ideologically motivated citizens who vote over centralization and representation schemes within a single period. Centralization in this environment is valuable for reducing policy risk. Crémer and Palfrey (2000) consider the incentive for policy-motivated citizens to impose welfare-reducing central mandates in a federal system. Both papers do not consider the ideology of political elites. Gordon and Landa (2021) compare the policy polarization implications of federal and joint federal-state provision of public goods provision. Grossback, Nicholson-Crotty, and Peterson (2004), Gilardi (2010), Volden (2015), and Butler *et al.* (2017) show empirically that ideological affinity can lead to similar policy decisions across decentralized political subunits.

The literature on political centralization is vast enough to have spawned multiple review articles (Bednar 2011, Graham, Shipan, and Volden 2012, Mookherjee 2015, Gilardi 2016). In addition to models of policy experimentation in federal systems, our work is most closely related to a series of theoretical papers that address the effects of centralization on public goods provision (e.g., Oates 1999, Besley and Coate 2003, Hafer and Landa 2007, Tommasi and Weinschelbaum 2007, Kessler 2014). These papers examine a variety of institutional settings but share a concern with the control of spillovers across units. Finally, Myerson (2006, 2021) endogenizes elections and politician performance in models of political centralization.

The paper proceeds as follows. Section 2 describes the basic model. Next, Section 3 presents our main results on centralization choices. Section 4 performs a numerical constitutional design exercise that compares the welfare implications of the equilibrium results with allocations of authority that are fixed over time. Section 5 concludes.

2 Model

We consider an infinite horizon game of policy-making across two localities. In each period of the game, the players are two local governments, denoted by $i \in \{1, 2\}$, and a central "executive" player. In each period t, a policy vector $\mathbf{x}_t = (x_{1,t}, x_{2,t})$ is chosen, where $x_{i,t}$ is implemented in locality i. There is no discounting.

All players derive utility from policy choices. The basic per period utility that an actor with ideal point y derives from a policy $x_{i,t}$ implemented in locality i is:

$$u\left(x_{i,t}, y\right) = -\left(x_{i,t} - y\right)^2.$$

Local government i has an ideal point y_i, where $y_1 \leq y_2$ and, for tractability, $y_2 \equiv -y_1$. Each local government's utility over $\mathbf{x}_t$ is given by

$$U_i(\mathbf{x}_t, y_i) \equiv \gamma u\left(x_{i,t}, y_i\right) + (1-\gamma) u\left(x_{-i,t}, y_i\right). \tag{1}$$

Local governments assign weight $\gamma \in (0, 1]$ to the policy in their own locality, and $1-\gamma$ to the policy in the other locality. Thus γ is a measure of cross-locality externalities. Local government players can live for any finite number of periods, and are automatically replaced by identical players.

There are two types of executives, each of which is closer ideologically to one of the localities. Executives of type or party $j \in \{L, R\}$ have a time-invariant ideal points z_j which are symmetrically distributed around 0: $z_L \leq 0$ and $z_L = -z_R$. As a consequence, more extreme values of z_L imply more extreme values of z_R, and hence an increase in elite ideological polarization. In a given period party j executives earn the following utility from a policy vector $\mathbf{x}_t$:

$$U_j^e(\mathbf{x}, \mathbf{y}) \equiv \omega \sum_{i=1}^{2} u(x_i, z_j) + (1 - \omega) \sum_{i=1}^{2} U_i(\mathbf{x}, y_i) \tag{2}$$

This utility function combines the executive's pure policy utility with her concern for locality-level welfare, where $\omega \in (0, 1)$ is the common weight on the former. Note that the concern for welfare internalizes externalities across localities.

Every newly elected executive has a lifespan of two periods and automatically becomes her party's candidate in the subsequent election. Executives receive the utility given in equation (2) regardless of whether they are in power. Whenever a party does not have an incumbent, a new party j candidate who may become the next executive is born. We denote the age or *term* of the incumbent executive in period t by $a_t \in \{1, 2\}$.

Parties' electoral prospects vary across periods. Specifically, at the beginning of each period t, nature determines the probability p_t that a party L executive will be voted into office in the subsequent election, where $p_t \sim F(\cdot)$ is drawn randomly from non-degenerate distribution $F(\cdot)$ that has support $[0, 1]$. The party R executive wins office in the following period with complementary probability $1 - p_t$.

The incumbent executive observes p_t and may attempt to alter the status of centralization and decentralization across the polity. Each locality can be either *centralized* or *decentralized*. Centralization means that the executive chooses policy for a locality, while decentralization means that its local government chooses. We denote the centralization status of locality i in period t by $c_{i,t} \in \{0, 1\}$, where 0 corresponds to decentralization and 1 corresponds to centralization. A *centralization profile* $\mathbf{c}_t = (c_{1,t}, c_{2,t})$ for period t is the set of centralization statuses for the localities. Let $\mathcal{C} = \{0, 1\} \times \{0, 1\}$ represent the set of possible centralization profiles.

Whether the period t executive is able to change the centralization profile depends on institutional features and political conditions. With known probability $q > 0$, the executive in any given period is *weak* and unable to change the centralization profile, and thus $\mathbf{c}_t = \mathbf{c}_{t-1}$. With probability $1-q$, the executive is *strong* and free to choose $\mathbf{c}_t$. We refer to q as *rigidity*. For example, a highly rigid polity may be one with many institutional veto players or "checks and balances" that prevent rapid institutional changes. A consequence of such features is that centralization decisions made by one executive may persist over multiple periods. Once $\mathbf{c}_t$ has been determined, the actors that have policy-making authority simultaneously choose local policies. The period ends with an election.

The timing of the stage game can be summarized as follows:

1. Nature draws $p_t \sim F(\cdot)$.
2. With probability q the executive in power becomes *weak*, otherwise she becomes *strong*.
3. If the executive is *strong* she chooses $\mathbf{c}_t$, otherwise $\mathbf{c}_t = \mathbf{c}_{t-1}$.
4. Local governments and the executive simultaneously choose $\mathbf{x}_t$ according to $\mathbf{c}_t$.
5. With probability p_t a party L executive is elected; otherwise a party R executive is elected.

We assume that in period 1 a party L executive is in office, and that the *status quo* centralization profile at the beginning of the game is $\mathbf{c}_0 = (0, 0)$ (full decentralization). Neither assumption affects the results.

We derive the unique subgame perfect Nash equilibrium in which all actors play stage-optimal policy strategies. This requires policy choices in each period to be myopically optimal, and rules out contingent policy strategies.[3] Let H_t represent the history of play up to period t. In each period, a strong executive chooses a centralization profile $H_t \times \{1, 2\} \times [0, 1] \mapsto \mathcal{C}$ according to her age a_t and realized election probability p_t. Additionally, the incumbent executive chooses a policy for each centralized locality, represented by the mapping $H_t \times$

[3] This is equivalent to having each local government live for only one period.

$\{1, 2\} \times [0, 1] \times \{weak, strong\} \times \mathcal{C} \mapsto \mathbb{R}$. Decentralized local governments have analogous mappings for policy strategies.

3 Equilibrium

3.1 Stage Preferences

We begin by characterizing the policy preferences of each actor in the stage game. For a local government, maximizing equation (1) simply produces its ideal point:

$$x_i^* = \arg\max_{x_i} U_i(\mathbf{x}, y_i) = y_i. \tag{3}$$

Next, maximizing equation (2) produces an executive's optimal policy for a centralized locality:

$$x_i^* = \arg\max_{x_i} U_j^e(\mathbf{x}, \mathbf{y}) = \omega z_j + (1 - \omega) \left[\gamma y_i + (1 - \gamma) y_{-i}\right]. \tag{4}$$

Unlike the locality's optimal policy, the executive's takes externalities into account and thereby deviates from her ideal point. Additionally, the executive's optimal policy for each locality is independent of policy in the other locality, and thus does not depend on whether the other locality is centralized.

An important observation is that while centralization profiles may persist across periods, there is no policy persistence. Policy choices in a given period therefore have no implications for any player's future payoffs. Combined with stage-optimal strategies, this implies that conditional upon $\mathbf{c}_t$, the myopic optimal policies given in equations (3) and (4) fully describe all policy choices.

These policies shape the trade-off that a newly-elected party j executive faces when choosing a centralization profile. Substituting the optimal policies from equations (3) and (4) into equation (2) yields the utility of executive j under the optimal policy vector $\mathbf{x}_t^*$ chosen by the two localities and by an executive with ideal point z_k (where k may not be the same as j), given a centralization profile $\mathbf{c}_t$. We denote this utility by $U^e_{j,k}(\mathbf{x}_t^*(z_k, \mathbf{c}_t))$. Comparing the expressions for $U^e_{j,k}(\mathbf{x}_t^*(z_k, \mathbf{c}_t))$ across different centralization profiles and different executives provides two important facts that are summarized in Lemmas 1 and 2.

Lemma 1 shows how party control affects an executive's utility under each centralization profile. Its proof, along with all other proofs, are in Appendix A.

Lemma 1 (Party Control)**.** *The difference between the stage utility of a party j executive when she is in power as opposed to when an executive from party $k \neq j$ is in power is:*

$$U^e_{j,j}\left(\mathbf{x}_t^*(z_j, \mathbf{c}_t)\right) - U^e_{j,k}\left(\mathbf{x}_t^*(z_k, \mathbf{c}_t)\right) = \begin{cases} 0 & \text{if } \mathbf{c}_t = (0,0) \\ 4z_L^2\omega^2 & \text{if } \mathbf{c}_t = (0,1) \\ 4z_L^2\omega^2 & \text{if } \mathbf{c}_t = (1,0) \\ 8z_L^2\omega^2 & \text{if } \mathbf{c}_t = (1,1). \end{cases} \tag{5}$$

Party control of the executive makes no difference under complete decentralization (i.e., $\mathbf{c}_t = (0,0)$). This is obviously the case because when both localities choose policies themselves, the executive becomes irrelevant. When at least one locality is centralized, the stakes of an election increase as executives become more polarized (lower z_L) and more ideologically- as opposed to welfare-motivated (higher ω). The benefits of winning elections are the same under the two partial centralization profiles and are maximized under full centralization (i.e., $\mathbf{c}_t = (1,1)$). Thus *centralization raises the cost of losing elections*, and decentralization can potentially play an insurance role for the first-term executive.

The next lemma characterizes the executive's preferences over centralization profiles in a single period. We state the result from the perspective of a party L executive; a symmetric result holds for a party R executive. The result depends on the following threshold values of z_L:

$$\underline{z}_L = \left(2\gamma + \frac{2(1-\gamma)}{\omega} - 1\right) y_1, \tag{6}$$
$$\overline{z}_L = \frac{1}{3}\left(2\gamma + \frac{2(1-\gamma)}{\omega} - 1\right) y_1. \tag{7}$$

Note that the term in parentheses is greater than 1 and decreases in ω and γ. It is straightforward to verify that $\underline{z}_L < \overline{z}_L < 0$.

Lemma 2 (Executive Stage Preferences)**.** *For a party L executive:*

(i) When a party L executive is in power, $(1,1) \succ (0,1) \succ (1,0) \succ (0,0)$.

(ii) When a party R executive is in power,

$$(1,1) \succ (0,1) \succ (1,0) \succ (0,0) \text{ if } \overline{z}_L \le z_L \le 0,$$
$$(0,1) \succ (1,1) \succ (1,0), (0,1) \succ (0,0) \succ (1,0) \text{ if } \underline{z}_L \le z_L \le \overline{z}_L,$$
$$(0,0) \succ (0,1) \succ (1,0) \succ (1,1) \text{ if } z_L \le \underline{z}_L.$$

Lemma 2 shows that an executive in power has a unique preference ordering over centralization profiles, with more centralization preferred to less. An executive can always increase her stage utility by centralizing a locality. Thus, a second-term executive will attempt complete centralization. At the same time any executive prefers centralizing the more ideologically distant locality to centralizing the ideologically closer one. In what follows, we use the following terms for these localities:

Definition 1 (Ideological ally and opponent)**.** *The* ideological ally *of an executive j is the locality with the smallest ideological distance from z_j. Analogously, the* ideological opponent *of an executive j is the locality with the largest ideological distance from z_j.*

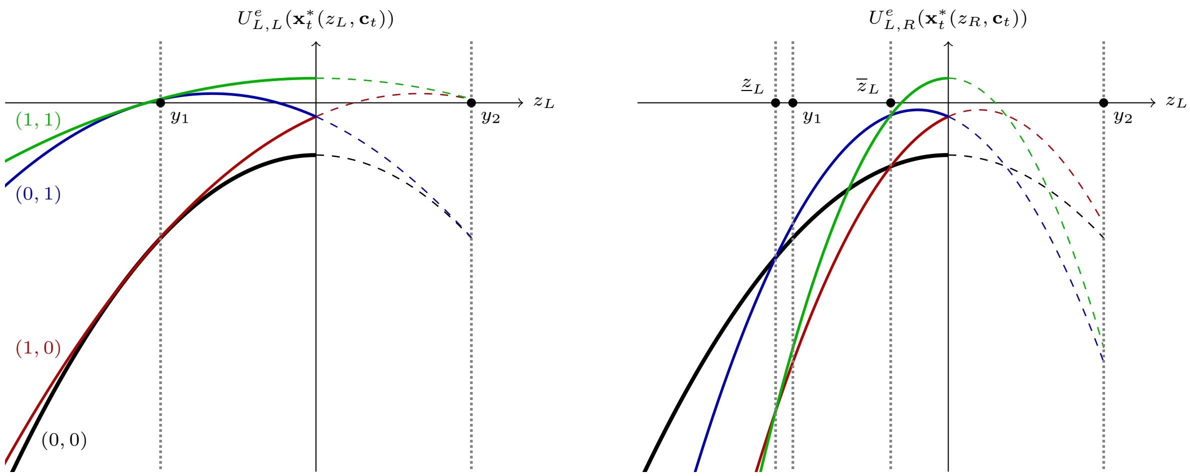
The preference ordering is ambiguous when the other party's executive is in power. As before, the executive prefers centralizing the ideological opponent to centralizing her ally.

All other comparisons depend on the degree of elite polarization, as given by the location of z_L relative to $\underline{z}_L$ and $\overline{z}_L$. When polarization is low ($\overline{z}_L \leq z_L \leq 0$), the executive out of power prefers full centralization, and when it is high ($z_L \leq \underline{z}_L$), she prefers full decentralization. This suggests that as executives become more extreme relative to localities, they become increasingly inclined to let localities choose policies to guard against the prospect of being out of power.

Several observations about the cutoffs $\underline{z}_L$ and $\overline{z}_L$ follow directly from equations (6) and (7). First, $\underline{z}_L = 3\overline{z}_L$: Higher $\underline{z}_L$ shrinks the range of elite polarization in which at least partial centralization is supported by executives out of power. Second, full decentralization is supported by executives out of power only if the elites are more polarized than localities, i.e. $\underline{z}_L < y_1$. Finally, full centralization can always be preferred by moderate executives ($z_L > y_1 > \overline{z}_L$) if they are sufficiently welfare-motivated: $\omega < \frac{1-\gamma}{2-\gamma}$.

In sum, higher welfare motivations of executives (lower ω) and localities (lower γ) align party preferences. This expands the range of elite polarization under which executives would support at least partial centralization even when the opposition holds executive power. By contrast, if executives and localities are more ideologically motivated (high ω and γ), then there is high disagreement between executives from different parties. As a consequence, first-term executives have incentives to "lock in" full decentralization or centralization of the ideological opponent, especially if the probabilities of both winning the upcoming election and strong executives are low.

Figure 2 illustrates both observations for a party L executive. (Stage preferences for party R executives are symmetric with $(0, 1)$ replaced by $(1, 0)$ and *vice versa*.) Panel (a) shows that when she is in power, a party L executive has a strict preference ordering over centralization profiles. Panel (b) shows that when R is in power, executive L's preference ordering changes as she becomes more extreme, i.e. as z_L decreases. Recall that since $z_R = -z_L$, a decrease in z_L implies more party polarization. We can also see that executive L prefers full decentralization only if her opponent is in power and parties are more extreme than the localities they represent.



(a) $(1,1) \succ (0,1) \succ (1,0) \succ (0,0)$ **(b)** $(0,1) \succ (1,0)$

Figure 2: Stage preferences of a party L executive for different executives in power and centralization profiles. Here, $\gamma = 5/6$, $\omega = 3/4$, and $y_1 = -3$. In both panels for the relevant domain of z_L: The solid black line depicts executive L's stage utility from centralization profile $\mathbf{c}_t = (0,0)$, red – from $\mathbf{c}_t = (1,0)$, blue – from $\mathbf{c}_t = (0,1)$, and green – from $\mathbf{c}_t = (1,1)$. $U^e_{L,R}(\mathbf{x}^*_t(z_R, \mathbf{c}_t))$ is executive L's utility when executive R is in power and implements policy under $\mathbf{c}_t$.

3.2 Infinite Horizon

In the full game, a party j executive who comes into power in period t faces the possibility of replacement in the following period by an executive from the opposing party. If she is re-elected and strong, then given the single period preferences of executives derived previously, she will choose full centralization ($\mathbf{c}_{t+1} = (1,1)$) and implement her optimal policy (4) for both localities. If she is not re-elected, then the opposing party's executive will choose a new centralization profile if she is strong. This produces a distribution of possible centralization profiles in $t+1$, where $\mathbf{c}_{t+1}$ depends on the realization of p_{t+1}.

These elements allow us to fully describe the dynamic objective, $V_j(\mathbf{c}_t, p_t)$. By the symmetry of the game, we focus on a party L executive's problem. The expected lifetime utility of a strong party L executive who is newly elected in period t and observes her probability of re-election p_t is as follows:

$$\begin{aligned} V_L\left(\mathbf{c}_t, p_t\right) &= U^e_{L,L}(\mathbf{x}^*_t(z_L, \mathbf{c}_t)) + p_t\left[qU^e_{L,L}(\mathbf{x}^*_t(z_L, \mathbf{c}_t)) + (1-q)U^e_{L,L}(\mathbf{x}^*_t(z_L, (1,1)))\right] + \\ & \quad (1-p_t)\left[qU^e_{L,R}(\mathbf{x}^*_t(z_R, \mathbf{c}_t)) + (1-q)\,\mathbb{E}_{p_{t+1}}\left[U^e_{L,R}(\mathbf{x}^*_{t+1}(z_R, \mathbf{c}_{t+1}))\right]\right]. \qquad (8) \end{aligned}$$

In this expression, $\mathbb{E}_{p_{t+1}}\left[U^e_{L,R}(\mathbf{x}^*_{t+1}(z_k, \mathbf{c}_{t+1}))\right]$ is the executive's expected utility from the lottery over period $t+1$ centralization profiles chosen by party R. The expected lifetime utility of a party R executive can be expressed analogously by switching L and R subscripts and switching p_t and $1-p_t$ in the expression above.

An important observation is that the payoff a first-term executive in period t anticipates from a strong period $t+1$ executive is independent of the period t centralization profile $\mathbf{c}_t$. A strong executive is never constrained by her predecessor's centralization profile. What matters for the first-term executive's choice of centralization profile in period t is the case in which the $t+1$ executive is weak and thus constrained to choose policy under $\mathbf{c}_t$.

Recall from Lemma 2 that $(1,0)$ is dominated for party L in the stage game. Hence, it can never be optimal for a first-term executive. In a similar fashion, $(0,1)$ is dominated for party R. Consequently, a party L executive of age 1 effectively chooses between three "increasing" levels of centralization ($(0,0)$, $(0,1)$, and $(1,1)$). A first-term executive can maximize her utility in period t by implementing full centralization $(1,1)$. In period $t+1$, however, she may no longer be in office, and, as we know from Lemma 1, greater centralization increases the stakes of losing the election. Hence in deciding how much to centralize today, she trades off the benefit of choosing policy today and potentially tomorrow against the risk of having her opponent set policies in centralized localities tomorrow.

How the first-term executive resolves this trade-off will depend on her probability of re-election p_t. An executive who is likely to be in office tomorrow will find centralization more appealing, while decentralization will be more appealing in an adverse electoral environment. In line with this reasoning, the expected lifetime utility of a strong first-term executive increases linearly with p_t and more so, the higher the level of period t centralization. In other words, *the benefits of greater centralization are increasing in the executive's electoral prospects*, and thus in equilibrium centralization must be monotonically increasing in p_t.

To derive conditions under which a party j executive switches between centralization profiles, we find the values of p_t at which she is indifferent between centralization profiles. Equating different values of $V_j(\mathbf{c}_t, p_t)$ produces two important cut-offs on the probability of re-election. We denote these cut-offs $\underline{p}$ and $\overline{p}$.

The executive from party L is indifferent between $(0,0)$ and $(0,1)$, and the executive from party R is indifferent between $(0,0)$ and $(1,0)$ when their probability of re-election is:

$$\underline{p} = 1 - \frac{1+q}{q}\left(\frac{z_L + (2\gamma + 2(1-\gamma)/\omega - 1)\, y_1}{2z_L}\right)^2. \tag{9}$$

Analogously, the executive from party L is indifferent between $(1,1)$ and $(0,1)$, and the executive from party R is indifferent between $(1,1)$ and $(1,0)$, when their probability of re-election is:

$$\overline{p} = 1 - \frac{1+q}{q}\left(\frac{z_L - (2\gamma + 2(1-\gamma)/\omega - 1)\, y_1}{2z_L}\right)^2. \tag{10}$$

The following result summarizes the optimal choice of centralization profile by *strong* party j executives given their electoral prospects.

Proposition 1 (Optimal Centralization)**.** *The optimal centralization profile for a strong first-term executive from party L is:*

$$\mathbf{c}_L^* = \begin{cases} (0,0) & \textit{if } p_t < \underline{p} \\ (0,1) & \textit{if } \underline{p} \le p_t < \overline{p} \\ (1,1) & \textit{if } p_t \ge \overline{p}. \end{cases} \tag{11}$$

For a strong first-term party R executive, the optimal centralization profile $\mathbf{c}_R^*$ is symmetric, replacing $(0,1)$ by $(1,0)$ and p_t by $1-p_t$.

Proposition 1 confirms our earlier intuition about the insurance value of decentralization: When strong executives face a low probability of re-election, they respond by decentralizing the ideological ally ($\mathbf{c}_t = (0,1)$ for executive L) or even both localities ($\mathbf{c}_t = (0,0)$). With some rigidity, this deprives their opponent of future policy-making power. By contrast, a high probability of re-election makes executives more "greedy": They might attempt full centralization, anticipating that they are likely to remain in office but might not be able to change the centralization level because of rigidity.

It is clear from equations (9) and (10) that $\underline{p} < \overline{p} \leq 1$. Thus there always exists an election probability for which strong executives will at least weakly prefer full centralization. Intuitively, full centralization has few downsides for an executive who is certain of re-election. It is furthermore straightforward to find conditions under which $\overline{p} \leq 0$, so that a party *only* chooses full centralization. This implies that full decentralization is never optimal for all realized re-election probabilities. For an incumbent executive to prefer full decentralization for some re-election probabilities we need $\underline{p} \geq 0$, which is not guaranteed to hold.

What conditions determine equilibrium centralization? The answer depends on the behavior of the thresholds $\overline{p}$ and $\underline{p}$. To characterize this behavior, it will be helpful to distinguish between two kinds of polities:

Definition 2 (Rigidity)**.** *A polity has high rigidity if $q > \frac{1}{3}$ and low rigidity if $q < \frac{1}{3}$.*

Figure 3 plots two cases of $\overline{p}$ and $\underline{p}$ as a function of z_L, which represents both the ideal point of party L executives and polarization. The upper and lower panels consider high and low rigidity environments, respectively. The figure depicts two critical values of z_L. There is a z_c such that $\overline{p} < 0$ for all $z_L > z_c$, regardless of rigidity. And there is a z_p such that for all $z_L < z_p$, $\underline{p} > 0$ when rigidity is high, and $\overline{p} < 0$ when rigidity is low.

In both panels, $\overline{p}$ first increases and then decreases with z_L. Put differently, as executives become less polarized, partial centralization (blue regions) gains relative to full centralization (red regions) at first, but ultimately recedes. This non-monotonicity stems from changes in the trade-off faced by first-term executives deciding whether to centralize ideological allies. Decentralizing this locality prevents the executive from setting its policy today and potentially in the future if she remains in power, but also potentially prevents the opposition from setting extreme policies in the future. The ideological cost of a decentralized ideological ally therefore becomes critical. As very extreme executives moderate and move towards their ideological allies, partial centralization becomes more attractive relative to full centralization. This dynamic reverses as moderation takes the executive further away from her ideological ally and closer to the opposition executive. When the executives are sufficiently close to each other ($z_L \geq z_c$), a decentralized ally becomes too costly, $\overline{p}$ drops below 0, and full centralization is always preferred.

For $z_L < z_c$, the character of the equilibrium depends on whether rigidity is high or low. When rigidity is low, future executives will likely be able to change the centralization profile, and so there is no point for an incumbent to give up policy-making authority in order to "lock in" decentralization. Complete decentralization is never optimal and accordingly, $\underline{p} < 0$ across the entire range of z_L. By contrast, partial centralization may be optimal since $\overline{p} > 0$ for some interval of z_L below z_c. The reason is that decentralizing an ideological ally will be almost costless for an ideologically proximate incumbent executive. As executives become more extreme than their ideological allies, however, the value of partial centralization dissipates rapidly if rigidity is low. Given that partial centralization is unlikely to survive into the future, extreme executives are hesitant to give up present policy-making authority even to moderate localities on their side of the ideological spectrum.

Only high rigidity allows for complete decentralization. Under high rigidity, $\underline{p}$ is positive for extreme values of z_L. This captures the ability of decentralization to insure against adverse electoral outcomes. An extreme first-term executive who is pessimistic of re-election can exploit rigidity to preserve her ideological ally's policy autonomy. As executives become more moderate, $\underline{p}$ decreases because they become less concerned about the possibility of centralization by their opponent. This increases the attractiveness of partial centralization. The value of $\underline{p}$ is also increasing in rigidity q, because the insurance value of decentralization depends on the persistence of institutional mechanisms.

Proposition 2 collects these cases to state the relationship between rigidity, elite polarization and optimal centralization decisions. The main result is that full decentralization requires both high rigidity and elite polarization ($z_L < z_p$). First-term executives in the interval $[z_p, z_c]$ partially centralize if they are pessimistic of re-election, and fully centralize if they are optimistic. Full centralization across the range of p_t is possible under low polarization ($z_L > z_c$) or low rigidity and high polarization. Otherwise, the relationship between full versus partial centralization and polarization is non-monotonic. As before, symmetric statements hold for a newly elected party R executive, replacing $(0, 1)$ by $(1, 0)$ and p_t by $1 - p_t$.

Proposition 2 (Elite Polarization and Centralization)**.** *There exists z_c and z_p, where $z_p < z_c$, such that:*

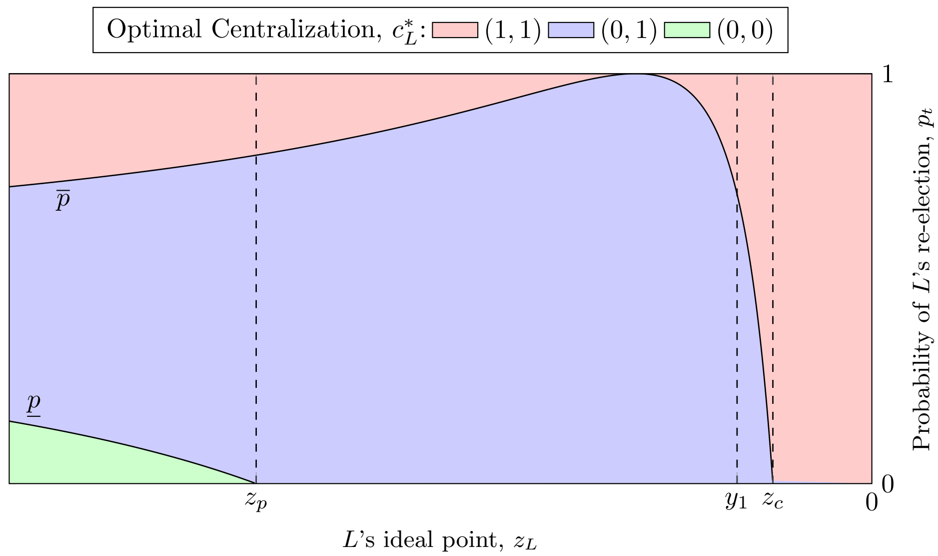
(i) if $z_L \geq z_c$, then $\overline{p} \leq 0$ and thus $c^* = (1, 1)$.

(ii) if $z_L \in [z_p, z_c)$, then $\overline{p} > 0 > \underline{p}$ and thus $c^* \neq (0, 0)$.

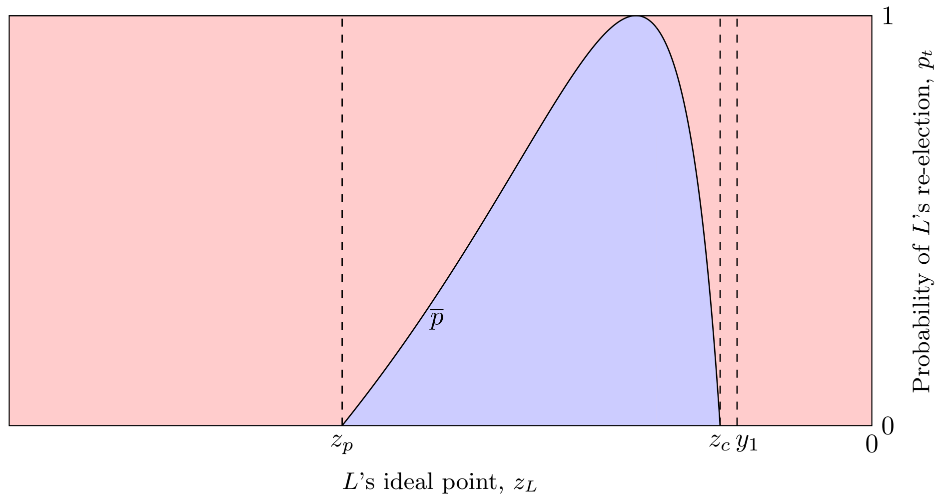
(iii) if $z_L < z_p$ and rigidity is low, then $\overline{p} < 0$ and thus $c^* = (1, 1)$.

(iv) if $z_L < z_p$ and rigidity is high, then $\underline{p} > 0$ and thus all centralization profiles are possible.

The calculated values of z_c and z_p in the proof of Proposition 2 allow us to be more specific about the polarization levels required for different centralization profiles of interest. In particular, it is easily shown that full decentralization requires $z_L < y_1$: Executives must be *more* extreme than the localities.



(a) High rigidity ($q = 11/12 > 1/3$): Implementing $(0, 0)$ as an insurance against policy reversals can be beneficial if the polity is rigid and executives are ideologically polarized.



(b) Low rigidity ($q = 1/12 < 1/3$): Implementing $(0, 0)$ as an insurance against policy reversals is not beneficial if institutional arrangement is not stable, so $(0, 1)$ becomes a "middle ground."

Figure 3: Rigidity, polarization and centralization preferences. Here, $\gamma = 5/8$, $\omega = 1/2$, and $y_1 = -5/4$. Colors represent the centralization profile that maximizes the lifetime expected utility of a first-term L executive. Solid black lines represent $\underline{p}$ and $\overline{p}$.

By jointly considering polarization and institutional rigidity, Proposition 2 is potentially useful for unifying two outstanding relationships examined by empirical studies of federalism. First, while we are not aware of any work that links ideological polarization with decentralization, several papers have examined the role of ethnic fragmentation. Polarization and ethnic fragmentation are plausibly related because both create conditions under which policy outcomes that favor one segment of society may hurt opposing segments. One sensible conjecture is that higher degrees of fragmentation should encourage decentralization (e.g., Mookherjee 2015), but empirical findings on the question have been mixed (Treisman 2006, Blume and Voigt 2011, Spina 2013). Further studies on the topic could make use of data on institutional constraints to understand whether the relationship between fragmentation and decentralization changes across low- and high-rigidity systems.

Second, as Figure 3 illustrates, Propositions 1 and 2 broadly imply that higher institutional rigidity increases decentralization by insecure incumbents. Our results are therefore consistent with the evidence on how electoral prospects affect centralization decisions in countries with rigid presidential systems (O'Neill 2003, 2005). Yet, whether full decentralization arises in the model also depends on the level of elite polarization. Hence, a fuller exploration would require data on the ideological dimension of party competition as well.

One aspect of our model that merits further discussion is that election probabilities are drawn every period from an exogenous distribution. Hence, election outcomes are unaffected by the policies implemented in the localities and by the executive's choice about centralization. This assumption fits well with situations in which centralization decisions pertain to policies that are not the primary focus of electoral competition, as is likely the case in the example of air quality regulations mentioned above. In the case of our other example – paid sick leave and minimum wage laws – it seems more conceivable that policy choices and, perhaps, by extension choices about the allocation of policy making authority would have electoral implications. How would our results change if policy choices mattered for the outcomes of elections? Our framework allows us to speculate.

Executives in our model care about their own policy utility and about state-level welfare. In an electoral setting, it seems plausible that increasing citizens' welfare makes a candidate more popular. If we take the standard view that executives are office motivated, electoral concerns may thus lead executives to place a greater weight on state-level welfare relative to their own policy preferences. In our model, such a shift correspond to a decrease in ω, the weight that executives place on their own policy utility. If ω decreases, the policies that executives choose in centralized states move closer to the welfare optimum and thus closer to each other. As a result, the stakes of being out of power are lower and the insurance function of decentralization becomes less important. Accordingly, a decrease in ω leads to an increase in $\underline{p}$, z_c and z_p.[4] As can be seen in Figure 3, these changes increase the likelihood of higher levels of centralization in high rigidity regimes. In a world where policy choices matter for electoral outcomes, we are thus likely to see less decentralization in contexts where such institutional arrangements are otherwise likely.

4 Constitutional Design

In our model, strong executives can shift policy-making authority from the localities to the center and vice versa. Whether or not such re-allocations are possible is a question of constitutional design. In many cases, constitutions assign policy-making authority in particular policy domains to one level of government and do not allow this arrangement to be changed through standard political processes. This section considers the decision problem of a constitutional designer who cares about social welfare. In principle, we may expect the constitutional designer to be able to choose political institutions that generate any level of rigidity q. But, to simplify, we presume that the constitutional designer's choice set is more constrained: she either allows for centralization choices to be made endogenously

[4] $\overline{p}$ can increase or decrease with ω.

according to the political equilibrium described above at some exogenous level $q \in (0,1)$ or fixes one centralization arrangement over time, thereby essentially setting $q = 1$. We first analyze optimal institutional arrangements within a single period to build intuition. We then numerically analyze the welfare performance of the constitutional designer's options over time.

An initial issue is the selection of the welfare standard that the constitutional designer cares about. Consistent with the executive's valuation of locality utility in the basic model, we use the sum of utilities of the two localities, defined as follows:

$$\begin{aligned} W(\mathbf{x}) &= \sum_i U_i(\mathbf{x}, y_i) \\ &= \gamma \sum_i u\left(x_{i,t}, y_i\right) + (1-\gamma) \sum_i u\left(x_{i,t}, y_{-i}\right). \end{aligned}$$

The expression for $W(\mathbf{x})$ makes clear that welfare is independent of election probabilities. Since equilibrium strategies in our game depend on election prospects, deviations from welfare-maximizing centralization profiles will be inevitable.

4.1 One Period

As in the preceding analysis, we focus without loss of generality on the case of a party L executive. For each centralization profile, we can substitute the equilibrium policy choices into the localities' utility functions to arrive at the following welfare values.

$$W_c(\mathbf{x}^*) = \begin{cases} 8(\gamma-1)y_1^2 & \mathbf{c}_t = (0,0) \\ -\left(4\gamma^2(\omega^2-1) - 4\gamma\omega^2 + \omega^2 + 4\right) y_1^2 + 2(1-2\gamma)\omega^2 y_1 z_L - \omega^2 z_L^2 & \mathbf{c}_t = (0,1) \\ -\left(4\gamma^2(\omega^2-1) - 4\gamma\omega^2 + \omega^2 + 4\right) y_1^2 - 2(1-2\gamma)\omega^2 y_1 z_L - \omega^2 z_L^2 & \mathbf{c}_t = (1,0) \\ -2\left(4\gamma^2(\omega^2-1) - 4\gamma(\omega^2-1) + \omega^2\right) y_1^2 - 2\omega^2 z_L^2 & \mathbf{c}_t = (1,1) \end{cases} \tag{12}$$

Independently of the centralization profile, the "first best" policies that maximize $W(\mathbf{x})$ are $-y_1(1-2\gamma)$ and $y_1(1-2\gamma)$ for localities 1 and 2, respectively, which result in $W(\mathbf{x}) = -8y_1^2(1-\gamma)\gamma$. The values of $W_c(\mathbf{x}^*)$ can only attain the first best if $\gamma = 1$.

From a welfare perspective, the optimal centralization profile depends on two thresholds for γ. First, when spillovers are very low ($\gamma > (2+\omega)/(2+2\omega)$), full decentralization dominates full centralization. Low spillovers reduce the value of coordination and thus the benefit of centralization. This threshold depends on the extent to which the executive values local policy utility (ω), since an executive who cares more about her own utility reduces the scope for welfare improvements from centralization.

Second, when $\gamma > 1/2$, welfare is higher under centralization profile $(1,0)$ than under $(0,1)$. This ordering is reversed when $\gamma < 1/2$. Centralizing an opposed locality (i.e., locality 2) under low spillovers reduces welfare because it allows the executive to manipulate its policy excessively. By contrast, high spillovers attenuate the welfare loss from setting locality 2's policy closer to locality 1's policy.

The expressions in equation (12) allow us to derive the following result on welfare-maximizing centralization profiles.

Proposition 3 (Static Welfare). *If $\gamma > \frac{2+\omega}{2+2\omega}$, then the welfare maximizing centralization profile in a single period is:*

$$\mathbf{c}_W^* = \begin{cases} (0,0) & \text{if } z_L < \frac{y_1(2\gamma(\omega-1)-\omega+2)}{\omega} \\ (1,0) & \text{otherwise.} \end{cases}$$

If $\gamma \in \left(\frac{1}{2}, \frac{2+\omega}{2+2\omega}\right]$*, the welfare maximizing centralization profile in a single period is:*

$$\mathbf{c}^*_W = \begin{cases} (0,0) & \text{if } z_L < \frac{y_1(2\gamma(\omega-1)-\omega+2)}{\omega} \\ (1,0) & \text{if } z_L \in \left[\frac{y_1(2\gamma(\omega-1)-\omega+2)}{\omega}, \frac{y_1(-2\gamma(\omega+1)+\omega+2)}{\omega}\right) \\ (1,1) & \text{otherwise.} \end{cases}$$

If $\gamma \leq \frac{1}{2}$*, then welfare maximizing centralization profile in a single period is:*

$$\mathbf{c}^*_W = \begin{cases} (0,0) & \text{if } z_L < \frac{y_1(2\gamma(1-\omega)+\omega+2)}{\omega} \\ (0,1) & \text{if } z_L \in \left[\frac{y_1(-2\gamma(\omega+1)+\omega+2)}{\omega}, \frac{y_1(2\gamma(1-\omega)+\omega-2)}{\omega}\right) \\ (1,1) & \text{otherwise.} \end{cases}$$

Proposition 3 suggests that the constitutional designer may not necessarily want to allow for centralization to be determined by a political equilibrium. Complete decentralization always maximizes welfare when z_L is sufficiently extreme. This coincides with the necessary condition for complete decentralization to arise in the political equilibrium given in Proposition 2. And for all but very high values of γ, welfare-maximizing complete centralization is also possible in the political equilibrium when elite polarization is low, as Proposition 2 also suggests. However, by Proposition 1, these profiles are endogenously chosen only under specific electoral conditions, and it is always possible for an executive not to choose the welfare maximizing profile.

The most considerable distortions to welfare occur when $\gamma > 1/2$. In these cases, welfare maximization calls for centralizing the "friendlier" locality over a range of z_L, but the party L executive never does this in equilibrium. Thus, roughly speaking, welfare-maximizing profiles are more likely when $\gamma < 1/2$, as high spillovers ensure the existence of some realized re-election probabilities that will result in the choice of $\mathbf{c}^*_W$. Unfortunately, $\gamma < 1/2$ seems unlikely in a two-locality world, as it implies that each locality cares about the other locality's policy more than its own.

4.2 Infinite Horizon

We shed light on the constitutional designer's decision problem through an exploratory analysis of welfare performance over time. To derive an expression for the average welfare that arises in the political equilibrium over an infinite horizon, we assume that re-election probabilities are drawn from a standard uniform distribution, i.e., $p_t \sim \mathrm{U}[0,1]$. The constitutional designer compares equilibrium welfare to three scenarios that fix the centralization profile for all t: (i) centralization, where the executive sets policy in both states, i.e., $\mathbf{c}_t = (1,1)$ for all t; (ii) partial centralization, where executives always set policy in one state but not the other, i.e., $\mathbf{c}_t = (0,1)$ or $\mathbf{c}_t = (1,0)$; and (iii) decentralization, where both localities always set their own policies, i.e., $\mathbf{c}_t = (0,0)$.

If both states are always centralized or never centralized, then the same level of welfare results in every period. Long-run average welfare under cases (i) and (iii) is thus given by, respectively, $\Omega_{11} = W_{11}(\mathbf{x}^*)$ and $\Omega_{00} = W_{00}(\mathbf{x}^*)$. For case (ii), where only one state is centralized, welfare in each period depends on the executive in power. The reason is that the policy that an executive implements in an ideologically allied centralized state differs from that which she chooses for her ideological opponent. Under the assumed symmetric election probabilities, each executive is in power half of the time in expectation. Long-run average welfare under partial centralization is given by

$$\Omega_{10/01} = \frac{1}{2}\left(W_{10}(\mathbf{x}^*) + W_{01}(\mathbf{x}^*)\right).$$

To derive long run average welfare under endogenously chosen centralization profiles, we model equilibrium play as a Markov chain that moves through states that are defined by the executive's age $a \in \{1,2\}$, type $j \in \{L,R\}$, whether she is strong or weak, and, if she is weak, by the centralization profile $\mathbf{c} \in \mathcal{C}$ under which policy is being chosen. Conditional on age and type, all periods with a strong executive can be grouped as one state. To see why, recall that the centralization profile that strong executives implement depends only on their age, type, and realized re-election probability but not on the previous period's centralization profile. Since there are four possible centralization profiles, the Markov chain has twenty states; $2 \times 2 \times 4 = 16$ possible states in which the executive is weak and $2 \times 2 = 4$ possible states in which the executive is strong. States with a strong executive of age a from party j are denoted by ajs. States with a weak executive of age a from party j and a centralization profile c are denoted by $ajwc$.

Our equilibrium characterization allows us to derive the probability $\rho_{\sigma,\sigma'}$ that play moves from any state σ to any other state σ'. The transition probabilities are summarized in Appendix B. Several facts facilitate this exercise. First, since weak executives cannot change the centralization profile, there can be no transition from a state with a given centralization profile to a state with a weak executive and a different centralization profile. Second, since executives have a two term limit, any state with a second-term executive must transition to a state with a first-term executive. Conversely, a state with a first-term executive transitions to a state with a first- or second-term executive, depending on the election result. Finally, the probability of transitioning from any state into a state with a weak executive is simply q. These facts imply, for example, that a transition between states in which an executive is re-elected and becomes weak occurs with probability $\frac{1}{2}q$.

The transition probabilities are slightly more complicated for states with a strong first-term executive, because the choice of centralization profile by a strong first-term executive depends on the realization of her re-election probability p_t. For example, the probability of moving from a state with a strong first-term party L executive to a state with a weak first-term party R executive who chooses policy under $\mathbf{c}_t = (0,1)$ is given by

$$\rho_{1Ls,1Rw01} = q\left(\overline{p} - \underline{p}\right)\left(1 - \frac{\underline{p} + \overline{p}}{2}\right).$$

Here, q is the probability that the period $t+1$ executive is weak, $\overline{p} - \underline{p}$ is the probability that p_t falls in the range in which a strong age 1 party L executive optimally implements $\mathbf{c}_t = (0,1)$, and $1 - \frac{\underline{p}+\overline{p}}{2}$ is the conditional probability that this executive loses the election. This expression presumes that $0 \leq \underline{p} \leq 1$ and $0 \leq \overline{p} \leq 1$. Recall, however, that one or both of these cutoffs can be negative, so that a strong first-term executive would either never choose full decentralization or always choose full centralization in equilibrium. Transition probabilities for these cases can be found by setting $\underline{p} = 0$ or $\overline{p} = 0$, respectively.

With the transition probabilities in hand, we calculate the long run probability of the system being in each of the twenty states by solving the system of equations $\boldsymbol{\pi}\boldsymbol{R} = \boldsymbol{\pi}$, where $\boldsymbol{\pi}$ is the vector of long-run probabilities for each state and $\boldsymbol{R}$ the matrix of transition probabilities.[5] Since welfare in any particular period depends only on the centralization profile implemented in that period, equilibrium welfare can be expressed as a function of the long-run probabilities of being in the set of states with full centralization, ϕ_{11}; full decentralization, ϕ_{00}; partial centralization with centralization of the executive's ideological ally, ϕ_{10}; and partial centralization with centralization of the executive's ideological opponent, ϕ_{01}.[6] To calculate value of each, we sum the long-run probabilities of all states with the relevant centralization profile, taking into account that the profile implemented by a strong first-term executive depends

[5] It is straightforward to show that $\boldsymbol{R}$ is positive recurrent and thus a unique stationary distribution $\boldsymbol{\pi}$ exists.

[6] Note that a state with partial centralization with centralization of the executive's ideological ally can have either a party L executive and state 1 centralized, or a party R executive and state 2 is centralized. In keeping with the rest of the paper, our notation takes the perspective of a party L executive. Hence, we denote the long-run probability of being in a state where the ideological ally is centralized by ϕ_{10} and the long-run probability of being in a state in which the ideological opponent is centralized by ϕ_{01}.

on the executive's realized election probability. For example, ϕ_{00} is given by:

$$\phi_{00} = \pi_{1Lw00} + \pi_{1Rw00} + \pi_{2Lw00} + \pi_{2Rw00} + (\pi_{1Ls} + \pi_{1Rs})\underline{p}.$$

The first four terms of this expression refer to the long-run probabilities of a weak executive who inherits full decentralization, for each combination of party and age. The expression $(\pi_{1Ls} + \pi_{1Rs})\underline{p}$ gives the long-run probability of a strong first-term executive who decides to implement full decentralization.

Using this procedure, we arrive at the following long-run probabilities:[7]

$$\begin{aligned}
\phi_{11} &= 1 - \frac{2}{3}\overline{p} \\
\phi_{00} &= \frac{2}{3}\underline{p} \\
\phi_{10} &= \frac{1}{3}(\overline{p} - \underline{p})\left((2 - \overline{p} - \underline{p})q + (\overline{p} + \underline{p} - 1)q^2\right) \\
\phi_{01} &= \frac{1}{3}(\overline{p} - \underline{p})\left(2 - (2 - \overline{p} - \underline{p})q - (\overline{p} + \underline{p} - 1)q^2\right).
\end{aligned}$$

Finally, long-run equilibrium welfare can be calculated as

$$\Omega_e = \phi_{11}W_{11}(\mathbf{x}^*) + \phi_{00}W_{00}(\mathbf{x}^*) + \phi_{10}W_{10}(\mathbf{x}^*) + \phi_{01}W_{01}(\mathbf{x}^*). \tag{13}$$

The constitutional designer compares long-run equilibrium welfare to welfare under the three alternative arrangements that fix the centralization profile over time. This comparison turns out to be complex and does not yield tractable results that pertain to the entire parameter space. Nonetheless, Proposition 4 provides analytical results for the simpler case where $z_L < z_p$. As Proposition 2(iv) shows, this condition implies that all centralization profiles

[7] The long-run probabilities for the case in which only full and partial centralization are possible can be found, again, by setting $\underline{p} = 0$ in the above expressions. Note that if we set $\underline{p} = \overline{p} = 0$, then these long-run probabilities simplify to $\phi_{11} = 1$ and $\phi_{00} = \phi_{10} = \phi_{01} = 0$, i.e., the case in which only full centralization is possible.

are possible in equilibrium. Below, we also provide some suggestive numerical results which show that similar patterns can arise outside this specific case.

Proposition 4 (Dynamic Welfare)**.** *Under high rigidity and $z_L < z_p$, $\Omega_{00} > \Omega_{10/01} > \Omega_e > \Omega_{11}$.*

Proposition 4 states that under high rigidity and executive polarization, the constitutional designer would not want to allow for endogenous centralization choices and instead fix full decentralization, which brings the highest social welfare. Fixing full centralization results in the lowest level of welfare. The long-run equilibrium welfare is always bounded by partial centralization and full centralization.

These results seem intuitive in light of the assumed extremity of executives. Under high elite polarization, full centralization leads to extreme policies. The equilibrium performs better than full centralization, since other centralization profiles will be implemented in equilibrium with non-zero probability. At the same time, on the equilibrium path full centralization will be observed more frequently than other centralization profiles, since all second-term executives implement $\mathbf{c}_t = (1, 1)$. Hence, equilibrium welfare is lower than those under the other two fixed arrangements.

What happens if elite polarization is moderate or low? Figure 4 shows that the ordering of welfare levels from Proposition 4 can remain the same across the whole range of executive ideal points z_L. The figure plots a case with high rigidity in which policy spillovers are very low ($\gamma = 9/10$), which makes centralization less attractive from a welfare perspective, and executives are highly motivated by self-interest ($\omega = 9/10$), which makes them implement policies closer to their ideal points in centralized localities. The constitutional designer then prefers full decentralization even as executives become very moderate. Full centralization always minimizes welfare. If z_L is such that executives choose only partial or full centralization in equilibrium ($z_p \leq z_L < z_c$), the equilibrium welfare level remains bounded by the partial and full centralization benchmarks. When executives are very moderate ($z_c \leq z_L$),

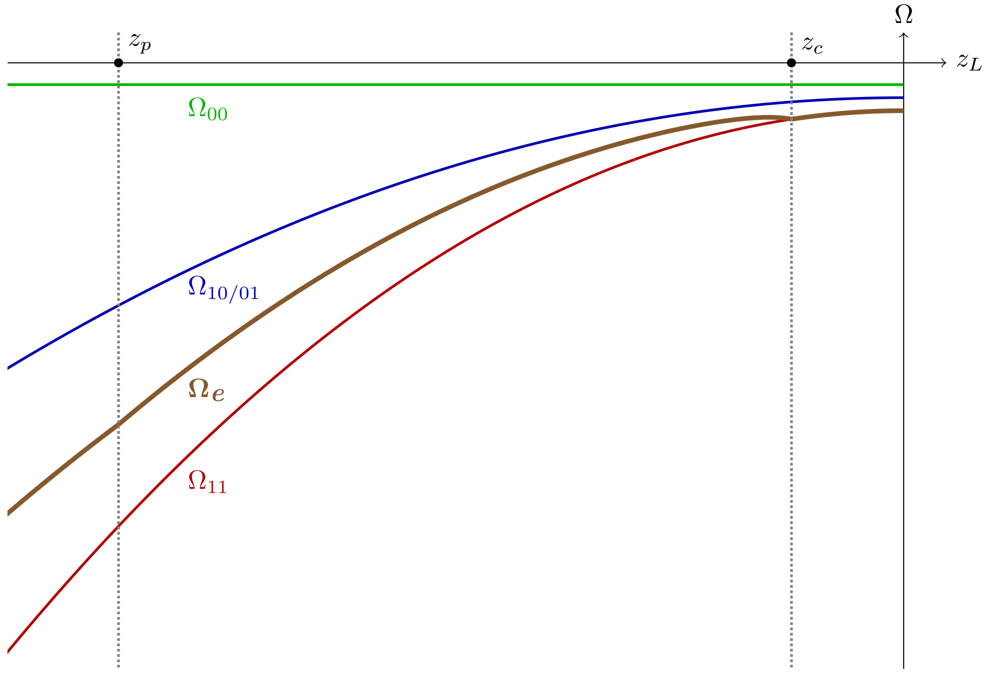


Figure 4: Long-run average welfare as a function of party L's ideal point. Here, $\gamma = 9/10$, $\omega = 9/10$, $y_1 = -3$, and $q = 4/5$. The solid green line depicts long-run average welfare from centralization profile $\mathbf{c}_t = (0,0)$ for all t, blue – from either $\mathbf{c}_t = (0,1)$ or $\mathbf{c}_t = (1,0)$ for all t, red – from $\mathbf{c}_t = (1,1)$ for all t. The solid brown line depicts long-run average welfare in equilibrium.

the equilibrium coincides with the full centralization benchmark and thus performs worst.

That said, the pattern illustrated by Proposition 4 and this figure does not generalize to the entire parameter space. Several other orderings are possible, including cases in which the constitutional designer would want to allow for centralization to arise endogenously from the political process. For example, as is apparent from Proposition 3, full centralization can be the preferred institutional arrangement for sufficiently moderate executives, especially if policy spillovers are high. In such cases, equilibrium behavior can result in high levels of welfare because it will sometimes coincide with the full centralization benchmark. Moreover, there are cases in which the equilibrium performs better than all benchmarks, even at intermediate levels of executive polarization where the equilibrium does not coincide with full centralization. Yet, there also exist cases in which the equilibrium performs worst.

5 Discussion

The allocation of policy-making authority is a key factor in determining policy outcomes, and therefore the question of centralization versus decentralization has long been a concern to institution designers. An extensive literature has addressed the role of decentralization in producing externalities, generating information, and diffusing policies. However, as recent examples make clear, ideology is often a primary driver of such decisions. This paper isolates the roles of ideology and electoral turnover to generate a purely political account of centralization choices.

Using a simple infinite horizon policy-making model, we show that ideological polarization and re-election prospects play important roles in pushing politicians away from fully centralized policy. The central intuition is that decentralization can allow current politicians to insure against future politicians' efforts at imposing unfavorable policies. For this mechanism to work, institutional rigidities such as those found in presidential systems are crucial. Majorities can easily undo decentralization in a system without rigidities or under a unified government, and insurance is impossible. But in an environment with rigidities, centralization is increasing in an incumbents' likelihood of re-election. We show that partial centralization is the norm, with complete decentralization predicted only when polarization is very high.

These comparative statics align with evidence on how electoral concerns condition centralization choices in presidential systems in Latin America, and may help explain why empirical findings on the relationship between ethnic heterogeneity and centralization are mixed. At the same time, our results contrast sharply with those of models based on experimentation, in which central policies ultimately reflect good experimental results. That centralization decisions in our model reflect politicians' re-election prospects also means that they are not always optimal from a social welfare perspective. Rather than allowing for adjustments made by ideologically motivated politicians, a welfare-maximizing constitutional designer may prefer to fix the level of centralization over time.

Our framework is simple enough to allow the exploration of many institutional features that we have so far suppressed. Two directions immediately stand out. First, many political systems feature systematic asymmetries in either ideologies or partisan balance. The "trifecta" states mentioned in the introduction illustrate the dilemma of liberal cities in persistently conservative states in the U.S. Second, election probabilities could be endogenized by allowing a median voter to arise from one of the two localities in each period. The need to design policies to cater to this voter might help to discipline central politicians. Both features could further illuminate the implications of interactions between institutions, ideology, and centralization for citizen welfare.

Appendix

A Proofs of Theoretical Results

Proof of Lemma 1. Using the expressions for $U^e_{j,k}(\mathbf{x}^*_t(z_k,\mathbf{c}_t),\mathbf{y})$ and substituting for $y_2 = -y_1$ and $z_R = -z_L$ yields

For executive L:

$$U^e_{L,L}(\mathbf{x}^*_t(z_L,\mathbf{c}_t)) = \begin{cases} y_1^2(-8\gamma(\omega-1)+6\omega-8)-2\omega z_L^2, & \text{if } \mathbf{c}_t=(0,0) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2)+(\omega-2)\omega z_L^2, & \text{if } \mathbf{c}_t=(0,1) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2)+(\omega-2)\omega z_L^2, & \text{if } \mathbf{c}_t=(1,0) \\ 2(\omega-1)\left(y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)+\omega z_L^2\right), & \text{if } \mathbf{c}_t=(1,1) \end{cases}$$

$$U^e_{L,R}(\mathbf{x}^*_t(-z_L,\mathbf{c}_t)) = \begin{cases} y_1^2(-8\gamma(\omega-1)+6\omega-8)-2\omega z_L^2, & \text{if } \mathbf{c}_t=(0,0) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2)-\omega(3\omega+2)z_L^2, & \text{if } \mathbf{c}_t=(0,1) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2)-\omega(3\omega+2)z_L^2, & \text{if } \mathbf{c}_t=(1,0) \\ 2(\omega-1)y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)-2\omega(3\omega+1)z_L^2, & \text{if } \mathbf{c}_t=(1,1) \end{cases}$$

For executive R:

$$U^e_{R,R}(\mathbf{x}^*_t(-z_L,\mathbf{c}_t)) = \begin{cases} y_1^2(-8\gamma(\omega-1)+6\omega-8)-2\omega z_L^2, & \text{if } \mathbf{c}_t=(0,0) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2)+(\omega-2)\omega z_L^2, & \text{if } \mathbf{c}_t=(0,1) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2)+(\omega-2)\omega z_L^2, & \text{if } \mathbf{c}_t=(1,0) \\ 2(\omega-1)\left(y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)+\omega z_L^2\right), & \text{if } \mathbf{c}_t=(1,1) \end{cases}$$

$$U^e_{R,L}(\mathbf{x}^*_t(z_L,\mathbf{c}_t)) = \begin{cases} y_1^2(-8\gamma(\omega-1)+6\omega-8)-2\omega z_L^2, & \text{if } \mathbf{c}_t=(0,0) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2)-\omega(3\omega+2)z_L^2, & \text{if } \mathbf{c}_t=(0,1) \\ y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right)+ & \\ \qquad 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2)-\omega(3\omega+2)z_L^2, & \text{if } \mathbf{c}_t=(1,0) \\ 2(\omega-1)y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)-2\omega(3\omega+1)z_L^2, & \text{if } \mathbf{c}_t=(1,1) \end{cases}$$

Subtracting expressions for particular executive and centralization profile when executives from different parties are in power implies equation (5).

Proof of Lemma 2. The preference orderings for each type of executive and for cut-offs directly follow from comparison of relevant expressions in the proof of Lemma 1.

Proof of Proposition 1. Denote the difference between the terms that correspond to the age 1 period t executive's utility from a strong executive in period $t+1$ as:

$$\forall j \in \{L,R\}: \ \Delta \equiv U^e_{j,j}(\mathbf{x}^*_t(z_j,(1,1))) - \mathbb{E}_{p_{t+1}}\left[U^e_{j,-j}(\mathbf{x}^*_{t+1}(z_{-j},\mathbf{c}_{t+1}))\right].$$

It is straightforward to see that due to symmetrical ideal points of executives and localities, Δ does not depend on the executive's party. In addition $\Delta > 0$, since $U^e_{j,j}(\mathbf{x}^*_t(z_j,(1,1)))$ is the maximum possible stage utility a party j executive can receive and no lottery over other possible policy choices can bring higher utility.

To see how the electoral environment changes the incentives to adopt different centralization profiles, we take the derivative of $V_L(\mathbf{c}_t, p_t)$ with respect to p_t at each possible profile:

$$\frac{\partial V_L(\mathbf{c}_t, p_t)}{\partial p_t} = \begin{cases} (1-q)\,\Delta & \text{if } \mathbf{c}_t = (0,0) \\ q\,4\omega^2 z_L^2 + (1-q)\,\Delta & \text{if } \mathbf{c}_t = (0,1) \\ q\,4\omega^2 z_L^2 + (1-q)\,\Delta & \text{if } \mathbf{c}_t = (1,0) \\ q\,8\omega^2 z_L^2 + (1-q)\,\Delta & \text{if } \mathbf{c}_t = (1,1). \end{cases} \tag{14}$$

It is clear that $V_L(\mathbf{c}_t, p_t)$ is linear and increasing in p_t, and furthermore

$$\frac{\partial V_L((1,1), p_t)}{\partial p_t} > \frac{\partial V_L((1,0), p_t)}{\partial p_t} = \frac{\partial V_L((0,1), p_t)}{\partial p_t} > \frac{\partial V_L((0,0), p_t)}{\partial p_t} > 0.$$

The corresponding derivatives for a party R executive's objective are identical. Since higher levels of centralization have higher slopes with respect to p_t, centralization must be monotonically increasing in p_t.

The existence of the cut-off values of p_t, $\underline{p}$ and $\overline{p}$, for which there are unique most preferred centralization profile for executive from party j can be proven directly by comparison of expressions for $V_j(\mathbf{c}_t, p_t)$ for each executive across different centralization profiles. The expressions are as follows

$$V_L(\mathbf{c}_t, p_t) =$$

$$\begin{cases} (1-q)(U^e_{L,L}(\mathbf{x}^*_t(z_L,(1,1))) - (1-p_t)\Delta) - \\ \qquad q\left(y_1^2(8\gamma(\omega-1)-6\omega+8)+2\omega z_L^2\right) + y_1^2(-8\gamma(\omega-1)+6\omega-8) - 2\omega z_L^2, \text{ if } \mathbf{c}_t = (0,0) \\ (1-q)(U^e_{L,L}(\mathbf{x}^*_t(z_L,(1,1))) - (1-p_t)\Delta) + \\ \qquad q\left(\omega z_L^2((4p_t-3)\omega-2) + y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2)\right) + \\ \qquad y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2) + (\omega-2)\omega z_L^2, \text{ if } \mathbf{c}_t = (0,1) \\ (1-q)(U^e_{L,L}(\mathbf{x}^*_t(z_L,(1,1))) - (1-p_t)\Delta) + \\ \qquad q\left(\omega z_L^2((4p_t-3)\omega-2) + y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2)\right) + \\ \qquad y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2) + (\omega-2)\omega z_L^2, \text{ if } \mathbf{c}_t = (1,0) \\ (1-q)(U^e_{L,L}(\mathbf{x}^*_t(z_L,(1,1))) - (1-p_t)\Delta) + \\ \qquad q\left(2\omega z_L^2((4p_t-3)\omega-1) + 2(\omega-1)y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)\right) + \\ \qquad 2(\omega-1)\left(y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)+\omega z_L^2\right), \text{ if } \mathbf{c}_t = (1,1) \end{cases}$$

$$V_R(\mathbf{c}_t, p_t) =$$

$$\begin{cases} (1-q)(U^e_{R,R}(\mathbf{x}^*_t(z_R,(1,1))) - (1-p_t)\Delta) - \\ \qquad q\left(y_1^2(8\gamma(\omega-1)-6\omega+8)+2\omega z_L^2\right) + y_1^2(-8\gamma(\omega-1)+6\omega-8) - 2\omega z_L^2, \text{ if } \mathbf{c}_t = (0,0) \\ (1-q)(U^e_{R,R}(\mathbf{x}^*_t(z_R,(1,1))) - (1-p_t)\Delta) + \\ \qquad q\left(\omega z_L^2((4p_t-3)\omega-2) + y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2)\right) + \\ \qquad y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(-2\gamma(\omega-1)+\omega-2) + (\omega-2)\omega z_L^2, \text{ if } \mathbf{c}_t = (0,1) \\ (1-q)(U^e_{R,R}(\mathbf{x}^*_t(z_R,(1,1))) - (1-p_t)\Delta) + \\ \qquad q\left(\omega z_L^2((4p_t-3)\omega-2) + y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2)\right) + \\ \qquad y_1^2\left((\omega-2\gamma(\omega-1))^2+2(\omega-2)\right) + 2\omega y_1 z_L(2\gamma(\omega-1)-\omega+2) + (\omega-2)\omega z_L^2, \text{ if } \mathbf{c}_t = (1,0) \\ (1-q)(U^e_{R,R}(\mathbf{x}^*_t(z_R,(1,1))) - (1-p_t)\Delta) + \\ \qquad q\left(2\omega z_L^2((4p_t-3)\omega-1) + 2(\omega-1)y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)\right) + \\ \qquad 2(\omega-1)\left(y_1^2(4(\gamma-1)\gamma(\omega-1)+\omega)+\omega z_L^2\right), \text{ if } \mathbf{c}_t = (1,1) \end{cases}$$

The resulting cut-offs that define the most preferred centralization profile in infinite horizon game are given in equations (9) and (10) and are the same for both executives for their respective probabilities of re-election. It is straightforward to see that the difference between these cut-offs is

$$\overline{p} - \underline{p} = \frac{1+q}{q} \frac{(2\gamma + 2(1-\gamma)/\omega - 1)\, y_1}{z_L}.$$

Since $z_L < 0$ and $y_1 < 0$, and $2\left[\gamma + (1-\gamma)\frac{1}{\omega})\right] - 1 > 0$, this expression is always positive, and thus $\overline{p} > \underline{p}$.

Proof of Proposition 2. The proof directly follows from solving for $\overline{p} = 0$ and $\underline{p} = 0$ using the expressions in equations (9) and (10).

Solving $\underline{p} = 0$ for z_L produces one negative root that simplifies to:

$$z_p' = -\frac{1+q+2\sqrt{q(1+q)}}{1-3q}\left(2\gamma + \frac{2(1-\gamma)}{\omega} - 1\right) y_1. \tag{15}$$

For $z_L < z_p'$, $\underline{p} > 0$; Proposition 1 implies that $(0,0)$ is the preferred profile for $p_t < \underline{p}$. This cut-point exists (i.e., is negative) if and only if $q > \frac{1}{3}$. In addition, it is straightforward to show that $z_p' < y_1$ when $q > \frac{1}{3}$: Executives have to be more polarized than localities for $(0,0)$ to be implementable.

Solving $\overline{p} = 0$ for z_L yields two roots. The first is:

$$z_c = \frac{1+q-2\sqrt{q(1+q)}}{1-3q}\left(2\gamma + \frac{2(1-\gamma)}{\omega} - 1\right) y_1. \tag{16}$$

For $z_L > z_c$, $\overline{p} < 0$. Again invoking Proposition 1, for $z_L \geq z_c$, $(1,1)$ is the preferred profile for all p_t. It can be shown that when $q > \frac{1}{3}$, $\overline{p} = 0$ can hold only if $z_L > y_1$.

The second root is:

$$z_p'' = \frac{1 + q + 2\sqrt{q(1+q)}}{1 - 3q} \left(2\gamma + \frac{2(1-\gamma)}{\omega} - 1\right) y_1. \tag{17}$$

For $z_L < z_p''$, $\overline{p} < 0$; by Proposition Proposition 1, for $z_L < z_p''$, $(1,1)$ is the preferred profile for all p_t. This cut-point exists (i.e., is negative) if and only if $q < \frac{1}{3}$.

Now define

$$z_p = \begin{cases} z_p' & \text{if } q > \frac{1}{3} \\ z_p'' & \text{if } q < \frac{1}{3} \end{cases}$$

Part (i) of the result follows from the derivation of z_c. Part (ii) follows from the derivations of z_c and z_p. Finally, parts (iii) and (iv) follow from the derivation of z_p.

Proof of Proposition 3. We first provide the condition under which profile $(0,0)$ dominates profile $(1,1)$. From (12), it is obvious that $W_{00}(\mathbf{x}^*)$ is constant in z_L and $W_{11}(\mathbf{x}^*)$ is maximized at $z_L = 0$. Evaluating both at $z_L = 0$ yields that $W_{00}(\mathbf{x}^*)$ is always higher than $W_{11}(\mathbf{x}^*)$ if:

$$\gamma > \frac{2+\omega}{2+2\omega}.$$

Next, we provide the condition under which profile $(1,0)$ dominates profile $(0,1)$. From (12), it is straightforward to verify that $W_{01}(\mathbf{x}^*)$ and $W_{10}(\mathbf{x}^*)$ are parabolas that are symmetric around $z_L = 0$ and maximized at $y_1(1-2\gamma)$ and $-y_1(1-2\gamma)$ respectively, but are otherwise identical. Thus $(1,0)$ dominates profile $(0,1)$ if and only if $-y_1(1-2\gamma) < y_1(1-2\gamma)$. Since $y_1 < 0$, this is equivalent to $\gamma > 1/2$.

Now consider three cases. (i) If $\gamma > (2+\omega)/(2+2\omega)$, then $(1,1)$ is never welfare maximizing and $(1,0)$ dominates $(0,1)$. Solving for z_L, the welfare under $(1,0)$ is higher than under $(0,0)$

if:

$$
\begin{aligned}
W_{10}(\mathbf{x}^*) &> W_{00}(\mathbf{x}^*) \\
z_L &\in \left(\frac{y_1(2\gamma(\omega-1)-\omega+2)}{\omega}, \frac{y_1(2\gamma(\omega+1)-\omega-2)}{\omega}\right)
\end{aligned} \tag{18}
$$

Since $y_1(2\gamma(\omega+1)-\omega-2)/\omega > 0$ and $y_1(2\gamma(\omega-1)-\omega+2)/\omega < 0$, $(1,0)$ is welfare maximizing for $z_L > y_1(2\gamma(\omega-1)-\omega+2)/\omega$ and $(0,0)$ is welfare maximizing otherwise.

(ii) If $\gamma \in (1/2, (2+\omega)/(2+2\omega)]$, then $(0,0)$, $(1,0)$, and $(1,1)$ may all be welfare maximizing. The condition for $W_{10}(\mathbf{x}^*) > W_{00}(\mathbf{x}^*)$ is given by (18). The condition for $W_{11}(\mathbf{x}^*) > W_{10}(\mathbf{x}^*)$ evaluates to:

$$
z_L \in \left(\frac{y_1(-2\gamma(\omega+1)+\omega+2)}{\omega}, \frac{y_1(-2\gamma(\omega-1)+\omega-2)}{\omega}\right).
$$

Since $y_1(-2\gamma(\omega-1)+\omega-2)/\omega > 0$ and $y_1(-2\gamma(\omega+1)+\omega+2)/\omega < 0$ for these values of γ, $W_{11}(\mathbf{x}^*) > W_{10}(\mathbf{x}^*)$ for $z_L > y_1(-2\gamma(\omega+1)+\omega+2)/\omega$. Observe finally that:

$$
\frac{y_1(-2\gamma(\omega+1)+\omega+2)}{\omega} - \frac{y_1(2\gamma(\omega-1)-\omega+2)}{\omega} = \frac{y_1(2-4\gamma)}{\omega} > 0,
$$

so the interval of z_L for which $(1,0)$ is welfare maximizing is non-empty.

(iii) If $\gamma \leq 1/2$, the analysis is identical to case (ii), but (since $(0,1)$ dominates $(1,0)$) substituting in profile $(0,1)$ for $(1,0)$.

Proof of Proposition 4. Appendix B shows the transition matrix for equilibrium play for the case in which $0 \leq \underline{p} \leq 1$ and $0 \leq \overline{p} \leq 1$.

To calculate the long run probability of the system being in each of the twenty states, we solve the following system of equations:

$$
\begin{aligned}
\pi_{1Ls} &= \frac{1}{2}(1-q)\left(\pi_{1Rs}+\pi_{2Ls}+\pi_{2Rs}+\pi_{1Rw00}+\pi_{1Rw10}+\pi_{1Rw01}+\pi_{1Rw11}\right.\\
&\quad \left.+\pi_{2Lw00}+\pi_{2Rw00}+\pi_{2Lw10}+\pi_{2Rw10}+\pi_{2Lw01}+\pi_{2Rw01}+\pi_{2Lw11}+\pi_{2Rw11}\right)\\
\pi_{1Rs} &= \frac{1}{2}(1-q)\left(\pi_{1Ls}+\pi_{2Ls}+\pi_{2Rs}+\pi_{1Lw00}+\pi_{1Lw10}+\pi_{1Lw01}+\pi_{1Lw11}\right.\\
&\quad \left.+\pi_{2Lw00}+\pi_{2Rw00}+\pi_{2Lw10}+\pi_{2Rw10}+\pi_{2Lw01}+\pi_{2Rw01}+\pi_{2Lw11}+\pi_{2Rw11}\right)\\
\pi_{2Ls} &= \frac{1}{2}(1-q)\left(\pi_{1Ls}+\pi_{1Lw00}+\pi_{1Lw10}+\pi_{1Lw01}+\pi_{1Lw11}\right)\\
\pi_{2Rs} &= \frac{1}{2}(1-q)\left(\pi_{1Rs}+\pi_{1Rw00}+\pi_{1Rw10}+\pi_{1Rw01}+\pi_{1Rw11}\right)\\
\pi_{1Lw00} &= \pi_{1Rs}q\underline{p}(1-\frac{\underline{p}}{2})+\frac{1}{2}q\left(\pi_{1Rw00}+\pi_{2Lw00}+\pi_{2Rw00}\right)\\
\pi_{1Rw00} &= \pi_{1Ls}q\underline{p}(1-\frac{\underline{p}}{2})+\frac{1}{2}q\left(\pi_{1Lw00}+\pi_{2Lw00}+\pi_{2Rw00}\right)\\
\pi_{1Lw10} &= \pi_{1Rs}q\left(\overline{p}-\underline{p}\right)(1-\frac{\underline{p}+\overline{p}}{2})+\frac{1}{2}q\left(\pi_{1Rw10}+\pi_{2Lw10}+\pi_{2Rw10}\right)\\
\pi_{1Rw10} &= \frac{1}{2}q\left(\pi_{1Lw10}+\pi_{2Lw10}+\pi_{2Rw10}\right)\\
\pi_{1Lw01} &= \frac{1}{2}q\left(\pi_{1Rw01}+\pi_{2Lw01}+\pi_{2Rw01}\right)\\
\pi_{1Rw01} &= \pi_{1Ls}q\left(\overline{p}-\underline{p}\right)(1-\frac{\underline{p}+\overline{p}}{2})+\frac{1}{2}q\left(\pi_{1Lw01}+\pi_{2Lw01}+\pi_{2Rw01}\right)\\
\pi_{1Lw11} &= \pi_{1Rs}q(1-\overline{p})(1-\frac{1+\overline{p}}{2})+\frac{1}{2}q\left(\pi_{1Rw11}+\pi_{2Ls}+\pi_{2Rs}+\pi_{2Lw11}+\pi_{2Rw11}\right)\\
\pi_{1Rw11} &= \pi_{1Ls}q(1-\overline{p})(1-\frac{1+\overline{p}}{2})+\frac{1}{2}q\left(\pi_{1Lw11}+\pi_{2Ls}+\pi_{2Rs}+\pi_{2Lw11}+\pi_{2Rw11}\right)\\
\pi_{2Lw00} &= \pi_{1Ls}q\frac{\underline{p}^2}{2}+\frac{1}{2}q\pi_{1Lw00}\\
\pi_{2Rw00} &= \pi_{1Rs}q\frac{\underline{p}^2}{2}+\frac{1}{2}q\pi_{1Rw00}\\
\pi_{2Lw10} &= \frac{1}{2}q\pi_{1Lw10}\\
\pi_{2Rw10} &= \pi_{1Rs}q\left(\overline{p}-\underline{p}\right)\frac{\underline{p}+\overline{p}}{2}+\frac{1}{2}q\pi_{1Rw10}\\
\pi_{2Lw01} &= \pi_{1Ls}q\left(\overline{p}-\underline{p}\right)\frac{\underline{p}+\overline{p}}{2}+\frac{1}{2}q\pi_{1Lw01}\\
\pi_{2Rw01} &= \frac{1}{2}q\pi_{1Rw01}\\
\pi_{2Lw11} &= \pi_{1Ls}q\left(1-\overline{p}\right)\frac{1+\overline{p}}{2}+\frac{1}{2}q\pi_{1Lw11}\\
\pi_{2Rw11} &= \pi_{1Rs}q\left(1-\overline{p}\right)\frac{1+\overline{p}}{2}+\frac{1}{2}q\pi_{1Rw11},
\end{aligned}
$$

where π_{ajwc} refers to the long-run probability of being in a state characterized by a weak (w) executive of age a ($a \in \{1,2\}$) from party j ($j \in \{L,R\}$) and by centralization profile c ($c \in$

$\{00, 01, 10, 11\}$), while π_{ajs} denotes the long-run probability of being in a state characterized with a strong (s) executive of age a ($a \in \{1,2\}$) from party j ($j \in \{L, R\}$).

This system provides a unique solution for the twenty long-run probabilities. These long-run probabilities can be used to calculate the four long-run probabilities of being in state with decentralization (ϕ_{00}), partial centralization (ϕ_{10} and ϕ_{01}) and full centralization (ϕ_{11}) used in equation (13) as follows:

$$\phi_{11} = \pi_{1Lw11} + \pi_{1Rw11} + \pi_{2Lw11} + \pi_{2Rw11} + \pi_{2Ls} + \pi_{2Rs} + (\pi_{1Ls} + \pi_{1Rs})(1 - \overline{p})$$
$$\phi_{00} = \pi_{1Lw00} + \pi_{1Rw00} + \pi_{2Lw00} + \pi_{2Rw00} + (\pi_{1Ls} + \pi_{1Rs})\underline{p}$$
$$\phi_{10} = \pi_{1Lw10} + \pi_{1Rw01} + \pi_{2Lw10} + \pi_{2Rw01}$$
$$\phi_{01} = \pi_{1Lw01} + \pi_{1Rw10} + \pi_{2Lw01} + \pi_{2Rw10} + (\pi_{1Ls} + \pi_{1Rs})(\overline{p} - \underline{p}).$$

Comparing Ω_e to welfare from full centralization, $\Omega_{11} = W_{11}(\mathbf{x}^*)$, partial centralization, $\Omega_{10/01} = \frac{1}{2}\left(W_{10}(\mathbf{x}^*) + W_{01}(\mathbf{x}^*)\right)$ and decentralization, $\Omega_{00} = W_{00}(\mathbf{x}^*)$ we can show that

$$\Omega_{00} > \Omega_{10/01} > \Omega_e > \Omega_{11}.$$

B Transition Matrix for Welfare Calculations

Below we present the transition matrix for equilibrium play for $0 \leq \underline{p} \leq 1$ and $0 \leq \overline{p} \leq 1$. For legibility, the first 10 and last 10 columns are presented separately. States with a strong executive of age a from party j are denoted by ajs. States with a weak executive of age a from party j and a centralization profile c are denoted by $ajwc$.

	1Ls	1Rs	2Ls	2Rs	1Lw00	1Rw00	1Lw10	1Rw10	1Lw01	1Rw01
1Ls	0	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	$q\underline{p}\left(1-\frac{\underline{p}}{2}\right)$	0	0	0	$q(\overline{p}-\underline{p})\left(1-\frac{\underline{p}+\overline{p}}{2}\right)$
1Rs	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}(1-q)$	$q\underline{p}\left(1-\frac{\underline{p}}{2}\right)$	0	$q(\overline{p}-\underline{p})\left(1-\frac{\underline{p}+\overline{p}}{2}\right)$	0	0	0
2Ls	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	0	0
2Rs	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	0	0
1Lw00	0	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}q$	0	0	0	0
1Rw00	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}(1-q)$	$\frac{1}{2}q$	0	0	0	0	0
1Lw10	0	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	$\frac{1}{2}q$	0	0
1Rw10	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}q$	0	0	0
1Lw01	0	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	$\frac{1}{2}q$
1Rw01	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}(1-q)$	0	0	0	0	$\frac{1}{2}q$	0
1Lw11	0	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	0
1Rw11	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}(1-q)$	0	0	0	0	0	0
2Lw00	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0	0	0
2Rw00	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0	0	0
2Lw10	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0
2Rw10	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0
2Lw01	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	$\frac{1}{2}q$	$\frac{1}{2}q$
2Rw01	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	$\frac{1}{2}q$	$\frac{1}{2}q$
2Lw11	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	0	0
2Rw11	$\frac{1}{2}(1-q)$	$\frac{1}{2}(1-q)$	0	0	0	0	0	0	0	0

	1Lw11	1Rw11	2Lw00	2Rw00	2Lw10	2Rw10	2Lw01	2Rw01	2Lw11	2Rw11
1Ls	0	$q(1-\overline{p})\left(1-\frac{1+\overline{p}}{2}\right)$	$q\frac{\underline{p}^2}{2}$	0	0	0	$q(\overline{p}-\underline{p})\frac{\underline{p}+\overline{p}}{2}$	0	$q(1-\overline{p})\frac{1+\overline{p}}{2}$	0
1Rs	$q(1-\overline{p})\left(1-\frac{1+\overline{p}}{2}\right)$	0	0	$q\frac{\underline{p}^2}{2}$	0	$q(\overline{p}-\underline{p})\frac{\underline{p}+\overline{p}}{2}$	0	0	0	$q(1-\overline{p})\frac{1+\overline{p}}{2}$
2Ls	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0	0	0	0	0	0	0
2Rs	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0	0	0	0	0	0	0
1Lw00	0	0	$\frac{1}{2}q$	0	0	0	0	0	0	0
1Rw00	0	0	0	$\frac{1}{2}q$	0	0	0	0	0	0
1Lw10	0	0	0	0	$\frac{1}{2}q$	0	0	0	0	0
1Rw10	0	0	0	0	0	$\frac{1}{2}q$	0	0	0	0
1Lw01	0	0	0	0	0	0	$\frac{1}{2}q$	0	0	0
1Rw01	0	0	0	0	0	0	0	$\frac{1}{2}q$	0	0
1Lw11	0	$\frac{1}{2}q$	0	0	0	0	0	0	$\frac{1}{2}q$	0
1Rw11	$\frac{1}{2}q$	0	0	0	0	0	0	0	0	$\frac{1}{2}q$
2Lw00	0	0	0	0	0	0	0	0	0	0
2Rw00	0	0	0	0	0	0	0	0	0	0
2Lw10	0	0	0	0	0	0	0	0	0	0
2Rw10	0	0	0	0	0	0	0	0	0	0
2Lw01	0	0	0	0	0	0	0	0	0	0
2Rw01	0	0	0	0	0	0	0	0	0	0
2Lw11	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0	0	0	0	0	0	0
2Rw11	$\frac{1}{2}q$	$\frac{1}{2}q$	0	0	0	0	0	0	0	0

References

Bednar, Jenna. 2011. "The Political Science of Federalism." *Annual Review of Law and Social Science* 7(1): 269-288.

Besley, Timothy, and Stephen Coate. 2003. "Centralized Versus Decentralized Provision of Local Public Goods: A Political Economy Approach." *Journal of Public Economics* 87(12): 2611-2637.

Blume, Lorenz, and Stefan Voigt. 2011. "Federalism and Decentralization – A Critical Survey of Frequently Used Indicators." *Constitutional Political Economy* 22: 238-264.

Bulman-Pozen, Jessica. 2014. "Partisan Federalism." *Harvard Law Review* 127(4): 1077-1146.

Butler, Daniel M., Craig Volden, Adam M. Dynes, and Boris Shor. 2017. "Ideology, Learning, and Policy Diffusion: Experimental Evidence." *American Journal of Political Science* 61(1): 37-49.

Cai, Hongbin, and Daniel Treisman. 2009. "Political Decentralization and Policy Experimentation." *Quarterly Journal of Political Science* 4(1): 35-58.

Callander, Steven, and Bård Harstad. 2015. "Experimentation in Federal Systems." *Quarterly Journal of Economics* 130(2): 951-1002.

Cheng, Chen, and Christopher Li. 2019. "Laboratories of Democracy: Policy Experimentation under Decentralization." *American Economic Journal: Micro* 11(3): 125-154.

Crémer, Jacques, and Thomas R. Palfrey. 1999. "Political Confederation." *American Political Science Review* 93(1): 69-83.

Crémer, Jacques, and Thomas R. Palfrey. 2000. "Federal Mandates by Popular Demand." *Journal of Political Economy* 108(5): 905-927.

Dickovick, J. Tyler. 2007. "Municipalization as Central Government Strategy: Central-Regional-Local Politics in Peru, Brazil, and South Africa." *Publius: The Journal of Federalism* 37(1): 1-25.

Escobar-Lemmon, Maria. 2003. "Political Support for Decentralization: An Analysis of the Colombian and Venezuelan Legislatures." *American Journal of Political Science* 47(4): 683-697.

Gilardi, Fabrizio. 2010. “Who Learns from What in Policy Diffusion Processes?” *American Journal of Political Science* 54(3): 650-666.

Gilardi, Fabrizio. 2016. “Four Ways We Can Improve Policy Diffusion Research.” *State Politics & Policy Quarterly* 16(1): 8-21.

Graham, Erin R., Charles R. Shipan, and Craig Volden. 2012. “Review Article: The Diffusion of Policy Diffusion Research in Political Science.” *British Journal of Political Science* 43: 673-701.

Gordon, Sanford C., and Dimitri Landa. 2021. “National Conflict in a Federal System.” *Journal of Politics* 83(3): 961-974.

Grossback, Lawrence J., Sean Nicholson-Crotty, and David A. Peterson. 2004. “Ideology and Learning in Policy Diffusion.” *American Politics Research* 67: 521-545.

Hafer, Catherine, and Dimitri Landa. 2007. “Public Goods in Federal Systems.” *Quarterly Journal of Political Science* 2(3): 253-275.

Kessler, Anke S. 2014. “Communication in Federal Politics: Universalism, Policy Uniformity, and the Optimal Allocation of Fiscal Authority.” *Journal of Political Economy* 122(4): 766-805.

Kollman, Ken, John H. Miller, and Scott E. Page. 2000. “Decentralization and the Search for Policy Solutions.” *Journal of Law, Economics, and Organization* 16(1): 102-128.

Mardones, Rodrigo. 2007. “The Congressional Politics of Decentralization: The Case of Chile.” *Comparative Political Studies* 40(3): 333-358.

Mookherjee, Dilip. 2015. “Political Decentralization.” *Annual Review of Economics* 7: 231-249.

Moscovich, Lorena. 2015. “Decentralization and Local Government in Latin America.” In: Millett, Richard L., Holmes, Jennifer S., Perez, Orlando J. (eds.). *Latin American Democracy: Emerging reality or endangered species.* New York: Routledge, pp. 134-150.

Myerson, Roger B. 2006. “Federalism and Incentives for Success of Democracy.” *Quarterly Journal of Political Science* 1(1): 3-23.

Myerson, Roger B. 2021. “Local agency costs of political centralization.” *Theoretical Economics* 16(2): 425-448.

Oates, Wallace E. 1999. "An Essay on Fiscal Federalism." *Journal of Economic Literature* 37(3): 1120-1149.

O'Neill, Kathleen. 2003. "Decentralization as an Electoral Strategy." *Comparative Political Studies* 36(9): 1068-1091.

O'Neill, Kathleen. 2005. *Decentralizing the State: Elections, Parties, and Local Power in the Andes.* Cambridge: Cambridge University Press.

Richardson, Lilliard E. 2019. "Medicaid Expansion During the Trump Presidency: The Role of Executive Waivers, State Ballot Measures, and Attorney General Lawsuits in Shaping Intergovernmental Relations." *Publius: The Journal of Federalism* 49(3): 437-464.

Sorens, Jason. 2009. "The Partisan Logic of Decentralization in Europe." *Regional & Federal Studies* 19(2): 255-272.

Spina, Nicholas. 2013. "Explaining Political Decentralization in Parliamentary Democracies." *Comparative European Politics* 11: 428-457.

Strumpf, Koleman S. 2002. "Does Government Decentralization Increase Policy Innovation?" *Journal of Public Economic Theory* 4(2): 207-241.

Tommasi, Mariano, and Federico Weinschelbaum. 2007. "Centralization vs. Decentralization: A Principal-Agent Analysis." *Journal of Public Economic Theory* 9(2): 369-389.

Treisman, Daniel. 2006. "Explaining Fiscal Decentralisation: Geography, Colonial History, Economic Development and Political Institutions." *Commonwealth & Comparative Politics* 289-325.

Volden, Craig. 2015. "Failures: Diffusion, Learning, and Policy Abandonment." *State Politics & Policy Quarterly* 16(1): 44-77.

Volden, Craig, Michael M. Ting, and Daniel P. Carpenter. 2008. "A Formal Model of Learning and Policy Diffusion." *American Political Science Review* 102(3): 319-332.

von Wilpert, Marni. 2017. "City governments are raising standards for working people — and state legislators are lowering them back down." Economic Policy Institute. `https://www.epi.org/publication/city-governments-are-raising-standards-for-working-`