Lobbying Bureaucrats

Delegation and Influence Under Alternative Political Structures[1]

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Abstract

This paper studies how interest group lobbying of the bureaucracy affects policy outcomes and how it changes the legislature's willingness to delegate decision-making authority to the bureaucracy. We extend the standard model of delegation to account for interest group influence during the implementation stage of policy and apply it to different institutional structures of government. The paper addresses the following questions: First, how does the decision to delegate change when the bureaucratic agent is subject to external influence? What cost does this influence impose on the legislative principal? Finally, how susceptible are policy choices to bureaucratic lobbying under different government structures? In answering these questions, the paper seeks to provide a comparative theory of lobbying and to explain the different patterns of interest group activity across political systems.

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1 Introduction

In any political system, a large number of policy decisions are made by bureaucratic agencies. Delegating policy authority to the bureaucracy is not only a necessity for the legislature, it also engenders many advantages by relying on the policy expertise of bureaucrats. The disadvantage, of course, is that policy choices by the bureaucracy may not be the ones the legislature would enact if it had the same information available as the bureaucrat. Delegation is a choice variable, and the present paper analyzes how the optimal degree of delegation is affected by interest group activity at the bureaucratic level, and how the influence of interest groups differs across different political systems.

Extensive scholarly work has recently been devoted to the tradeoff between informational advantage and loss of political control. This body of work has highlighted how optimal delegation from the point of view of the legislature depends on the professionalism and expertise of the bureaucracy relative to the legislature, on the ability to monitor and to sanction bureaucratic decisions, on the political environment such as divided government in the U.S. or the composition of the government coalition in Parliamentary systems, and the type of agency.[2] Within any given political system, the degree of delegation also tends to vary across policy areas: bureaucrats tend to have the less discretion in tax and social security policy than in areas such as education, foreign trade and environmental policy (Epstein and O'Halloran 1999).

As a consequence of delegation, the bureaucracy, endowed with the authority to determine policy within its domain, provides an important venue of interest group activity. Interest groups participate in agency decision-making on a regular basis. In the U.S., the administrative procedures require agencies to engage interest groups formally in the rule making process (McCubbins, Noll, and Weingast 1997, 1989, 1990, Moe 1990, Wright 1996). Interest groups testify in administrative hearings, participate through notice and comment

[2]See Banks 1989, Kiewiet and McCubbins 1991, Bawn 1995, Epstein and O'Halloran 1996, 1999, Gailmard 2002, Volden 2002, Huber and Shipan 2002.

and use their policy- and legal expertise to intervene in agency adjudication and thereby affect policy choices. In addition to the formal ways of participation, interest groups maintain direct contacts with agencies that led in the past to a view of the interest group–agency–legislative committee relationship as an "iron triangle" of interlocking interests. Interest groups leverage their informational advantage to influence agency decision-making in their favor, and concern is often raised about the "revolving door" that exists between interest groups and bureaucratic agencies through which top-level bureaucrats stand to gain from favorable treatment of certain groups. In the comparative context, private interests have even cozier relationship with the bureaucracy in corporatist political systems where their participation obtains quasi-official character.

In contrast to the active role interest groups play during policy implementation, the theory of delegation conceives the relationship between the legislature and the bureaucracy almost solely as a principal–agent relationship with imperfect information between the legislature and the bureaucracy, while interest groups serve primarily the role as control device in the guise of fire alarms that informs the legislature about independent bureaucratic drift. In this paper we reintroduce interest groups lobbying at the bureaucratic level into the delegation discussion and show how their activity changes predictions about optimal delegation and the resulting policy outcomes. While this step is a straightforward extension of the standard delegation model, we will show that it provide a new channel to explain some of the observed variation in delegation of authority across policy areas and across different institutional environments. This supplements existing explanations as well as introduces interesting comparative statics across political systems.

The first contribution of this extension is to characterize how the effect of bureaucratic lobbying on the delegation tradeoff depends on the presence, strength, and preferences of the interest group(s). Interest group lobbying of the agency charged with implementing policy can either increase or decrease the amount of delegated authority, depending on whether lobbying further exacerbates the preference conflict between the agency and the legislature

or whether the interest groups act as the legislature's ally.

Consider, e.g., the policy areas of taxation and environmental protection, between which the degree of delegation differs substantially. Suppose, first, that the design of tax policy for a heterogenous group of agents were delegated extensively to a tax authority. We would expect interest groups to lobby for lowering their own tax rates, while hardly any significant pressure would be exerted to increase taxes for any group or groups of agents. Thus, bureaucratic lobbying would push the bureaucrat's choice of taxes in one direction only, making it unlikely that the legislature's preferred policy would be implemented (unless the agency's own preferred tax rates exceeded that of the legislature). Everything else equal, lobbying should thus decrease the amount of delegation to the bureaucrats. (It is worth noting that "blame shifting" would suggest that taxes not be determined in detail by the legislature, while the "hold up" of the agency by interest groups justifies the detailed budget legislation that is common in most legislatures.)

Next, consider an agency operating in an environment that Wilson (1980, 1989) characterizes as entrepreneurial or as interest group politics, i.e., where organized interests are opposed to the agency's inherent mission or where they oppose each other, such as in environmental policy or the domain of public health. Here the danger of bureaucratic lobbying "hijacking" the agency is less warranted. Quite the opposite may be the case, as the aggregate effect of bureaucratic lobbying may be to align the agency's decision more closely with the legislature's preferences. This implies that the legislature will be less concerned about potential policy drift and thus increase delegation to harvest the fruits of expert knowledge embodied in the bureaucratic administration of environmental policy. In both cases, taking the effect of lobbying on the bureaucracy's behavior into account affects the amount of optimal delegation.

The paper's second contribution is to analyze how the interaction between bureaucratic lobbying and delegation is affected by the structure of the larger political institution. We contrast the effect of bureaucratic lobbying in a separation of powers system with those of a

parliamentary system. In earlier work (Bennedsen and Feldmann 2002a,b) we have shown that the two systems provide different incentives for lobbying in the legislative arena; in this paper we show that the effect of lobbying also differs at the bureaucratic level, albeit the results are far from clear-cut due to the complicating fact that delegation is endogenous.

In the parliamentary system, lobbying always reduces delegation since interest groups move policy away from the legislature's ideal policy. In a separation of powers system, where the agency is appointed by the administration and thus need not have preferences similar to the legislature's, the effect of lobbying is ambivalent. As the agency's policy preference differs from the legislature's even without lobbying, interest group influence may move policy outcomes closer to the legislature's most preferred outcome, in which case the legislature optimally expands delegation to the agency. But interest groups may also draw policy further from the legislature's preferred outcome; in this case the opposite result holds, and the legislature ideally delegates less.

We derive the relative impact of lobbying on the expected utility of the legislature and on expected policy outcomes across the two systems. The impact differs between the two systems and is non-linear in agents' ideal points. Comparing the effect on the legislature's expected utility is relatively easy: there is a cutoff point such that bureaucratic lobbying has a greater (negative) impact on legislative utility in the parliamentary system whenever the lobby group is not exacerbating the preference conflict between the bureaucrat and the legislature.

The relative impact on expected policy is more involved. The reason is that the legislature can always move the average policy closer to its preferred policy by reducing the amount of discretion, whereby the uncertainty about policy outcomes increases. Thus, observing average policy outcomes close to the legislature's preference does not necessarily indicate low lobbying activity; it may equally be an indication of low delegation in reaction to high degrees of lobbying. This suggests that observed differences in delegation across political systems should be regarded with substantial care to the details for the incentives

to delegate and to the political (i.e., interest group) environment.

The paper builds on and extends the now standard model of delegation as developed by Epstein and O'Halloran (1994, 1999) in the U.S. context and adapted by Huber and Shipan (2001, 2002) for the comparative context. Huber and Shipan (2002) provide a comprehensive comparative study of legislative delegation and bureaucratic discretion identifying various factors that determine degree of delegation, but they do not consider the role of interest groups. In the traditional Congressional dominance literature it is often assumed that Congressional policy is intended to serve interest groups (McCubbins, Noll, and Weingast 1987, 1989), which implies that interest groups have the ability to influence bureaucratic decision-making *ex post*. One of the interest groups' roles in this context is to feed information back to Congress when agencies depart from their legislative mandate and disregard the groups' interest (McCubbins and Schwartz 1984, Banks and Weingast 1992, Epstein and O'Halloran 1995).

Interest groups influence on agency decision-making, if present, remains largely black box in these models. An obvious way of influencing policy decisions is via the information an interest group provides. In this paper we employ a simpler form of influence technology that is based on simple incentive schemes offered to the bureaucrat, similar to Grossman and Helpman (1994). As mentioned above, interest groups often provide lucrative post-government employment opportunities for high-level bureaucrats that can be seen as providing incentives for bureaucrats to change their manifest policy preferences. By sidestepping the difficult problem of information provision for the moment, we provide a framework for a comparative institutional analysis of lobbying the bureaucracy. A similar approach in the comparative analysis of legislative lobbying is taken by Diermeier and Myerson (1999), Persson (1998), and Helpman and Persson (2001).

The paper proceeds as follows: The next section extends the delegation model to include lobbying at the bureaucratic level. Section 3 solves the model and shows the interaction

between bureaucratic lobbying and optimal delegation. Section 4 introduces our stripped-down version of separation-of-power and parliamentary government structures. Section 5 analyzes the relative impact of bureaucratic lobbying in these two systems and Section 6 discuss our findings. All proofs are relegated to the appendices.

2 The Model

In the basic version of the model we have three players: a legislator (L) who delegates a task to a bureaucrat (B), and an interest group (I) that is able to influence the bureaucrat. Later on we will also introduce an administration (A) representing the president or government in a system of separation of powers or parliament, respectively. In these cases, A chooses the bureaucrat.

We assume that the policy space is one-dimensional. All players have preferences over the policy outcome, x. The policy outcome is a function of the chosen policy, p, and a noise parameter, ω, such that $x = p + \omega$. We assume that ω is uniformly distributed on the interval $[-r, r]$, with r being a measure of the ex ante uncertainty in the environment. The politician does not know the realization of ω since this requires expert knowledge that the bureaucrat and the interest group are assumed to possesses.

All players have single peaked preferences over policy outcomes,

$$\begin{aligned} U^L(x) &= -(x - x^L)^2, \\ U^B(x,t) &= -(x - x^B)^2 + \alpha^B t, \\ U^I(x,t) &= -(x - x^I)^2 - \alpha^I t, \end{aligned}$$

where t is a measure of transferable utility (i.e., in the simplest case, money) that is transferred from the interest group to the agent. The transfer may be in form of an explicit incentive contract, but may also be a more indirect contract, e.g., the promise of a better paid future job arranged by the interest group for the publicly employed bureaucrat. α^i reflects the relative value the bureaucrat and the interest group place on the transferred

resource, respectively, and thus $\alpha \equiv \alpha^B/\alpha^I$ is a measure of the efficacy of the influence technology.

The timing of the model is as follow:

Date 0: The agency is chosen.

Date 1: The legislator specifies a reference policy, q, and a distance, d, the combination of which reflects the scope of delegation. The range $D = [q - d, q + d]$ is the window of discretion in which the bureaucrat may implement the policy.

Date 2: The realization of the policy shock ω is revealed to the bureaucrat and the interest group. Then, the interest group offers an incentive schedule $t(p)$, i.e., an offer that specifies a utility transfer t from the interest group to the bureaucrat conditional on the policy choice p.

Date 3: The bureaucrat chooses policy p, and payoffs are realized.

We assume that policy outside the window $[q-d, q+d]$ will be struck down by the courts. Gailmard (2002) generalizes the notion of the delegation window in that the bureaucrat can exceed her delegated authority at some cost and faces a probability of being struck down less than one. We adopt the simpler and more rigid notion of a fixed window.

An implicit assumption in our framework is that the legislature (or later the administration) cannot make a strategic choice of bureaucratic preferences. Hence, we think of situations where bureaucrats either are inherited from past legislature's, or where the bureaucrat is picked for other reasons like expert knowledge on the relevant policy areas, previous work in the party organization of the majority party, or political loyalty. An alternative but more complicated framework could allow for strategic choice of bureaucratic preferences in a model with sufficient electoral uncertainty (Calvert, McCubbins, Weingast 1989, Persson and Tabellini 2000).

3 Optimal Policy, Discretion, and Influence

We solve for the subgame perfect equilibrium of the game by backward induction. The following lemma and corollary characterize the solution to the delegation game with lobbying.

Lemma 1. *Let* $\hat{x} = \frac{x^B + \alpha x^I}{1+\alpha}$. *The unique subgame perfect equilibrium of the delegation game with bureaucratic lobbying is as follows. The legislature chooses reference policy and degree of discretion*

$$\begin{aligned} q &= x^L \\ d &= \max\left\{r - |\hat{x} - x^L|, 0\right\}. \end{aligned}$$

Given (q, d), *the interest group induces the bureaucrat to implement policy*

$$p = \begin{cases} \hat{x} - \omega & \text{if} \quad \underline{\omega} \leq \omega \leq \bar{\omega} \\ q + d & \text{if} \quad \omega < \underline{\omega} \\ q - d & \text{if} \quad \omega > \bar{\omega} \end{cases}$$

where $\underline{\omega} = (\hat{x} - q) - d$ *and* $\bar{\omega} = (\hat{x} - q) + d$. *The transfer offered exactly compensates the bureaucrat for the utility loss relative to the policy implemented without lobbying.*

The proof is given in the appendix.

The lemma states that the bureaucrat seeks to implement a policy that yields the outcome $\hat{x}$, provided that such policy lies within the delegation window; failing this, she implements the closest policy possible. The group accomplishes this choice using the minimal transfer, so that the bureaucrat's utility after influence equals the utility she would have received without influence.

The legislature, anticipating this bureaucratic implementation strategy, chooses the level of delegation so as to optimally trade off the benefit from the bureaucrat's expertise (knowledge of the state of the world) and the loss from policy bias. Delegation occurs if and only if the induced implementation bias is not too great relative to the ex ante policy uncertainty, specifically, if $|\hat{x} - x^L| < r$. The equilibrium level of delegation in Lemma 1 is analogous

to the standard model (Epstein and O'Halloran, 1999). However, since the agency is being lobbied, the legislature takes into account the bureaucrat's induced ideal point $\hat{x}$ that results from the incentive schedule. Depending on the direction of influence from the interest group, the legislature may in fact grant the agency more or less discretion than in the absence of lobbying, as summarized in the following, unsurprising corollary.

Corollary 1. *a) The presence of an interest group decreases bureaucratic discretion if and only if the interest group's lobbying activity moves the bureaucrat's induced ideal policy further away from the legislature's preferred policy, i.e., iff* $|\hat{x} - x^L| \geq |x^B - x^L|$.

b) Ceteris paribus, increasing ex ante uncertainty increases bureaucratic discretion.

Part b) of the Corollary states that the greater the ex ante uncertainty, as represented by r, the more discretion the legislature delegates to the bureaucrat, reflecting the informational rationale for delegation.

We now show that the distribution of outcomes resulting from delegation follows a two-part distribution. From Lemma 1 we know that whenever $\omega \in [\underline{\omega}, \bar{\omega}]$, the agency chooses p so that the outcome is $x = \hat{x}$. When ω falls outside this $2d$-wide interval, the agency's choice is constrained by the lower (upper) bound of the discretion window if $\hat{x} >(<) x^L$ and is thus $p = q -(+) d$. Thus, with probability mass $\frac{d}{r}$ the policy outcome is $x = \hat{x}$, and with the remaining probability it varies uniformly from $2x^L - \hat{x}$ to $\hat{x}$ ($\hat{x}$ to $2x^L - \hat{x}$), a range that is symmetric around the legislature's ideal point x^L, having an expectation of x^L. Thus, given the uniform density $f(\omega) = \frac{1}{2r}$, the expected policy outcome with delegation is easy to calculate and is

$$E(x) = \frac{d}{r}\hat{x} + (1 - \frac{d}{r})x^L.$$

If the legislature does not delegate to the agency (setting $q = x^L, d = 0$), outcomes vary uniformly from $x^L - r$ to $x^L + r$, yielding an expected outcome of x^L. Thus, delegation *necessarily* induces bias (whenever $d > 0, \hat{x} \neq x^L$). The benefit of optimal delegation, then, is to eliminate outcomes whose distance $|x - x^L| > |\hat{x} - x^L|$. Under the assumption of

a uniform distribution of ω, the distribution of outcomes *first-order stochastically dominates* the distribution of outcomes without delegation from the legislature's point of view.[3] Thus, any legislature with single-peaked preferences benefits from delegation and from the bureaucrat's expertise, *even if the legislature is not risk averse.*

Defining Influence

Since delegation reduces the range and variance of outcomes at the cost of bias in the expected outcome and with the effect of raising the legislature's utility, one can gauge the degree of interest group influence by measuring its impact on the legislature's delegation decision and on the agency's policy choice or, alternatively, on the degree to which policy outcomes and the uncertainty associated with these outcomes are affected. Both approaches are, of course, interrelated and measure the extent of policy bias induced by lobbying and how it affects the legislature's ability to rely on the expertise of the bureaucracy. In our model, since utility functions are quadratic, mean and variance of policy outcomes are a sufficient statistic for the welfare of the actors.[4] We will thus focus on the second set of measures, the impact of lobbying on expected policy outcomes and their variance.

Influencing policy outcomes. We define the *l*obby group's *i*mpact on expected policy *o*utcomes (LIO) as the average bias induced relative to policy outcomes from delegation when no lobbying occurs:

$$\begin{aligned} LIO &= E(x \mid \text{lobbying}) - E(x \mid \text{no lobbying}) \\ &= \frac{d^{\ell}}{r}\hat{x} + (1 - \frac{d^{\ell}}{r})x^{L} - \frac{d^{n\ell}}{r}x^{B} + (1 - \frac{d^{n\ell}}{r})x^{L}, \end{aligned}$$

[3] More precisely, given optimal delegation (q, d) and a uniform distribution of ω, the distribution of the distance $|x - x^L|$ first order stochastically dominates the distribution of $|x - x^L|$ resulting from any other degree of delegation $\tilde{d}$. However, if the distribution of ω is not uniform, *fosd* need no longer hold. A similar point about the effect of delegation has been raised, albeit less precisely, by Bendor and Meirowitz (forthcoming).

[4] Specifically, for *any* distribution of outcomes x, $EU^i(x) = -E\big[(x - x^i)^2\big] = -\big[(E(x) - x^i)^2 + V(x)\big]$, $i = L, B, I$. For utility functions other than quadratic, more information about the distribution may be relevant and necessary.

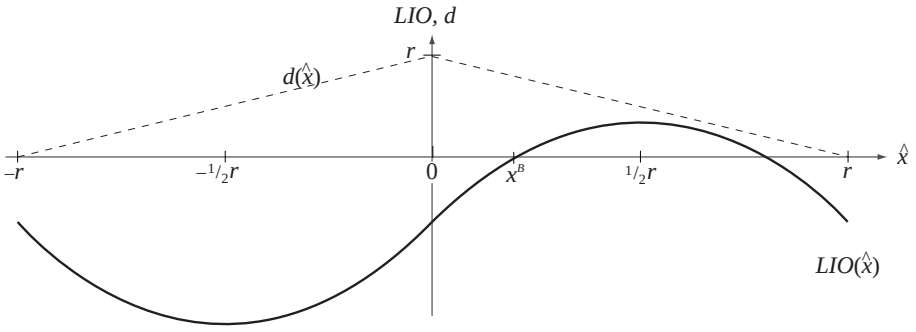

Figure 1: Impact of lobbying on expected outcome and delegation

where d^{ℓ} and $d^{n\ell}$ are the degrees of delegation granted to an agency that is being lobbied or not being lobbied, respectively. From now on we normalize the legislature's ideal point to $x^L = 0$ and assume without loss of generality $x^B \geq 0$. This simplifies notation and yields

$$LIO \quad = \quad \frac{d^{\ell}}{r}\hat{x} - \frac{d^{n\ell}}{r}x^B \tag{1}$$

In the following we are often interested in the magnitude of $|LIO|$ rather than its direction.

When $\hat{x}$ and x^B are not too far from x^L, then lobbying moves the expected policy outcome in the direction of the interest group's ideal point. This effect, however, is not monotonic. Beyond some point the impact is reversed. The reason is that the expected policy for either form of delegation (with or without lobbying) is furthest away from x^L when delegation allows for the greatest expected policy bias in exchange for a reduction of uncertainty, as is reflected in the first-order conditions for a maximum of LIO in (1),

$$\max_{\hat{x}} |LIO| \quad \Rightarrow \quad |\hat{x}| \; = \; \frac{r}{2}.$$

Thus, if $\hat{x}$ is more than $\frac{r}{2}$ away from x^L, then a move of $\hat{x}$ further away from B's ideal point actually moves the expected policy *closer* to x^L, as less discretion is being granted to the agency. This effect is illustrated in Figure 1.

The cost of lobbying in this latter case lies not in increased influence, but in an increase of uncertainty due to the reduction in delegation. If the agency's induced ideal point is further away from x^L, the informational advantage of delegation for the legislature is diminished.

Affecting the legislature's expected welfare. Let $\tilde{x}$ be the bureaucrat's induced ideal point with or without lobbying.[5] As we saw above, under uniform distribution of ω and optimal delegation (with $d > 0$), the policy outcome x equals $\tilde{x}$ with probability d/r and continues to be uniformly distributed on the interval $[-|\tilde{x}|, |\tilde{x}|]$ with probability $1 - d/r$. Thus, the legislature's expected utility, or welfare, from optimal delegation and given $\tilde{x}$, is

$$\begin{aligned} W(\tilde{x}) \;\equiv\; E[U^L(x) \mid d, \tilde{x}] \;=\; E(-(x)^2 \mid d, \tilde{x}) \;&=\; -\frac{d}{r}\tilde{x}^2 - \int_{-|\tilde{x}|}^{|\tilde{x}|} \frac{z^2}{2r} dz \\ &=\; -\tilde{x}^2(1 - \tfrac{2}{3r}|\tilde{x}|). \end{aligned} \tag{2}$$

$d > 0$ requires $r > |\tilde{x}|$, $\Rightarrow 1 - \frac{2}{3r}|\tilde{x}| \geq \frac{1}{3}$.

Differentiating (2) with respect to the agency's ideal point yields

$$\frac{\partial W}{\partial |\tilde{x}|} = -2|\tilde{x}|\,(1 - \tfrac{|\tilde{x}|}{r}) < 0,$$

where the inequality holds due to $d > 0$. Thus, the legislature's welfare is monotonically decreasing in the distance $|\tilde{x}|$.

Similarly to the above impact on policy outcomes, we are interested in the *l*obby group's *i*mpact on the legislature's *w*elfare, LIW. Denoting the legislature's welfare under optimal delegation without lobbying by $W^{n\ell}$ and with lobbying by W^{ℓ}, we have $LIW = W^{\ell} - W^{n\ell}$. Given the monotonicity of $W(\tilde{x})$ when delegation is strictly positive, we conclude that bureaucratic lobbying diminishes the legislature's welfare whenever $|\hat{x}| > x^B$.

4 Delegation Under Different Political Structures

The incentives to delegate in a system of separation of powers have amply been analyzed, and few studies have addressed the different incentives for a legislature to delegate across different institutional environments. In this section we analyze the role of interest groups and their effect on delegation in a comparative context, a subject which has not been investigated theoretically before.

[5] I.e., $\tilde{x} = \hat{x}$ with lobbying and $\tilde{x} = x^B$ without lobbying.

Arguably, one key difference between a parliamentary system and a separation-of-powers system is the amount of conflict that arises between the administration and the legislature. In a parliamentary system the majority coalition (generally) controls the legislature and governs the bureaucracy, hence it is likely that the preferences of the bureaucrat closely reflect the preferences of the majority coalition. In a separation-of-powers system, by contrast, legislature and the administration are distinct and answer to different constituencies. Even if the control of the legislature and the government is not formally divided between the parties, greater preference divergence may persist between the administration and the legislature.

We model the difference in government structure by introducing an administration A with single peaked preferences that may differ from the legislatures, and denote them by $U^A \equiv -(x - x^A)^2$. To make the analysis sufficiently straightforward, we assume that the administration picks a bureaucrat with identical preferences to itself, i.e. $x^B \equiv x^A$. We focus in the following on how the wedge between the preferences of the administration and the legislature affects the influence of lobby groups. We characterize the *parliamentary system* by the congruence of administrative and legislative preferences, $x^A = x^L$, and the *separation of powers system* by the potential conflict between the two, $x^A \neq x^L$. To simplify notation we normalize $x^L = 0$ and focus without loss of generality on the case $x^A \geq 0$.

In the parliamentary system with $x^B = x^L$, the legislature would have no need to constrain the administration without lobbying. According to Lemma 1, full discretion is granted and the bureaucracy chooses policy that offsets any ex post shock; the outcome is precisely the legislature's idealpoint. With lobbying the picture looks slightly different. The bureaucrat's induced idealpoint with lobbying in the parliamentary system (using subscript p) is $\hat{x}_p = \frac{x^L + \alpha x^I}{1+\alpha} = \frac{\alpha}{1+\alpha} x^I$, and the legislature reduces the scope of delegation to $d_p = r - |\hat{x}_p|$.

In the separation of powers system without lobbying, delegation depends on the extent of conflict between the legislature and the administration. The larger the conflict, the smaller

the authority delegated to the bureaucracy, $d = r - x^A$ (Epstein and O'Halloran, 1999). With lobbying the bureaucrat's induced preference (using subscript s for sep. of powers) is $\hat{x}_s = \frac{x^A + \alpha x^I}{1+\alpha}$, and the degree of discretion becomes $d_s = r - |\hat{x}_s|$. Depending on the location of the interest group, lobbying may exacerbate or attenuate the conflict between the legislature's preference and the bureaucrat's policy choice. The bureaucrat's induced preference is more moderate with lobbying than without if $|\hat{x}_s| < x^A$, which is always the case whenever x^I lies between x^L and x^A, and is also the case when x^I is not too far to the left of x^L so as to over-compensate the A's preference on the opposite side.[6]

Proposition 1. *1. In the parliamentary system, lobbying reduces delegation and moves expected policy away from the legislature's ideal point.*

2. In a separation of powers system, lobbying increases delegation if

$$x^I \in \left[-\frac{2+\alpha}{\alpha}x^A,\ x^A\right]. \qquad (A)$$

3. For given x^L and x^A, the legislature delegates more to the bureaucracy under a separation of powers system than under a parliamentary structure iff

$$x^I < -\frac{1}{2\alpha}x^A. \qquad (B)$$

Proposition 1 recaps that lobbying decreases delegation in the parliamentary system in all cases, while in the separation of powers system lobbying may have a moderating effect on the bureaucrat's policy choice that leads to more delegation and to a more efficient use of the bureaucrat's expertise if the interest group's ideal point lies in the range given by (A). Part 3 of the proposition states that if the interest group is a sufficient counter-weight to the administration's preference (B), then the legislature delegates more to the bureaucracy in the separation of powers system than in the parliament.

Since the legislature's welfare is directly related to the amount of delegation that occurs in equilibrium, we have as a corollary to Proposition 1, Parts 1 and 2, that LIW_p is always

[6]Specifically, $|\hat{x}_s| < x^A$ if $x^I > -\frac{2+\alpha}{\alpha}x^A$ for $x^I < 0$.

negative in the parliamentary system, whereas in the separation of powers system lobbying may increase or decrease legislative welfare, as the sign of LIW_s depends on whether $|\hat{x}_s| \lessgtr x^A$, as given by (A).

5 Influence and Political Structure

In this section we examine in which political system bureaucratic lobbying yields the greatest influence on policy. Unfortunately, comparing the two political systems in this regard is not straightforward. The complication lies in the fact that since the degree of delegation is endogenous to the group's lobbying efforts, the impact of lobbying is non-linear. Secondly, the public debate about influence of interest groups focuses on their influence on (expected) policy outcomes, whereas in the context of delegation the effect of lobbying on the legislature's ability to make use of bureaucratic expertise and thus on its expected *utility* may be more pertinent.

For these reasons we will analyze the two measures of influence below. We first present an example that shows the non-linearity of the relationships, which should be sufficiently straightforward to provide an intuition for the basic comparative statics at work. Afterwards we characterize formally the relative impact of the lobby group on expected utility and expected outcome in the two systems.

5.1 A Simple Example

For a comparison of the effect of bureaucratic lobbying we calculate the degree of delegation, expected policy, its variance, and the legislature's resulting expected utility in the two political systems for different interest group ideal points. The values are easy enough to calculate using the results from above.[7] For the sake of the example we assume $x^L = 0$,

[7]Let x^I be given. In the parliamentary system we then have: $x_p^B = 0$ and $\hat{x}_p = \frac{\alpha x^I}{1+\alpha}$; in the separation of powers system: $x_s^B = x^A$ and $\hat{x}_s = \frac{x^A + \alpha x^I}{1+\alpha}$. Optimal delegation implies $d = r - |\hat{x}|$, and we get the expected policy outcome $E(x) = \hat{x} - \frac{\text{sign}(\hat{x})\hat{x}^2}{r}$. In addition, the variance of the policy outcome is $V(x) = \frac{|\hat{x}^3|}{r}(\frac{4}{3} - \frac{|\hat{x}|}{r})$. Since the legislature's utility function is negative quadratic and its ideal point is zero, its expected utility $EU^L = -\big(E(x)^2 + V(x)\big) = -\hat{x}^2(1 - \frac{2|\hat{x}|}{3r})$.

$x^A = \frac{r}{2}$, $r = 1$ and $\alpha = 1$, while the interest group's ideal point varies. Table 1 illustrates the effect of lobbying in the two political systems.

Table 1: Example of the effect of bureaucratic lobbying

	Parliamentary System					Separation of Powers				
x^I	$\hat{x}$	d_p	$E(x)$	$V(x)$	EU^L	$\hat{x}$	d_s	$E(x)$	$V(x)$	EU^L
—	0	1	0	0	0	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	.104	$-.167$
$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{16}$	.017	$-.052$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	.104	$-.167$
1	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	.104	$-.167$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{3}{16}$	.246	$-.281$
$-\frac{1}{2}$	$-\frac{1}{4}$	$\frac{3}{4}$	$-\frac{3}{16}$	.017	$-.052$	0	1	0	0	0

In this example: $x^L = 0$, $x^A = \frac{r}{2}$, $r = 1$, and $\alpha = 1$.

First, row 1 shows the outcome of delegation without lobbying. Delegation is greater and the expected policy more in line with the legislature's preferences in the parliamentary system than in the separation of powers system, due to the executive–legislative conflict in the separation of powers system.

Comparing lobbying (rows 2–4) with no lobbying (row 1) in the parliamentary system shows that lobbying, when it induces the bureaucrat's ideal point to move further from the legislature's ideal point, reduces the amount of discretion granted to the legislature and *may* move expected policy outcomes further from the legislature's ideal policy.

The numbers under separation of powers illustrate however that the policy outcome does not move monotonically with the extremeness of the interest group. In row 3 the interest group is more extreme than in row 2, but the expected policy is closer to the legislature. In this case the legislature's expected utility is nonetheless lower, as it grants less discretion to the bureaucrat. This happens whenever the bureaucrat's induced ideal point is further than $|r/2|$ from the legislature's ideal point, as we have seen above.

In the separation of powers system the interest group may move policy closer to x^L and thus increase the informational benefit of the bureaucracy for the legislature if the interest

group influence compensates (at least in part) the differences in preferences between the legislature and the administration: In row 4, e.g., the legislature delegates completely and obtains its most preferred outcome with lobbying, while without lobbying it only partially delegates and also only partially benefits from delegation.

Row 3 under the separation of powers system also illustrates that an interest group may be worse off lobbying than not lobbying at all: here the expected policy is further away from the interest group's ideal and the variance of the outcome is greater than in row 1 without lobbying. The reason is that the presence of the lobby group induces the legislature to delegate less. As a consequence, both legislature and interest group are worse off than without lobbying. If the group could *commit* not to lobby, it would be better off. But in the absence of such a commitment strategy, the legislature must anticipate that bureaucratic lobbying will occur, and thus reduces (or increases) the degree of discretion accordingly.

The impact of lobbying on expected policy outcomes in this example is, of course, the difference of expected policy with lobbying (rows 2–4) and that without lobbying (row 1).

5.2 Impact on Legislature's Welfare

As we see from the example, the effects of lobbying on expected policy outcomes and the legislature's welfare are non-monotonic in the interest group's ideal point. Thus, the relationship between bureaucratic lobbying and the legislative structure is not a straightforward one. We first analyze the effect of lobbying on the legislature's welfare under the alternative government structures before turning to the effect on policy outcomes in the next subsection.

We define $\Delta LIW_{ps} \equiv LIW_p - LIW_s$ as the impact of lobbying on welfare in the parliamentary system relative to the separation of powers system. We already know that lobbying always reduces legislative welfare in the parliamentary system, while it may have a positive or negative effect under separation of powers. Thus, when if ΔLIW_{ps} is positive, it means that lobbying has a less pernicious effect on the legislature's utility in the parliamentary system, even though lobbying reduces utility in both systems.

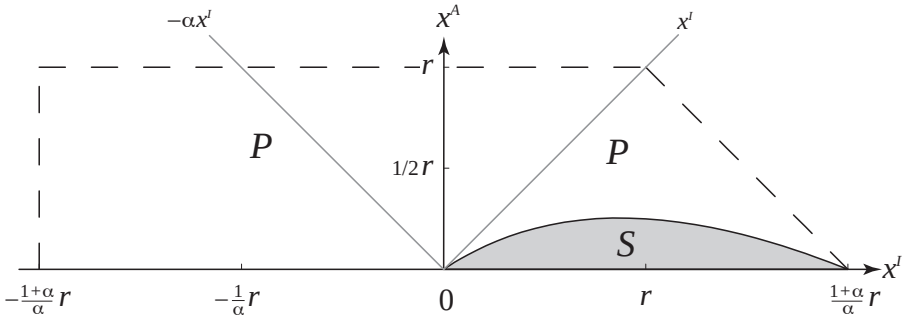

Figure 2: Ideal point ranges where lobbying reduces the legislature's welfare more in the parliamentary (P) or the separation of powers (S) system

To limit the permutation of cases to be covered we confine our analysis to the situation in which the ideal points of the bureaucratic agent and the interest group are sufficiently aligned with the legislature so that the legislature has an incentive to delegate, both with and without lobbying. The incentive to delegate is (weakly) positive if $\max\{|\hat{x}_p|, |\hat{x}_s|, x^A\} \leq r$. With sufficient ex ante uncertainty this condition is always satisfied. The relevant range of ideal points is, therefore, $x^A \in [0, r]$ and $x^I \in [-\frac{1+\alpha}{\alpha}r, \frac{1+\alpha}{\alpha}r - \frac{1}{\alpha}x^A]$.

Proposition 2 characterizes the range of ideal points for which lobbying affects legislative welfare less negatively in the parliamentary system:

Proposition 2. *Assume that the legislature has a (weak) incentive to delegate in each system of government, both with and without lobbying. Then lobbying at the bureaucratic level reduces the legislature's welfare more in the parliamentary system than in the separation of powers system iff*

$$x^I \leq 0 \quad or \quad x^A \geq \frac{r(1+\alpha)x^I - \alpha {x^I}^2}{(x^I + r(1+\alpha)(\alpha/2+1))}.$$

The bound on x^A for which lobbying has a less pernicious effect in the parliamentary case is quadratic in x^I and is therefore not readily interpreted. Figure 2 graphs the conditions and depicts the range of ideal points for which the effect of lobbying is less detrimental.

The outer bounds for the figure are given by the premise that there is a positive incentive to delegate. For instance, when $x^I < -\frac{1+\alpha}{\alpha}r$ the parliamentary legislature prefers not to

leave any discretion to the bureaucrat. Similarly, if $x^I > \frac{1+\alpha}{\alpha} r$ and $x^A = 0$ there will be no discretion in neither legislative structure. When x^A increases the maximum x^I that leaves some positive discretion in the separating power case decreases. Thus, when $x^A = r$, a necessary condition for discretion is $x^I \leq r$.

In the white area, labeled P, the ideal points are such that the interest group has a larger negative impact in the parliamentary case than in the separation of power case. In the shaded area, labeled S, we have the opposite effect. To grasp the intuition behind Proposition 2, we focus on some of the simpler cases: First, consider ideal points such that $x^A = -\alpha x^I$. In this case the lobby has indeed a positive effect on the legislature's welfare in the separation of powers system, since it induces the bureaucrat to have a preferred outcome identically to the legislature. On the other hand, in the parliamentary system, the lobby always has a negative effect on expected welfare, given the preference divergence between the legislature and the interest group. Hence, in this case, it is clear that the impact on the legislature's welfare is more negative in the parliamentary case. In general, when an interest group has a opposite interest than the administration from the legislature's perspective, then we always observe a more negative effect on legislature's welfare in the parliamentary system: From the perspective of the legislature the opposing interests of administration and lobby group offset each other and that the legislature expands the delegation in the separation of power case.

Second, to see the intuition in the white area to the right in Figure 2, consider ideal points on the $x^A = x^I$ locus. In the separation of power case, there will be no impact on the induced preferences through lobbying, as the administration's and the interest group's preferences are identical. Hence lobbying does not affect expected welfare. In the parliamentary system without lobbying we are in the best possible case for the legislature, as there is no preference divergence between the legislature and the bureaucrat. Only the introduction of a lobby creates a preference conflict, thus reducing the legislature's expected utility. Hence, in this case the lobby again has a more negative impact on expected welfare in the parliamentary

case. By continuity, this holds for ranges of ideal points close to the $x^A = x^I$ line as well.

Third, consider ideal points that lie inside the shaded area labeled S in the right part of Figure 2. Recall that EU^L contains quadratic terms and that therefore a given shift of ideal point away from the legislature's has a larger impact on utility the further the ideal points are from x^L. In the shaded area we have $x^I > x^A$, x^A small. Thus, the lobby induces a bureaucratic ideal point $\hat{x} > x^B$ in both institutional regimes, and, since $x^A > 0$ but small, the induced movement is smaller in the separation of power system than in the parliamentary system, but occurs further away from x^L. The quadratic loss function then explains that the interest group's reduction in expected utility is greater in the separation of power system for this range of ideal points.

We conclude that for most ideal point constellations bureaucratic lobbying has a less detrimental effect in the separation of powers system than in the parliamentary system.

The following proposition shows the effect of an increase in ex ante uncertainty, r, on the impact of lobbying across legislative systems.

Proposition 3. *Assume that the legislature has a (weak) incentive to delegate in each system of government, both with and without lobbying.*

1. *The interest group's (negative) impact on the legislature's welfare increases in the ex ante uncertainty in the parliamentary system.*

2. *The interest group's impact on the legislature's welfare decreases in the ex ante uncertainty in the separation of powers system iff* $x^I \in [-(\frac{2+\alpha}{\alpha})x^A, x^A]$.

3. *The marginal effect on the interest group's impact on the legislature's welfare from an increase in uncertainty is larger in the parliamentary system than in the separation of power system iff* $|\hat{x}_p|^3 + x^{A^3} \geq |\hat{x}_s|^3$.

An increase in uncertainty, as measured by r, increases the (detrimental) effect of lobbying on the legislature's welfare in the parliamentary system. In the separation of powers

system, increased uncertainty enhances the positive effect of lobbying in the range where bureaucratic lobbying mitigates the conflict between the legislature and the administration. The condition in Proposition 3(2.) is the same as condition A in Proposition 1.

5.3 Impact on Policy Outcomes

We define the relative impact of a lobby group on expected outcome across the two legislative systems as $\Delta LIO_{ps} = |LIO_p| - |LIO_s|$. A positive value of ΔLIO_{ps} means that the lobby group has a larger effect on expected outcome in the parliamentary system than in the separation of power system. Proposition 4 below characterizes the circumstances in which the interest group influence on bureaucrats moves expected policy more in a parliamentary legislative system than in a system with separation of powers, i.e., in which system an interest group has a greater influence on expected policy outcomes.

Since ΔLIO_{ps} involves absolute values, its value depends on whether the change in expected outcome from introducing lobbying is positive or negative in each of the systems.[8] We shall keep in mind, however, that the absolute value is a continuous operator, which assures that ΔLIO_{ps} is continuous throughout.

In the parliamentary system LIO_p is positive (negative) if $x^I >(<) 0$. In the separation of powers system the following Lemma identifies the regions in the range of ideal points for which LIO_s is positive (negative).

Lemma 2. *In the separation of powers system lobbying moves the expected outcome to the right ($LIO_s > 0$) if and only if*

$$\textit{either} \quad x^I > x^A \quad \textit{and} \quad x^I < \tfrac{1+\alpha}{\alpha} r - \tfrac{2+\alpha}{\alpha} x^A \qquad (C)$$

$$\textit{or} \quad -\tfrac{1}{\alpha} x^A < x^I < x^A \quad \textit{and} \quad x^I > \tfrac{1+\alpha}{\alpha} r - \tfrac{2+\alpha}{\alpha} x^A. \qquad (D)$$

Lemma 2 states that LIO_s is positive if x^I and x^A fall into the regions delineated by

[8] $\Delta LIO_{ps} = |LIO_p| - |LIO_s|$ and $d_i = r - |\hat{x}_i|$. We thus need to consider separately the cases for which $LIO_s \lesseqgtr 0$, $LIO_p \lesseqgtr 0$, $\hat{x}_s \lesseqgtr 0$, and $\hat{x}_p \lesseqgtr 0$. For LIO_s, this is done in Lemma 2. Furthermore, the sign of $\hat{x}_p$ is given by $x^I \lesseqgtr 0$; and $\hat{x}_s > 0 \Leftrightarrow x^I > -\frac{1}{\alpha} x^A$.

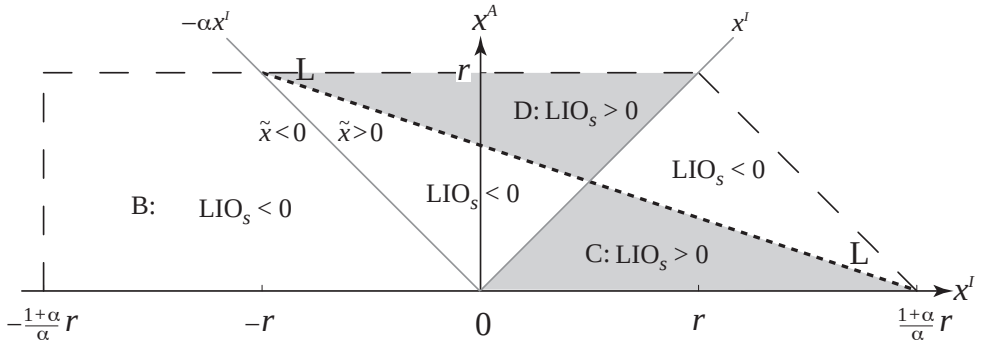

Figure 3: Ideal points where lobbying moves expected policy right (left)

condition C or D. (Notice that on the boundary of C and D, where any of the inequalities holds with equality, $LIO_s = 0$.) These regions are illustrated in Figure 3. Again the bounds of the figure are given by the assumption that the legislature always has a (weak) incentive to delegate.

We already observed that the $-\alpha$-sloped line through the origin delineate the points where $\hat{x}_s = 0$. The line LL has a slope $-\frac{2+\alpha}{\alpha}$ and constitutes the boundary for the cases in Lemma 2. It separates the areas where $LIO_s \lesseqgtr 0$; hence, on line LL lobbying has *no* effect on expected policy outcomes in the separation of powers system. This, of course, does not mean that lobbying has no effect at all; lobbying still affects the amount of delegation, the legislature's welfare, and the variance of policy outcomes, which highlights that these effects are not monotonically related. On LL the *average* outcome is not affected by lobbying.

The intuition behind the area delineated by condition C—that is the bottom shaded area in Figure 3—can simplest be provided by fixing the administration's preference at some moderate level. Without lobbying this implies a positive level of delegation and an expected outcome higher than the legislator's preferred outcome. Consider an interest group whose preferred outcome lies between the legislature's and the administration's preferred outcomes. The impact of this lobby group is to moderate the impact of the administration on the bureaucrat, which increases delegation and lowers expected outcome. Thus, the presence of the lobby has a negative impact on expected outcome. Next, assume the lobby's

preferences are more extreme than the administration's. Then the impact of the lobby group is to increase the administration's preferred outcome and through this to increase the expected outcome. Finally, when the lobby becomes to extreme, the induced preferences on the bureaucrat will be so far away from the legislature's preferences that delegation is decreased relative to the situation without a lobby. When the line LL is crossed the reduction in delegation is so significant that expected policy comes close to zero. In these cases we have that the presence of the lobby group decreases expected outcome.

To grasp the intuition behind the area delineated by condition (D) we look at the case where $x^I = 0$, i.e., where the interest group has the same preferences as the legislature. When there is little conflict between the legislature and the administration, that is in the white area on the vertical axis, there is a positive amount of delegation in the absence of lobbying and the bureaucrat generally picks an outcome that is higher than the one the legislature would choose themselves if it were informed. Now the interest group moves the bureaucrat's induced ideal point towards the legislature's most preferred outcome. Therefore, in expectation, the lobby has a negative impact on the outcome in this case. If the administration's preferences become too extreme relative to the legislature, the legislature limits the amount of delegation to the bureaucrat. In these cases, the impact of the lobby group can moderate the preferences of the bureaucrat, such that delegation is increased after lobbying. When delegation increases the expected outcome may increase, thus lobbying moves expected outcome further away from the legislature—even though the lobby had identical preferences to the legislature. This happens in area D of Figure 3, and the key is that due to the moderating effect of the interest group it is beneficial for the legislature to delegate more, which induces the expected policy to move further from x^L, but has the benefit of reducing the variance of the outcome.

We now have a full set of conditions that allows us to state the relative impact of lobbying on expected policy outcome in the two systems of government, given in Proposition 4.

Proposition 4. *Assume that the legislature has a (weak) incentive to delegate in each sys-*

tem of government, both with and without lobbying. Then bureaucratic lobbying has a greater impact on the expected policy outcome in the parliamentary system than in the separation of powers system ($\Delta LIO_{ps} > 0$) under the following conditions:

1. *suppose* $x^I > 0$,

   (a) *under C, always,*

   (b) *under D, iff* $x^I \geq \frac{2+\alpha}{2}x^A - \frac{1+\alpha}{2}r$,

   (c) *under* $\sim C$ *and* $\sim D$, *iff*

   $$(2+\alpha){x^A}^2 - ((1+\alpha)r + 2x^I)x^A + 2((1+\alpha)r - \alpha x^I)x^I \geq 0;$$

2. *suppose* $-\frac{1}{\alpha}x^A < x^I < 0$,

   (a) *under D, iff* $(2+\alpha){x^A}^2 - ((1+\alpha)r + 2\alpha x^I)x^A + 2(1+\alpha)rx^I \leq 0$,

   (b) *under* $\sim D$, *iff* $(2+\alpha){x^A}^2 - ((1+\alpha)r + 2x^I)x^A - 2\alpha{x^I}^2 \geq 0$;

3. *suppose* $x^I < -\frac{1}{\alpha}x^A$ *(i.e., B), iff* $x^I \geq \frac{1+\alpha}{2}r - \frac{2+2\alpha+\alpha^2}{2\alpha}x^A$.

If $x^I = 0$, *then lobbying always has a greater impact on the expected policy outcome in the separation of powers system.*

The condition for $\Delta LIO_{ps} \lesseqgtr 0$ differs across the regions identified above. The conditions in 1(b) and 3 are linear, condition 2(a) is quadratic in x^A, and 1(c) and 2(b) are quadratic in both x^A and x^I, making them somewhat difficult to compare. It is easy to verify, however, that the conditions in 1(b),(c) and 2(a),(b) all meet at a point s where $x^I = 0$, and those in 2(b) and 3 meet at a point q where $x^I = -\frac{1}{\alpha}x^A$, as the continuity of ΔLIO_{ps} requires.

Figure 4 then illustrates the result of Proposition 4 by depicting the ranges of ideal points for which the impact of lobbying on expected outcomes is greater in the parliamentary system (denoted by P) and those for which the impact is greater under the separation of powers system (indicated by S). Again, the bounds for the figure are given by the proposition's premise that there is always a positive incentive to delegate.

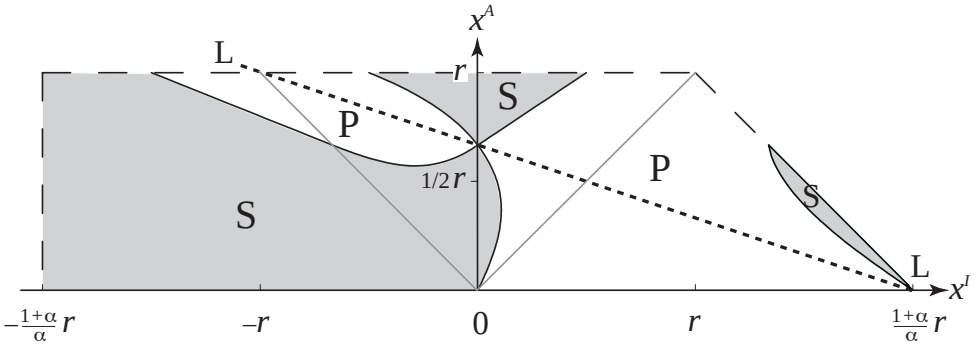

Figure 4: Regions where impact of lobbying on expected outcomes is greater in the parliamentary (P) or the separation of powers (S) system

The intuition is not straight forward, since it combines the insight from Figure 3 with the interest group's effect on the expected outcome in the parliamentary case. Hence we only provide the intuition for the most simple areas in Figure 4.

First, from Figure 3 we have that line LL is characterized by preference combinations where lobbying does not move expected outcome in the separation of power system. In the parliamentary system, the expected outcome is moved whenever the lobby has different preferences than the legislature, conditional on there being strictly positive delegation after lobbying. Hence we conclude, that the impact of a lobby group on expected outcome is larger in the parliamentary system for all preference combinations along line LL except when $x^I = 0$, where there is zero impact in both systems. By continuity the lobby's impact in the separation of power system is relative small compared to the parliamentary system in a neighborhood around LL. This provides the intuition for the two wide ares in Figure 4 where the impact of lobbying is relative larger under a parliamentary legislature.

Second, when $x^I = 0$ the lobby has no impact on expected outcome in the parliamentary case. For $x^A > 0$ it will in general tend to moderate the preference divergence between the legislature and the administration. As discussed before, this has a negative impact on expected outcome for less extreme administrative preferences and a positive impact on expected outcome for extreme preferences due to increased delegation. Hence, when the

interest group has the same preferences as the legislature (except where LL crosses the vertical axis) the lobby has a greater impact on expected outcome in the separation of power system. Again by continuity, this will also be the case for preference combinations where the interest group is close to the legislature. This provides the intuition for the two dark areas in Figure 4 where the impact of lobbying is relative larger under a separation of power system.

Third, for extreme values of x^I an interesting effect happens. In such circumstances, there is little impact on expected outcome in the parliamentary case because the legislature's reaction to the presence of a lobby is to remove almost all the discretion from the bureaucrat. On the other hand, in the absent of lobbying under the separation of power system there will be some delegation given the administration is not too extreme. The lobby group induces more extreme preferences on the bureaucrat and accordingly the legislature removes discretion. Therefore, there will be a significant negative impact on expected policy implying that the lobby in these cases have greater impact on expected outcome in the separation of power case. This explains why there is a dark area to the right in Figure 4.

The striking feature of Proposition 4, illustrated in Figure 4, is how non-monotonic the effect of lobbying on expected policy is across the two systems of government. If the interest group's ideal point is relatively similar (on the same side and not too different in size) to the administration's, then lobbying has a greater effect in the parliamentary system. If, however, the interest group is on the opposite side of the administration, the counterbalancing effect of lobbying in the separation of powers system and the distorting effect in the Parliamentary system may each dominate.

It is interesting to know what effect a change in the ex ante uncertainty (as measured by r) has on the magnitude of lobby group's influence. This is characterized in the following proposition.

Proposition 5. *Assume that the legislature has a (weak) incentive to delegate in each sys-*

tem of government, both with and without lobbying.

1. *In the parliamentary system the interest group's impact on the expected outcome is increasing in the level of uncertainty.*

2. *In the separation of power system, the interest group's impact on the expected outcome is increasing in the level of uncertainty iff*

$$x^I \leq \frac{1+\alpha}{\alpha} r - \frac{2+\alpha}{\alpha} x^A.$$

The intuition behind Proposition 5 is straightforward in the parliamentary case, since any preference divergence between the interest group and the legislature moves the expected outcome. Given the level of ex ante uncertainty (r) and the induced preferences on the bureaucrat ($\hat{x}_p$) the optimal amount of delegation trades off an expected bias in outcome against a reduced variance on this outcome. Now if uncertainty increases and the delegation is not changed, the expected bias in policy is unchanged but the variance is increased implying that it is optimal to increase the amount of delegation. Since delegation is increased, the expected policy bias increases, which is what the first part of Proposition 5 states.

In the separation of power case the intuition is more involved. Notice that the condition in part 2 of Proposition 5 is identical to the LL-line in Figure 4, which provides us with the key for the intuition behind the result. First, consider ideal points in the shaded area below LL in Figure 4. In this case we know that the lobby has a positive impact on expected outcome and the intuition behind the uncertainty result is exactly the same as in the parliamentary case: An increase in uncertainty increases delegation and thus increases the impact of the more extreme lobby group. Second, in the white area below LL, the lobby group provides an moderating impact on the bureaucrat's preferences and thus have a negative impact on expected policy. Assume that the legislature has chosen an optimal delegation level given the preferences of the lobby and the bureaucrat in this

case and consider an increase in uncertainty. Now for an unchanged delegation level, the expected policy bias is constant but the variance has increased; hence, it is optimal to increase delegation. The increased delegation provides a stronger expected outcome bias in the absence of the lobby. The Proposition shows us that the moderating effect of the lobby, therefore, increases, which results in that the lobby's impact on expected outcome becomes larger.

Third, assume that $x^A = r$ and that $x^I < x^A$, i.e. that we are in the shaded area above LL. Without lobbying the legislature leaves zero discretion to the bureaucrat implying that lobbying has a positive impact on expected policy even though it moderates the induces less extreme preferences on the bureaucrat. Now assume uncertainty increases; in the absence of lobbying the legislature optimally chooses a strictly positive amount of delegation that introduces an expected outcome bias. Similarly, in the presence of lobbying delegation is increased implying that the expected outcome bias increases. The Proposition tells us that the first effect dominates the second, implying that the lobby has lower effect on expected outcome when uncertainty increases. The intuition is similar for less extreme administrations in this area of Figure 4.

Finally, to grasp the intuition in the white area above LL, assume that preferences are given such that we are on a point on the dashed border line to the right in Figure 4. In this case there is positive delegation without lobbying and zero delegation with lobbying, implying that lobbying has a negative impact on expected outcome. Now, when uncertainty increases it increase the amount of delegation both with and without lobbying implying that the expected outcome bias increases. Again the result is that the change in expected outcome without delegation is largest without lobbying implying that the lobby's impact on expected outcome decreases in the level of uncertainty.

6 Discussion

In this paper we provided a framework for studying the influence of interest group lobbying on the bureaucratic policymaking and its consequences for optimal statutory design. In the presence of bureaucratic lobbying, the legislature needs to anticipate the influence of interest groups on agency decision-making and choose the degree of delegation to the agency accordingly. We showed that the optimal design of statutes differs across different political institutions.

The model shows that bureaucratic lobbying in the parliamentary system reduces the optimal degree of delegation, while in the separation-of-powers system the effect depends on the specific location of the interest group(s). The paper conducts no welfare analysis of interest group influence, since preferences of the legislature and of interest groups are a reduced form of broader societal preferences. To the extent legislative preferences are aligned with social welfare, the change in the legislature's payoff can serve as a proxy for welfare. We would be cautious, though, in making this inference.

The simple institutional differences considered in this paper assume that in a parliamentary system preferences of the bureaucracy more closely reflect those of the governing coalition, whereas in the separation-of-powers system preferences of the bureaucracy are aligned with those of the administration. This may particularly be the case if high-level bureaucratic appointments reflect the ideological precommitments of a newly elected administration. One might argue that the administration can choose the top bureaucrats more strategically so as to move policy outcomes closer to its most preferred outcome. However, since the legislature in the separation of powers system generally needs to confirm bureaucratic appointees, the nomination process becomes a bargaining game that is beyond the scope of his paper. The analysis could be fruitfully extended to cover strategic appointments.

The model suggests non-linear relationships between ideology and influence of interest

groups on the one hand and policy outcomes on the other. This observation should be informative for empirical studies of interest group influence. E.g., simply observing that policy does not change on average in the presence of interest groups would, in light of our model, not allow the conclusion that interest groups are without influence.

In the present model interest groups can lobby the bureaucracy only. We think of this as a subgame of a complete lobbying game in which interest groups face a choice of venue, i.e., whether (and how much) to lobby the legislature *and* the bureaucracy. This paper thus provides a necessary intermediary step in developing such a complete game of the policy process.

The framework and analysis presented in this paper might also be useful to study delegation to committees in the legislature (Krehbiel 1992) on the one hand and to bureaucratic experts on the other. The choice is then for the legislature to delegate to a bureaucrat with preferences similar to the administration or to delegate to a committee whose preferences may differ from the the legislature's more or less than the bureaucrat. Since lobbying congressional committees and bureaucratic agencies may be differentially effective, interesting (and non-monotonic) comparative statics may be the product or such analysis.

A Appendix

A.1 Proof of Lemma 1

Proof. We solve the game using backward induction. At date 3, having observed ω, the bureaucrat chooses p so as to maximize her utility from x subject to the legislative constraint (q, d) and the incentives $t(\cdot)$ offered by the interest group. If the maximum is not unique, we break indifference by letting x be the maximal element closest to x^I.

Given the bureaucrat's best response the interest group chooses $t(\cdot)$ and x so as to maximize its utility

$$\max_{x,t(\cdot)} U^I(x,t) = -(x - x^I)^2 - \alpha^I t(x)$$

$$\begin{aligned}
\text{s.t.} \quad -(x - x^B)^2 + \alpha^B t(x) &\geq -(x^\circ - x^B)^2 && \text{(PC)}\\
-(x - x^B)^2 + \alpha^B t(x) &\geq -(x' - x^B)^2 + \alpha^B t(x') \\
&\qquad \forall x' : x' - \omega \in [q \pm d] && \text{(IC)}\\
|x - \omega - q| &\leq d, && \text{(D)}\\
t(\cdot) &\geq 0. && \text{(N)}
\end{aligned}$$

where x° is the policy outcome the bureaucrat optimally chooses if she rejects the interest group's offer; hence, (PC) is the bureaucrat's participation constraint. Since without incentives the bureaucrat chooses $p \in D$ such that $p + \omega$ is closest to x^B, we have

$$x^\circ = \begin{cases} x^B & \text{if } \omega \in [(x^B - q) \pm d] \\ q + d + \omega & \text{if } \omega < (x^B - q) - d \\ q - d + \omega & \text{if } \omega > (x^B - q) + d. \end{cases}$$

The (IC) constraint assures that for all feasible $x' \neq x$ the bureaucrat is not better off and thus chooses x as intended by the interest group. Since x° maximizes the bureaucrat's utility of a policy choice in D, for any transfer $t(x)$ satisfying (PC) there always exists a non-negative schedule $t(x')$ satisfying (IC) and (N) for all $x' - \omega \in D$. Thus, the group's optimal transfer at x is to let (PC) be binding, or

$$t(x) = \tfrac{1}{\alpha^B}((x - x^B)^2 - (x^\circ - x^B)^2). \tag{3}$$

Substituting (3) into the objective function, the interest group's problem reduces to

$$\max_x \ -(x-x^I)^2 - \alpha(x-x^B)^2 + \tfrac{1}{\alpha^B}(x^\circ - x^B)^2, \tag{4}$$

subject to (D).

The last term in (4) is a constant, thus it does not affect the solution. (D), of course, is the legislative constraint, requiring that $p \in D$.

Suppose first that (D) is not binding. The FOC then yields the unconstrained maximum for (4) at

$$x^* = \frac{x^B + \alpha x^I}{1+\alpha} \equiv \hat{x}. \tag{5}$$

Checking (D), the constraint is not binding for $(\hat{x}-q)-d \leq \omega \leq (\hat{x}-q)+d$, which is non-empty iff $|\hat{x}-q| \leq d+r$. If (D) is binding, then the boundary of (D) implies the solution

$$x^* \ = \ \begin{cases} q+d+\omega & \text{if } \ \omega < \hat{x}-q-d \\ q-d+\omega & \text{if } \ \omega > \hat{x}-q+d. \end{cases} \tag{6}$$

At date 1 the legislature chooses q and d so as to maximize its expected utility, given the bureaucrat's implementation under lobbying. Given the policy outcomes in (5) and (6), the legislature's expected utility is given by

$$\begin{aligned} EU^L &= -\frac{1}{2r}\int_{-r}^{\hat{x}-q-d}(q+d+\omega-x^L)^2 d\omega - \frac{1}{2r}\int_{\hat{x}-q-d}^{\hat{x}-q+d}(\hat{x}-x^L)^2 d\omega \\ &\quad -\frac{1}{2r}\int_{\hat{x}-q+d}^{r}(q-d+\omega-x^L)^2 d\omega \\ &= -\frac{1}{6r}\left[(q+d+\omega-x^L)^3\right]_{-r}^{\hat{x}-q-d} - \frac{1}{2r}\left[(\hat{x}-x^L)^2\omega\right]_{\hat{x}-q-d}^{\hat{x}-q+d} \\ &\quad -\frac{1}{6r}\left[(q-d+\omega-x^L)^3\right]_{\hat{x}-q+d}^{r} \\ &= -\frac{1}{r}\left[\tfrac{1}{3}(r-d)^3 + (q-x^L)^2(r-d) + (\hat{x}-x^L)^2 d\right], \end{aligned}$$

where we applied the rule $(x+y)^3+(x-y)^3 = 2x^3+6xy^2$. Maximizing EU^L w.r.t. q and d, subject to $d \geq 0$, gives the following first order conditions

$$\begin{aligned} -\frac{2}{r}(q-x^L)(r-d) &= 0 \\ \frac{1}{r}[(r-d)^2 + (q-x^L)^2 - (\hat{x}-x^L)^2] &= 0 \end{aligned}$$

The first equation implies that $q = x^L$ and the second implies that $d = r - |\hat{x} - x^L|$, provided that the latter is positive ($d = 0$ otherwise). Given q and d, the bounds on ω follow from the constraint $|(\hat{x} - \omega) - q| \leq d$. □

A.2 Proof Proposition 1

Proof. Parts 1 and 2 follow from the text.

Part 3. According to Lemma 1, L delegates more in the separation of powers system than in the parliamentary system if $|\hat{x}_s| < |\hat{x}_p|$ $(*)$.

Recall that $\hat{x}_i = \frac{x_i^B + \alpha x^I}{1+\alpha}$, $i = c, p$. Since $x_p^B = 0$ and $x_s^B = x^A > 0$, we have $\hat{x}_p = \frac{\alpha x^I}{1+\alpha} < \frac{x^A + \alpha x^I}{1+\alpha} = \hat{x}_s$. Thus, if $\hat{x}_s \leq 0$, $(*)$ follows. If $\hat{x}_s > 0$, $(*)$ requires $\hat{x}_s < -\hat{x}_p \Leftrightarrow x^I < -\frac{1}{2\alpha} x^A$. □

A.3 Proof of Proposition 2

Proof. Assume $x^I < 0$. If $x^A + \alpha x^I \geq 0$, then the lobby group has a positive (negative) impact on the legislature's utility in the separation of power (parliamentary) system. If $x^A + \alpha x^I < 0$, then it may have a negative impact in both systems. However, since $x^A > 0$, then $0 > \hat{x}_s > \hat{x}_p \Leftrightarrow W_s^\ell > W_p^\ell$. Since $W_s^{n\ell} < W_p^{n\ell} = 0$, we have shown that the proposition is true for $x^I < 0$. Next, assume $x^I \geq 0$. Then,

$$\begin{aligned}
\Delta LIW_{ps} &= -\hat{x}_p^2(1 - \frac{2}{3r}\hat{x}_p) - (-\hat{x}_s^2(1 - \frac{2}{3r}\hat{x}_s) - (-x^{A^2}(1 - \frac{2}{3r}x^A))) \\
&= (\frac{2\alpha x^I x^A}{1+\alpha})^2 - \frac{2}{3r}\frac{3\alpha^2 x^{I^2} x^A + 3\alpha x^I x^{A^2}}{(1+\alpha)^3} - \frac{(\alpha+2)\alpha}{(1+\alpha)^2} x^{A^2}
\end{aligned}$$

$$\begin{aligned}
\Delta LIW_{ps} &\geq 0 \Leftrightarrow \\
\frac{2\alpha x^A x^I}{(1+\alpha)^2} - \frac{2}{3r}\frac{3\alpha x^I x^{A^2} + 3\alpha^2 x^{I^2} x^A}{(1+\alpha)^3} - \frac{(\alpha+2)\alpha}{(1+\alpha)^2} x^{A^2} &\geq 0 \Leftrightarrow \\
\frac{r(1+\alpha)x^I - \alpha x^{I^2}}{x^I + r(1+\alpha)(\alpha/2+1)} &\geq x^A.
\end{aligned}$$

□

A.4 Proof Proposition 3

Proof. *Part 1,* Since the lobby group has a *negative* impact on utility, we measure the effect of increased uncertainty as $-\frac{\partial LIW_p}{\partial r}$. From the text we know that $-LIW_p = \hat{x}_p^2(1 - \frac{2}{3r}|\hat{x}_p|)$ which is positive given the condition that discretion is weakly positive. Furthermore, it increases in r.

Part 2, Similarly to above we have $LIW_s = -\hat{x}_s^2(1 - \frac{2}{3r}|\hat{x}_s|) - (-x^{A^2}(1 - \frac{2}{3r}x^A))$ and,

$$-\frac{\partial LIW_s}{\partial r} \;=\; \frac{1}{r^2}\frac{2}{3}(|\hat{x}_s|^3 - x^{A^3}).$$

Thus the impact of r on $-LIW_s$ is increasing iff $|\hat{x}_s| = |\frac{x^A+\alpha x^I}{1+\alpha}| > x^A$. If $x^I \geq 0$, then the condition reduces to $x^I > x^A$. If $-x^A\frac{1}{\alpha} < x^I < 0$, then the condition is never satisfied. Finally, if $x^I < -x^A\frac{1}{\alpha}$, then the condition becomes $-x^A - \alpha x^I > (1+\alpha)x^A \Leftrightarrow x^I < -(\frac{2}{\alpha} + 1)x^A$.

Part 3. We want to determine the sign of $\frac{\partial \Delta LIW_{ps}}{\partial r}$. From above we have:

$$\frac{\partial \Delta LIW_{ps}}{\partial r} = -\frac{\partial LIW_p}{\partial r} + \frac{\partial LIW_s}{\partial r} = \frac{1}{r^2}\frac{2}{3}(|\hat{x}_p|^3 - |\hat{x}_s|^3 + x^{A^3})$$

This is positive iff $|\hat{x}_p|^3 + x^{A^3} \geq |\hat{x}_s|^3$. □

A.5 Proof Lemma 2

Proof. Recall that $LIO_s = \frac{d_s^\ell}{r}\hat{x}_s - \frac{d_s^{n\ell}}{r}x^A$ and $d \geq 0$, $x^A > 0$. Thus, $\hat{x}_s \leq 0 \Rightarrow LIO_s \leq 0$. Hence, assume $x_s > 0 \Leftrightarrow x^I > -\frac{1}{\alpha}x^A$. Then

$$\begin{aligned}
\frac{d_s^\ell}{r}\hat{x}_s - \frac{d_s^{n\ell}}{r}x^A &> 0 \;\Leftrightarrow \\
(r - \frac{x^A+\alpha x^I}{1+\alpha})\frac{x^A+\alpha x^I}{1+\alpha} - (r - x^A)x^A &> 0 \;\Leftrightarrow \\
\frac{r\alpha}{1+\alpha}(x^I - x^A) - \frac{x^{A^2} + \alpha^2 x^{I^2} + 2\alpha x^A x^I}{(1+\alpha)^2} + \frac{1+\alpha^2+2\alpha}{(1+\alpha)^2}x^{A^2} &> 0 \;\Leftrightarrow \\
\frac{r\alpha}{1+\alpha}(x^I - x^A) - \frac{\alpha^2(x^I - x^A)(x^I + x^A) + 2\alpha x^A(x^I - x^A)}{(1+\alpha)^2} &> 0
\end{aligned}$$

$$\begin{aligned}
\text{Case } x^I > x^A\text{:}\;\; r(1+\alpha) - \alpha x^I - (2+\alpha)x^A &> 0 \;\Leftrightarrow \\
r(1+\alpha) - (2+\alpha)x^A &> \alpha x^I
\end{aligned}$$

$$\begin{aligned} \text{Case } x^I < x^A\text{:}\quad r(1+\alpha) - \alpha x^I - (2+\alpha)x^A &< 0 \Leftrightarrow \\ r(1+\alpha) - (2+\alpha)x^A &< \alpha x^I. \end{aligned}$$

□

A.6 Proof of Proposition 4

Proof. **Cases 1(a) and (b).** Since C or D holds and $x^I > 0$, we have, by Lemma 2, $LIO_s > 0$, $LIO_p > 0$. Further, for $i = p, s$ we have $\hat{x}^i > 0$ and hence $d_i^\ell = r - \hat{x}_i$ and $d_i^{n\ell} = r - x_i^B$. Thus,

$$\begin{aligned} \Delta LIO_{ps} = LIO_p - LIO_s = \frac{d_p^\ell}{r}\hat{x}_p - (\frac{d_s^\ell}{r}\hat{x}_s - \frac{d_s^{n\ell}}{r}x^A) &\geq 0 \Leftrightarrow \\ \frac{r - \frac{\alpha x^I}{1+\alpha}}{r}\frac{\alpha x^I}{1+\alpha} - \frac{r - \frac{x^A+\alpha x^I}{1+\alpha}}{r}\frac{x^A+\alpha x^I}{1+\alpha} + \frac{r-x^A}{r}x^A &\geq 0 \Leftrightarrow \\ \frac{\alpha}{1+\alpha}x^A - \frac{1}{r}\frac{\alpha(\alpha+2)}{(1+\alpha)^2}x^{A^2} + \frac{1}{r}\frac{2\alpha x^I x^A}{(1+\alpha)^2} &\geq 0 \Leftrightarrow \\ r\alpha(1+\alpha) - (\alpha^2+2\alpha)x^A + 2\alpha x^I &\geq 0 \Leftrightarrow \\ -\frac{1+\alpha}{2}r + \frac{2+\alpha}{2}x^A &\leq x^I \end{aligned} \tag{7}$$

Furthermore, in case 1(a), condition C requires $x^I > x^A$. Now suppose eqn. (7) is violated. Then $x^A < x^I \leq \frac{2+\alpha}{2}x^A - \frac{1+\alpha}{2}r \Rightarrow r < x^A$, which contradicts the premise that $x^A \leq r$. Thus, $\Delta LIO_{ps} \geq 0$ must always hold in case 1(a).

Case 1(c). $\sim C$ and $\sim D$ implies $LIO_s < 0$ by Lemma 2, and $x^I > 0$ implies $LIO_p > 0$ and $\hat{x}^\ell, \hat{x}^\ell > 0$. Thus,

$$\begin{aligned} \Delta LIO_{ps} = \frac{d_p^\ell}{r}\hat{x}_p - \left|\frac{d_s^\ell}{r}\hat{x}_s - \frac{d_s^{n\ell}}{r}x^A\right| &\geq 0 \Leftrightarrow \\ \frac{r - \frac{\alpha x^I}{1+\alpha}}{r}\frac{\alpha x^I}{1+\alpha} + \frac{r - \frac{x^A+\alpha x^I}{1+\alpha}}{r}\frac{x^A+\alpha x^I}{1+\alpha} - \frac{r-x^A}{r}x^A &\geq 0 \Leftrightarrow \\ \frac{2\alpha x^I}{1+\alpha} - \frac{2\alpha^2 x^{I^2}}{r(1+\alpha)^2} - \frac{\alpha x^A}{1+\alpha} + \frac{1}{r}\frac{\alpha(\alpha+2)x^{A^2}}{(1+\alpha)^2} - \frac{2\alpha x^I x^A}{r(1+\alpha)^2} &\geq 0 \Leftrightarrow \\ (1+\alpha/2)x^{A^2} - \frac{r}{2}(1+\alpha)x^A - (x^A + \alpha x^I - (1+\alpha)r)x^I &\geq 0. \end{aligned}$$

Case 2(a). Suppose $x^I < 0$ and D. B implies $LIO_s > 0$ and $\hat{x}_s > 0$, and $x^I < 0$ implies

$LIO_p < 0$ and $\hat{x}_p < 0$. Thus, $d_p^\ell = r + \hat{x}_p$, $d_s^\ell = r - \hat{x}_s$ for $i = p, s$.

$$\begin{aligned}
\Delta LIO_{pc} = -\frac{d_p^\ell}{r}\hat{x}_p - (\frac{d_s^\ell}{r}\hat{x}_s - \frac{d_s^{n\ell}}{r}x^A) &\geq 0 \Leftrightarrow \\
-\frac{r + \frac{\alpha x^I}{1+\alpha}}{r}\frac{\alpha x^I}{1+\alpha} - \frac{r - \frac{x^A + \alpha x^I}{1+\alpha}}{r}\frac{x^A + \alpha x^I}{1+\alpha} + \frac{r - x^A}{r}x^A &\geq 0 \Leftrightarrow \\
-r\frac{\alpha x^I}{1+\alpha} - \frac{\alpha^2 {x^I}^2}{(1+\alpha)^2} - \frac{r{x^A} + r\alpha x^I}{1+\alpha} + \frac{{x^A}^2 + \alpha^2 {x^I}^2 + 2\alpha x^I x^A}{(1+\alpha)^2} + r{x^A} - {x^A}^2 &\geq 0 \Leftrightarrow \\
-2r\frac{\alpha x^I}{1+\alpha} + \frac{\alpha r x^A}{1+\alpha} + \frac{{x^A}^2 + 2\alpha x^I x^A}{(1+\alpha)^2} - \frac{(1+\alpha^2+2\alpha)}{(1+\alpha)^2}{x^A}^2 &\geq 0 \Leftrightarrow \\
-2r\alpha x^I(1+\alpha) + \alpha r x^A(1+\alpha) + 2\alpha x^I x^A - (\alpha+2)\alpha{x^A}^2 &\geq 0 \Leftrightarrow \\
2x^I(\alpha x^A - r(1+\alpha)) + r(1+\alpha)x^A - (\alpha+2){x^A}^2 &\geq 0
\end{aligned}$$

Case 2(b). Suppose $-\frac{1}{\alpha}x^A < x^I < 0$ and $\sim D$. $\sim D$ implies $LIO_s < 0$; $x^I > -\frac{1}{\alpha}x^A$ implies $\hat{x}_s > 0$; and $x^I < 0$ implies $LIO_p < 0$ and $\hat{x}_p < 0$. Thus, $d_p^\ell = r + \hat{x}_p$, $d_s^\ell = r - \hat{x}_s$.

$$\begin{aligned}
\Delta LIO_{ps} = -\frac{d_p^\ell}{r}\hat{x}_p + \frac{d_s^\ell}{r}\hat{x}_s - \frac{d_s^{n\ell}}{r}x_s^A &\geq 0 \Leftrightarrow \\
-\frac{r + \frac{\alpha x^I}{1+\alpha}}{r}\frac{\alpha x^I}{1+\alpha} + \frac{r - \frac{x^A + \alpha x^I}{1+\alpha}}{r}\frac{x^A + \alpha x^I}{1+\alpha} - \frac{r - x^A}{r}x^A &\geq 0 \Leftrightarrow \\
-r\frac{\alpha x^I}{1+\alpha} - \frac{\alpha^2 {x^I}^2}{(1+\alpha)^2} + r\frac{x^A + \alpha x^I}{1+\alpha} - \frac{{x^A}^2 + \alpha^2 {x^I}^2 + 2\alpha x^I x^A}{(1+\alpha)^2} - r{x^A} + {x^A}^2 &\geq 0 \Leftrightarrow \\
-\frac{2\alpha^2 {x^I}^2}{(1+\alpha)^2} + \frac{r{x^A}}{1+\alpha} - \frac{{x^A}^2 + 2\alpha x^I x^A}{(1+\alpha)^2} - r{x^A} + {x^A}^2 &\geq 0 \Leftrightarrow \\
-2\alpha^2 {x^I}^2 - \alpha r x^A(1+\alpha) - 2\alpha x^I x^A + (\alpha+2)\alpha{x^A}^2 &\geq 0 \Leftrightarrow \\
-2\alpha{x^I}^2 - r x^A(1+\alpha) - 2x^I x^A + (\alpha+2){x^A}^2 &\geq 0
\end{aligned}$$

Case 3. Suppose $x^I \leq -\frac{1}{\alpha}x^A$ (condition B). Then $LIO_i < 0$ and $\hat{x}_i < 0$ for $i = p, s$. Thus $d_i^\ell = r + \hat{x}_i$, for $i = p, s$.

$$\begin{aligned}
\Delta LIO_{pc} = -\frac{d_p^\ell}{r}\hat{x}_p + \frac{d_s^\ell}{r}\hat{x}_s - \frac{d_s^{n\ell}}{r}x_s^B &\geq 0 \\
-\frac{r + \frac{\alpha x^I}{1+\alpha}}{r}\frac{\alpha x^I}{1+\alpha} + \frac{r + \frac{x^A + \alpha x^I}{1+\alpha}}{r}\frac{x^A + \alpha x^I}{1+\alpha} - x^A + \frac{1}{r}{x^A}^2 &\geq 0 \Leftrightarrow \\
\frac{-\alpha x^A}{1+\alpha} + \frac{2\alpha x^A x^I}{r(1+\alpha)^2} + \frac{(2+2\alpha+\alpha^2){x^A}^2}{r(1+\alpha)^2} &\geq 0 \Leftrightarrow \\
x^I \;\geq\; \frac{r}{2}(1+\alpha) - (1/\alpha + 1 + \alpha/2)x^A.&
\end{aligned}$$

The final part of the proposition follows from the fact that $x^I = 0$ implies $LIO_p = 0$ and $|LIO_s| > 0$. □

A.7 Proof of Proposition 5

Proof. Part 1. The lobby group's impact on outcome in the parliamentary system is:

$$|LIO_p| = |\frac{d_p^L}{r}\hat{x}_p| = \frac{\alpha|x^I|}{1+\alpha} - \frac{1}{r}\frac{(\alpha x^I)^2}{(1+\alpha)^2}$$

which is weakly positive and increasing in r.

Part 2. In the separation of power system, we have three separate cases. *Case 1*: Assume C or D holds. $\Rightarrow LIO_s > 0$ and $\hat{x}_s > 0$.

$$\begin{aligned} |LIO_s| &= \frac{d_s^L}{r}\hat{x}_s - \frac{d_s^A}{r}x_c^A = \frac{r - \frac{x^A+\alpha x^I}{1+\alpha}}{r}\frac{x^A+\alpha x^I}{1+\alpha} - \frac{r-x^A}{r}x^A \\ &= \frac{x^A+\alpha x^I}{1+\alpha} - x^A - \frac{1}{r}((\frac{x^A+\alpha x^I}{1+\alpha})^2 - x^{A^2}) \end{aligned}$$

which is increasing in r iff $\frac{x^A+\alpha x^I}{1+\alpha} \geq x^A \Leftrightarrow x^I \geq x^A$.

Case 2: Assume $\hat{x}_s > 0$ and $\sim(C$ or $D)$. Then $LIO_s < 0$ and hence

$$\begin{aligned} |LIO_s| &= -\frac{d_s^L}{r}\hat{x}_s + \frac{d_s^A}{r}x_c^A = -\frac{r - \frac{x^A+\alpha x^I}{1+\alpha}}{r}\frac{x^A+\alpha x^I}{1+\alpha} + \frac{r-x^A}{r}x^A \\ &= -\frac{x^A+\alpha x^I}{1+\alpha} + x^A + \frac{1}{r}((\frac{x^A+\alpha x^I}{1+\alpha})^2 - x^{A^2}) \end{aligned}$$

which is increasing in r iff $|\frac{x^A+\alpha x^I}{1+\alpha}| < x^A$. $\Leftrightarrow x^I < x^A$. Finally, $(Case\ 3)$ assume $\hat{x}_s < 0$. $\Rightarrow LIO_s < 0$. Hence

$$\begin{aligned} |LIO_s| &= -\frac{d_s^L}{r}\hat{x}_s + \frac{d_s^A}{r}x_c^A = -(\frac{r + \frac{x^A+\alpha x^I}{1+\alpha}}{r}\frac{x^A+\alpha x^I}{1+\alpha} - \frac{r-x^A}{r}x^A) \\ &= -\frac{x^A+\alpha x^I}{1+\alpha} - \frac{1}{r}\frac{x^{A^2}+\alpha^2 x^{I^2}+2\alpha x^I x^A}{(1+\alpha)^2} + x^A - x^{A^2}\frac{1}{r} \\ &= -\frac{x^A+\alpha x^I}{1+\alpha} + x^A - \frac{1}{r}((\frac{x^A+\alpha x^I}{1+\alpha})^2 + x^{A^2}) \end{aligned} \tag{8}$$

which is increasing in r.

□

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