

## Bureaucratic Capacity, Delegation, and Political Reform

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*Abstract:* We analyze a model of delegation and policymaking in polities where bureaucratic capacity is low. Our analysis suggests that low bureaucratic capacity diminishes incentives for bureaucrats to comply with legislation, making it more difficult for politicians to induce bureaucrats to take actions that politicians desire. Consequently, when bureaucratic capacity is low, standard principles in the theoretical literature on delegation no longer hold. We also use the model to examine the issue of political reform in polities with low bureaucratic capacity. The model indicates that politicians in such polities will be trapped in a situation whereby they have little incentive to undertake reforms either the bureaucracy or other institutions (such as courts) that are crucial for successful policymaking.

## Introduction

The central tension motivating contemporary theories of delegation from politicians to bureaucrats lies between the value of bureaucratic expertise, on one hand, and the desire for political control, on the other. This tension is well-known, and has been debated at least since Weber's classic work on bureaucracy. Modern bureaucracies are staffed with individuals who, by virtue of "rational" bureaucratic organization, are highly skilled policy experts who in principle should be able to help less knowledgeable politicians achieve their goals. But the very skills and expertise that bureaucrats enjoy create the possibility that bureaucrats will usurp the rightful role of politicians in policymaking processes. The way this tension is resolved determines the ultimate compatibility of democracy and bureaucracy.

Considerable scholarship has been devoted to understanding how and to what extent politicians resolve this problem, but the vast majority of influential theoretical research focuses on the modern U.S. Congress. Much recent work develops formal theories of policymaking where politicians adopt legislation, bureaucrats implement policies in response, and policy consequences result. This research has developed a rich set of arguments about a number of variables that influence delegation and policymaking, including policy disagreement between politicians and bureaucrats, policy-specific expertise, the existence of executive vetoes, the effectiveness of oversight, the professionalism of the legislature, and the role of courts, to name but a few.<sup>1</sup>

However, in developing countries, this voluminous theoretical literature on delegation is of limited value at best. The main problem is that existing theories typically assume that bureaucrats are "Weberian" – they are a highly professionalized cadre of state officials who can usually take actions that will further their goals. In developing countries, bureaucrats hardly fit

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<sup>1</sup> See e.g., Bawn 1995, Bendor, Glazer, Hammond and Meirowitz 2002, Epstein and O'Halloran 1994, 1999, Gailmard 2002, Huber and Shipan 2002, and Volden 2002.

this mold. The problem for politicians in such places is not how to create appropriate incentives for high-powered bureaucrats. Instead, the problem is how to make policy when bureaucrats are known to lack capacity.

The problem of bureaucratic “incapacity” has received substantial attention in studies of developing countries. Problems of corruption – a form of “incapacity” whereby bureaucrats extract illegal payments from others in society – are central.<sup>2</sup> But scholars also describe problems of inefficiency and incompetence in the public sector even when bureaucrats are not corrupt. Geddes (1994, 17), for example, points out that in the early 1970s, leaders in Chile’s bureaucracy clearly had the knowledge and expertise for successful nationalization of Chilean copper mines, but general mismanagement, prompted by political incentives to treat important political positions as patronage plums, led to very poor performance of these mines (see also Moran 1974 and Valenzuela 1978). Geddes (1990) similarly describes a very incompetent bureaucracy in the 1930s in Brazil, when the government could not even locate the documents that were necessary to determine how much money Brazil owed foreign lenders. Bennett and Mills (1998), as a final example, describe problems in the health care sector, where even simple tasks – such as paying contractors on time, or keeping adequate records of contracts – are often performed very poorly by bureaucrats in the health departments of developing polities.

Given the widespread acknowledgement that bureaucratic “incapacity” of various stripes is an impediment to political and economic development, considerable attention has been paid to identifying reforms that can improve the performance of low-capacity bureaucrats. Existing research stresses, among other things, the importance of merit-based pay and promotion (e.g., Evans 1992; Evans 1995; Evans and Rauch 1999; Geddes 1990; Rauch 2001; Soskice, Bates and Epstein 1992; Asim 2001), public sector salaries that are sufficiently high to attract skilled

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<sup>2</sup> See, e.g., Rose-Ackerman’s seminal (1978) study of corruption, and her more recent review of the literature (Rose-Ackerman (1999). Recent important work on the effects of corruption on economic growth include (e.g., Knack and Kiefer 1995, Mauro, 1995, and Shleifer and Vishney 1993). Anderson and Tverddova (nd) examine how corruption influences citizen confidence in their institutions.

individuals into public service (e.g., Besley and McLaren 1993, Lindauer and Nunberg 1994, Klitgaard 1997), insulation of agency budgets from excessive political influence (e.g., Geddes 1994), and training programs (e.g., McCourt and Sola 1999, Mann 1999, Healy 2001).

Scholars also worry about identifying the impediments to the bureaucratic reforms that would increase capacity. Studies of corruption, for example, have examined incentives that exist in federal systems (e.g., Fisman & Gatti, 2000; Treisman, 2000) and electoral rules (Persson et al, 2002). The quality of legal and judicial systems also plays a clear role in limiting corruption (e.g., Ackerman 1999, pp. 151-62). Studies of more general bureaucratic incompetence often focus on incentives to use public sector jobs as sources of patronage. Geddes (1991, 1994), for example, argues that politicians are best able to introduce desirable reforms like merit pay in the civil service when there are a small number of parties (so that patronage benefits are evenly distributed across two major parties) and when there is closed-list PR (where party leaders can more effectively head off challenges to reforms from within a party). Geddes (1994) also identifies the importance of presidential incentives to make “side payments” to other actors (e.g., to the military). Thus, poor bureaucratic performance is most likely when the military is a potent rival to the president, when opposition parties are strong, and when parties are weak (forcing payments to individual legislators).

Issues of “bureaucratic capacity,” then, have received considerable attention, but the literature has not seen the development of models or theories that make explicit *how* low bureaucratic capacity influences policymaking processes. The standard models of delegation to bureaucrats -- where politicians make laws, bureaucrats implement them, and policy consequences result -- assume bureaucrats have high capacity (e.g., cites in note 1). And models that examine implementation by “low capacity” bureaucrats do not analyze policymaking. Models of corruption, for example, concentrate on behavior – such as monitoring – that occurs after legislation is (implicitly) adopted (e.g., Besley and McLaren 1993; Rauch 2001, and Soskice, Bates and Epstein 1992). Similarly, models of reform, such as Geddes (1994), do not

model policymaking, but rather examine factors external to the policymaking process that influence the incentives for patronage.

The central goal of this paper is therefore to develop a model of delegation that can help us to understand policymaking processes when bureaucratic capacity is lacking. Like previous formal theories of delegation, our model examines how politicians use legislation to delegate policymaking authority, and how bureaucrats respond to this legislation during policy implementation. Unlike previous research, our model analyzes policymaking processes in political systems with low bureaucratic capacity.

We use the model to explore three substantive issues. First, we examine *how* low bureaucratic capacity diminishes the ability of politicians to achieve their policy goals. Our main argument is that low bureaucratic capacity not only reduces the general quality of bureaucratic outcomes, but also *diminishes incentives for bureaucrats to comply with legislative statutes*. Put differently, bad bureaucracies are not only inefficient (i.e., less successful at implementing the policies they intend), they are also harder to control because their incompetence diminishes their incentives to implement the policies politicians describe in legislation. For this reason, politicians will usually prefer highly competent “enemy” bureaucrats (i.e., bureaucrats with policy preferences that differ from the politician’s) to incompetent “friendly” ones (who share the politician’s policy preferences). Importantly, however, politicians need some level of policy expertise to take advantage of bureaucratic competence. Without it, competent bureaucrats will often work successfully to achieve outcomes that politicians oppose.

Second, we use the model to understand incentives for political reform in polities with low bureaucratic capacity. We argue that politicians in such polities are trapped in a situation where they have little incentive to reform not only the bureaucracy, but other institutions as well. The incentives of politicians to reform low capacity bureaucracies increase as politicians gain more policy expertise, for instance, but the incentives of politicians to gain policy expertise are smallest when bureaucratic capacity is low. Similarly, incentives to reform low-capacity

bureaucrats increase when enforcement of statutes – which is often done by courts – becomes more effective, but incentives to create effective enforcement are diminished by low-bureaucratic capacity. In addition to these problems, we also find that the incentives of politicians to “politicize” the bureaucracy are largest when bureaucratic capacity is low, and that when bureaucrats are “politicized,” incentives to reform bureaucracy are lowest.

Finally, we use the model to understand how delegation strategies in situations of low bureaucratic capacity differ from delegation strategies that have been described in previous research on high-capacity bureaucracies. Our model suggests that when bureaucratic capacity is low, well-established principles in the existing literature no longer hold. In models that assume high-capacity bureaucrats, for example, politicians typically delegate more discretion to bureaucrats when the bureaucrats are ideological allies, and when *ex post* monitoring possibilities are most effective. We find the opposite in low capacity systems. Thus, empirical predictions about discretion in legislative statutes may not apply in political systems where bureaucratic capacity is low.

In what follows, we first describe the basic features of our model. In so doing, we make explicit our conceptualization of bureaucratic capacity, as well as the role of policy expertise and judicial enforcement in policymaking. We then use the model to explore how low bureaucratic capacity influences the strategies of politicians and bureaucrats, and draw implications from these results about incentives for political reform and delegation. A concluding section summarizes our results and contemplates optimal pathways toward political reform.

### **The Model**

The model has two players, a Politician who writes laws and a Bureaucrat who implements them. One can think of the Politician as the pivotal actor in the legislative process, which may be the legislature itself, a cabinet minister in a parliamentary democracy, or even the executive branch in presidential systems with very strong executives and weak legislatures. Interactions occur in a

one-dimensional policy space where the Politician has an ideal point at  $x_p = 0$  and the Bureaucrat has an ideal point at  $x_B > x_p$ . Each player has a quadratic utility function over policy outcomes.<sup>3</sup>

The game begins with the Politician adopting a statute that establishes the domain of implementation actions that the Bureaucrat can take while complying with the law. The Politician may be uncertain about which specific policies best serve her interests. Following the adoption of the statute, the Bureaucrat attempts to implement policy. The Bureaucrat's success at executing his desired action depends on the Bureaucrat's capacity. In the final stage, if the Bureaucrat's action does not comply with the statute, he is caught and punished with some probability. We interpret this probability as the effectiveness of oversight and of judicial enforcement. This general structure is therefore similar to the model in Huber and Shipan (2002). A central difference is the model here adopts assumptions about bureaucratic capacity that follow Chang, Lewis, and McCarty (2000). In the remainder of this section, we motivate and describe the details of this structure.

Two central variables in the model are the Bureaucrat's capacity to execute his intended action and the Politician's expertise regarding which specific policies will yield the desired policy outcome. First consider bureaucratic capacity. As noted above, there are many ways previous research conceptualizes bureaucratic capacity, ranging from corruption to incompetence. There are also different types of bureaucrats who lack capacity, ranging from those at the highest levels of the bureaucracy to those at the lowest. The specific form of bureaucratic capacity in our model relates more to competence than corruption. And it focuses more on the competence of low- and mid-level bureaucrats – and breakdowns in mechanisms by which senior bureaucrats control these individuals – than on the competence of individuals at the top of bureaucratic hierarchies.

Specifically, we are interested in analyzing situations where a high level bureaucrat knows what he would like to accomplish but -- because of problems with capacity below him --

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<sup>3</sup> For convenience, we multiply these utilities by  $\frac{1}{2}$ .

may find it very difficult to do so. It may be the case, for example, that a bureaucrat charged with administering a pension system can establish a clear set of rules about eligibility and payments. But this bureaucrat may be unable to enforce adequately the application of these rules, as subordinates may favor particular individuals over others, may refuse pensions where they are deserved, or provide them to individuals who are ineligible. Or a senior bureaucrat may be assisted by international development agencies regarding how to build a water project, but be unable to motivate those working under him to get the job done right. We want to focus, then, on a problem often described in the development literature: problems that senior bureaucrats often face when attempting to have their subordinates execute the intended actions.

To model this form of bureaucratic capacity, we assume that if the Bureaucrat attempts action  $a$ , then the realization of this action is  $a - \omega$ , where  $\omega$  is a random variable with a probability density function  $f(\omega) = \frac{\Omega - |\omega|}{\Omega^2}$  on the interval  $[-\Omega, \Omega]$ . Therefore,  $\omega$  is distributed symmetrically around a mean of 0 with a variance  $\sigma_\omega^2 = \frac{\Omega^2}{6}$ .<sup>4</sup> Since it is directly related to the variance of  $\omega$  and therefore to the Bureaucrat's ability to control the realized action,  $\Omega$  represents bureaucratic *incapacity* in our model. When  $\Omega$  is very small, the Bureaucrat's capacity is large (because the maximal errors in implementation are small). As  $\Omega$  increases, so too does the possibility of large errors in implementation. Since we wish to understand how bureaucratic incapacity influences institutional reform and policymaking in developing polities, we will focus on situations where  $\Omega$  is large (i.e., where bureaucratic capacity is reasonably small). We make this explicit below.

Next consider the Politician's level of policy expertise. Politicians often understand what policy outcomes they want to achieve – such as an efficient pension system or a reliable supply of clean water – but may be uncertain about which specific policy will achieve this objective. A

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<sup>4</sup> For our results, only the unimodality of  $\omega$  is crucial. The density of  $\omega$  is that of the sum or difference of two uniform random variables with 0 mean.

pension system might be accomplished through private contributions to insurance schemes or payments from general revenues, for example, and water supply might be assured by digging wells or making dams. In our analysis, we wish to treat the Politician's degree of policy uncertainty as a variable. Specifically, we assume that if some policy  $a - \omega$  is implemented, the ultimate policy outcome is  $a - \omega - \varepsilon$ , where  $\varepsilon \sim U[-E, E]$  with variance  $\sigma_\varepsilon^2 = \frac{E^2}{3}$ . Each player  $j$ 's preferred policy action is therefore  $x_j + \varepsilon$ . We assume that the Bureaucrat knows  $\varepsilon$  to capture the fact that in most democracies, the executive has the most resources for obtaining policy expertise, and his top advisors can communicate this expertise to individuals at the tops of the relevant departments. An interesting avenue for future research would be to examine cases where expertise in the bureaucracy is variable.

The smaller is  $E$ , the more policy expertise the Politician enjoys. At the extreme, where  $E = 0$ , the Politician is maximally informed. Substantive factors that might affect  $E$  in developing polities include the professional background of politicians, their access to expertise from outside sources (such as international organizations of various types), the degree to which party organizations have structures for policy planning, and the ability of politicians to rely on private staff for information. If legislatures are pivotal players in the legislative process, the institutional features of the legislature (such as the structure of the committee system or the level of staffing) or the individual attributes of legislators themselves (such as the extent to which they are willing to invest energies into achieving desirable policy outcomes) will influence policy expertise.

We manipulate the value of  $E$  to examine two issues. The first concerns how the level of policy uncertainty (the value of  $E$ ) influences policymaking processes. The second concerns political development: how does bureaucratic capacity influence politicians' incentives to create institutions that help them to develop expertise (e.g., that make  $E$  smaller), and how does the level of expertise affect incentives to improve bureaucratic capacity?

It is important to bear in mind that the ultimate outcome from any action attempted by the Bureaucrat is a function of capacity ( $\omega$ ) and the policy shock ( $\varepsilon$ ). Thus, the final outcome from the action,  $a$ , attempted by the Bureaucrat is  $a - \omega - \varepsilon$ .

As noted, the game begins when the Politician adopts a law. This law specifies the upper and lower bound on policies that the Bureaucrat can implement while remaining compliant with the law. Formally, this law is  $x = [\underline{x}, \bar{x}]$ . Since we assume  $x_L < x_B$ , the Politician will set  $\underline{x}$  as low as possible because the Bureaucrat never has an incentive to take actions that are lower than what an informed legislature would have wanted. To simplify the analysis, we therefore assume that  $\underline{x} = -\infty$ , and focus our analysis on the location of  $\bar{x}$ . Following the adoption of the law, the Bureaucrat attempts to implement  $a$ , the realization of this action is  $a - \omega$  and the policy outcome is  $a - \omega - \varepsilon$ .

A central feature of our model is the assumption that the policy that the Bureaucrat implements (i.e.,  $a - \omega$ ) may or may not comply with the statute (i.e., it may or may not be the case that  $a - \omega \in [\underline{x}, \bar{x}]$ ). We assume that if the policy is non-compliant (i.e.,  $a - \omega \notin [\underline{x}, \bar{x}]$ ), then with some probability,  $\gamma$ , the Bureaucrat is caught in non-compliance and pays a penalty,  $\delta$ . Our model does not assume, then, that the Bureaucrat must comply with the law. He may try to do so, but fail, because of a large implementation error. Or he may not even try, instead attempting an action that is known to be out of compliance with the statute. The parameters  $\gamma$  and  $\delta$  therefore capture the effectiveness of the political system, and particularly the courts, at uncovering and punishing actions by the Bureaucrat that do not comply with statutes.

It is useful to note that the punishment of bureaucrats for non-compliance is based on the realization of the Bureaucrat's attempted action,  $a - \omega$ , rather than on the policy outcome itself,  $a - \omega - \varepsilon$ . We assume that it is never possible to observe  $a$ , the Bureaucrat's intended action. We also assume that the Bureaucrat cannot be punished if the realization of his action complies

with the statute ( $a - \omega \in [\underline{x}, \bar{x}]$ ). It may be the case that  $a - \omega - \varepsilon \notin [\underline{x}, \bar{x}]$ . However, the Bureaucrat cannot be punished for this state of the world if he actually complied with what the statute says.

Politicians, for example, may want to contain health care costs. A law may state that global budgeting procedures should be adopted for individual hospitals to achieve this goal. It may be that senior bureaucrats instruct their team to develop these budgeting systems. If in fact some bureaucrats do not implement the required budgeting systems for their hospitals, this would be a situation where the *policy* is not compliant with the statute (and  $a - \omega \notin [\underline{x}, \bar{x}]$ ). In this case, if caught in non-compliance, the bureaucrats could be punished. By contrast, it may be the case that all of the budgeting procedures were put in place ( $a - \omega \in [\underline{x}, \bar{x}]$ ), but the end result did not save money, as was expected. In this second case,  $a - \omega - \varepsilon \notin [\underline{x}, \bar{x}]$ , yet the bureaucrat should not be punished for doing what the law prescribed. This possibility that faithful execution of the law leads to bad outcomes represents one of the risks to an uninformed legislators (one who is uncertain about the value of  $\varepsilon$ ) of placing policy constraints on the Bureaucrat – that is, the Politician may force the Bureaucrat to take actions that, given the actual value of  $\varepsilon$ , are bad from both the Bureaucrat’s and the Politician’s perspective.

Figure 1 summarizes the model. In the next section, we examine how bureaucratic capacity influences the Bureaucrat’s implementation strategy.

\*\*\* Figure 1 about here \*\*\*

### **Bureaucratic capacity and policy implementation**

In the model, one reason the Politician is harmed by a low capacity Bureaucrat is because of straightforward efficiency loss. This efficiency loss is simply  $\sigma_\omega^2 = \frac{\Omega^2}{6}$ , which is increasing in

$\Omega$ . In this section, by examining the Bureaucrat's best response to any statute, we show that bureaucratic capacity has two distinct effects on policymaking in addition to this efficiency effect. On one hand, the best action the Bureaucrat can be induced to take improves for the Politician as bureaucratic capacity increases. In fact, the Politician can often induce a better action from a high-capacity "enemy" Bureaucrat (with an ideal point far from the Politician's) than from a low-capacity "friendly" Bureaucrat (with an ideal point close to the Politician's). On the other hand, a high capacity Bureaucrat's action is more responsive to his information about the policy environment. This responsiveness can work both for and against the Politician's interests, for reasons we spell out below. In what follows, we describe the logic of these two effects and state formally the optimal response of the Bureaucrat to any statute.

The Bureaucrat reacts to a statute by attempting an action,  $a$ . He knows that the realization of this effort is  $a - \omega$ , but he does not know the value of  $\omega$  (only that  $\omega \in [-\Omega, \Omega]$ ). In determining  $a$ , then, the Bureaucrat must weigh the potential costs of attempting an action for which the realization leads to non-compliance against the potential policy benefits of attempting actions that are closer to his ideal policy.

\*\*\* Figure 2 about here \*\*\*

Figure 2 illustrates the Bureaucrat's decision problem given a statute,  $\bar{x}$ , and given an arbitrary level of capacity,  $\Omega$ , which has a probability density function  $f(\omega)$ . In this figure we assume that the Bureaucrat knows that  $\varepsilon = 0$ . The figure depicts three different actions --  $a_1$ ,  $a_2$ , and  $a_3$  -- along with the distribution of realizations of these actions, which are denoted by the triangles centered above each action. The attempted action  $a_1 = \bar{x} - \Omega$  would ensure compliance with the statute for any possible  $\omega$  because even if  $\omega = -\Omega$ , the realization of the Bureaucrat's action complies with  $\bar{x}$ . By contrast, by attempting action  $a_2 = x_B + \varepsilon$ , the Bureaucrat

completely ignores the statute by attempting the action that yields his most preferred policy. This will often lead to a better policy outcome for the Bureaucrat, but it will also lead to substantial non-compliance. In this example, whenever  $\omega < x_B - \bar{x}$ , the realization of the Bureaucrat's action will be non-compliant, and if caught in non-compliance (which occurs with probability  $\gamma$ ), the Bureaucrat pays a punishment penalty,  $\delta$ . The probability that the realization of the action at  $a_2$  is non-compliant is the area under the triangle centered above  $a_2$  that is to the right of  $\bar{x}$ .

Obviously, as the Bureaucrat moves his attempted action from  $a_1$  to  $a_2$  he obtains a better policy outcome, but he increases the probability that the realization of his action will not comply with the statute, and that he is caught and punished. In equilibrium, the Bureaucrat's optimal attempted action equates the marginal policy benefit of moving the action towards his ideal point with the marginal cost associated with being caught in non-compliance with the law, point  $a_3$  in Figure 2, for example. It is useful to note that the optimal action will at times result in non-compliance for some realizations of  $\omega$ .

Note that for some locations of  $\bar{x}$ , the Bureaucrat's optimal response will always be to attempt to implement his most preferred policy. If  $\bar{x} \geq x_B + \varepsilon + \Omega$ , for example, such as  $\bar{x}_1$  in Figure 2, then the Bureaucrat can attempt his most preferred action without ever risking non-compliance. If  $\bar{x}$  is sufficiently far to the left of  $x_B$  (relative to the cost of non-compliance, i.e.,  $\bar{x} \leq x_B + \varepsilon - \Omega$ ),<sup>5</sup> the Bureaucrat prefers taking his most-preferred action over taking any action that attempts to comply with the statute. Thus, for any  $\bar{x} \notin [x_B + \varepsilon - \Omega, x_B + \varepsilon + \Omega]$ , the Bureaucrat has will attempt an action at his ideal point. We can therefore see that as bureaucratic capacity improves ( $\Omega$  declines), the range of statutes that result in  $a = x_B + \varepsilon$  increases (i.e., the interval  $[x_B + \varepsilon - \Omega, x_B + \varepsilon + \Omega]$  shrinks).

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<sup>5</sup> Note that this boundary point implies that the cost of punishment for non-compliance is sufficiently small because we will assume  $\delta\gamma < \Omega^2$  (see below).

Although a high capacity Bureaucrat will respond to a wider range of “extreme” statutes by attempting an action at his ideal point, a higher capacity bureaucrats is also easier to “control” with non-extreme statutes. That is, when  $\bar{x} \in [x_B + \varepsilon - \Omega, x_B + \varepsilon + \Omega]$ , a higher capacity Bureaucrat can be induced to take actions that are closer to the Politician’s preferred policy than can a low capacity Bureaucrat. The reason can be seen in Figure 3, which depicts two different levels of bureaucratic capacity, a higher capacity Bureaucrat in the top figure and a lower capacity Bureaucrat in the bottom figure.

\*\*\* Figure 3 about here \*\*\*

Consider the consequences if the Bureaucrat moves his attempted action from  $a_1$  to  $a_2$ . For both levels of capacity, if the Bureaucrat attempts an action at  $a_1 = \bar{x}$ , the probability of non-compliance is one-half. For the high capacity Bureaucrat depicted in the top figure, attempting an action  $a_2$  guarantees full compliance with the statute (i.e., for all realizations of  $\omega$ ,  $a_2 - \omega \leq \bar{x}$ ). By contrast, for the low-capacity Bureaucrat depicted in the bottom figure, adopting  $a_2$  reduces the risk of non-compliance by much less (i.e., for many realizations of  $\omega$ ,  $a_2 - \omega > \bar{x}$ ). Thus, the expected benefit to for the low-capacity Bureaucrat of attempting greater compliance with the statute (by moving from  $a_1$  to  $a_2$ ) is much less than is this expected benefit for the higher capacity Bureaucrat. The policy loss (when non-compliance does not occur or is not detected) of moving from  $a_1$  to  $a_2$  is the same for the high-capacity and low-capacity Bureaucrat, but the low capacity Bureaucrat is less willing to pay this cost because he reduces his risk of non-compliance much less than does the high capacity Bureaucrat. Thus, all else equal, the lower capacity Bureaucrat is harder for the Politician to control. Since the results of the low capacity Bureaucrat’s actions are less sensitive to his efforts, he has less to lose from risking additional

non-compliance, and thus for a given statute, will attempt actions that are closer to his preferred policy than will the high-capacity bureaucrat.

To establish formally the precise location of the Bureaucrat's optimal action, recall we assume  $x_L < x_B$ ,  $\underline{x} = -\infty$ , and we multiply the quadratic policy utility by one-half. With these assumptions, the Bureaucrat's expected utility of attempting to implement the policy  $a$  in response to statute  $\bar{x}$  is given by

$$-\int_{a-\bar{x}}^{\Omega} \frac{1}{2}(a-\omega-\varepsilon-x_B)^2 f(\omega)d\omega - \int_{-\Omega}^{a-\bar{x}} \left[ \frac{1}{2}(a-\omega-\varepsilon-x_B)^2 + \gamma\delta \right] f(\omega)d\omega$$

The first term of this expression is the expected utility over the range of  $\omega$  for which  $a$  leads to a compliant policy by the Bureaucrat (i.e.  $a-\omega \in [\underline{x}, \bar{x}]$ ). For action  $a_3$  in Figure 2, this is the area under the triangle (with an apex over  $a_3$ ) that is to the left of  $\bar{x}$ , multiplied by the policy utility associated with action  $a_3$ . The second term of this expression is the expected utility over the range of  $\omega$  that lead to non-compliant policies (i.e.,  $a-\omega > \bar{x}$ ). For  $a_3$  in Figure 2, this is the probability depicted by the shaded area under the triangle that is to the right of  $\bar{x}$ , multiplied by the policy utility associated with  $a_3$  plus the expected penalty of being caught in non-compliance ( $d\gamma$ ).

Evaluating the integrals yields the following expected utility for the Bureaucrat from an action,  $a$

$$EU_B(a|\bar{x}) = -\frac{1}{2}(a-\varepsilon-x_B)^2 - \gamma\delta F(a-\bar{x}),$$

where  $F(\cdot)$  is the cumulative distribution function for  $\omega$ . Thus, the Bureaucrat's optimal implementation strategy  $a^*$  solves the first order condition

$$\frac{\partial EU_B(a|\bar{x})}{\partial a} = -(a-\varepsilon-x_B) - \gamma\delta f(a^*-\bar{x}) = 0$$

or

$$x_B + \varepsilon - a - \frac{\Omega - |a - \bar{x}|}{\Omega^2} \gamma \delta = 0. \quad [1]$$

We focus in the paper on the case where  $\Omega^2 > \gamma \delta$ . This simplifies the analysis by ensuring the sufficiency of the second order conditions (and obviating the need to analyze corner solutions). Substantively, this implies that we are focusing on cases where the variance in the implementation errors is relatively large compared to the Bureaucrat's expected costs of non-compliance. This restriction is reasonable given our focus on democracies where bureaucratic capacity is limited and the probability of the courts rigorously enforcing statutes is relatively small.

Solving Equation [1] yields the best-response function for the Bureaucrat, which is given in Proposition 1.

**Proposition 1:** The following intended actions by the Bureaucrat are optimal given  $\bar{x}$ :

- i) If  $\bar{x} - \varepsilon \leq x_B - \Omega$ ,  $a^* = x_B + \varepsilon$
- ii) If  $x_B - \Omega < \bar{x} - \varepsilon \leq x_B - \frac{\gamma \delta}{\Omega}$ ,  $a^* = \frac{\Omega^2 (x_B + \varepsilon) - \gamma \delta (\bar{x} + \Omega)}{\Omega^2 - \gamma \delta}$
- iii) If  $x_B - \frac{\gamma \delta}{\Omega} < \bar{x} - \varepsilon \leq x_B + \Omega$ ,  $a^* = \frac{\Omega^2 (x_B + \varepsilon) + \gamma \delta (\bar{x} - \Omega)}{\Omega^2 + \gamma \delta}$
- iv) If  $\bar{x} - \varepsilon \geq x_B + \Omega$ ,  $a^* = x_B + \varepsilon$

Proof. See Appendix.

There are three points we would like to make about the best response. First, it follows directly from the Proposition the Politician can induce any action in the interval

$\left[ x_B - \frac{\delta \gamma}{\Omega} + \varepsilon, x_B + \varepsilon \right]$ . In parts i) and iv), an “extreme” statute results in  $a^* = x_B + \varepsilon$ . In parts iii)

and iv),  $a^*$  is piecewise, linear function with a minimum at  $x_B - \frac{\delta \gamma}{\Omega} + \varepsilon$  and a maximum at

$x_B + \varepsilon$ . Consequently, if the Politician is relatively distant from the Bureaucrat, or if the

Bureaucrat has low capacity (i.e., if  $x_p < x_B - \frac{\delta\gamma}{\Omega} + \varepsilon$ ), then best action that the Politician can induce is  $a = x_B - \frac{\delta\gamma}{\Omega} + \varepsilon$ . Since we wish to focus in this paper on cases where Bureaucratic capacity is low, we will concentrate only on situations where the Politicians cannot induce his most preferred action (i.e., where  $x_B > \frac{\delta\gamma}{\Omega}$ ).

Second, as the Bureaucrat's ideal point moves away from the Politician's, so too does the best action that the Politician can obtain. In fact, for any  $\Omega$ , the best action that the Politician can induce the Bureaucrat to take is better when the Bureaucrat's ideal point is closer to the Politician's. Consistent with many theories of delegation, then, when we ignore the impact of bureaucratic capacity, the Politician in our model always prefers a Bureaucrat with an ideal point closer to the Politician's to one with an ideal point farther away.

Third, if we take bureaucratic capacity into account, the Politician may not prefer a Bureaucrat who has preferences similar to the Politician's. Note that  $a = x_B - \frac{\delta\gamma}{\Omega} + \varepsilon$  -- the best action the Politician can induce -- improves as bureaucratic capacity improves ( $\Omega$  gets smaller). Thus, when our assumption that  $x_B > \frac{\delta\gamma}{\Omega}$  is satisfied, in comparing any two Bureaucrats, there is always a level of bureaucratic capacity that will make the Politician prefer the "less friendly" one to the "more friendly" one (in terms of preferences) because the high capacity bureaucrat is more easy to control.

If the Politician knows  $\varepsilon$  (which occurs when  $E = 0$ ), the Politician can always adopt the statute that induces the best action,  $a^* = x_B - \frac{\delta\gamma}{\Omega} + \varepsilon$ . But what if the Politician does not know  $\varepsilon$ ? Then an increase in bureaucratic capacity creates a real tension for the Politician. On one hand, the increased capacity allows the Politician to induce a better action. On the other hand, this increased capacity is more likely to trigger the worst possible action if the Politician

adopts the wrong policy.

To understand the problem, consider Figure 4, which depicts the Bureaucrat's best response to any statute for two levels of bureaucratic capacity,  $\Omega_1$  and  $\Omega_2$ . For present purposes we will consider only the best response defined by  $\Omega_1$ . First assume that the Politician has complete policy expertise (i.e., knows  $\varepsilon$ ), which corresponds to the case where  $E = 0$ . From the figure, we can see that the Politician can adopt  $\bar{x}$ , which induces  $a^* = a_1$ , the best possible action that the Politician can induce from the Bureaucrat.

\*\*\* Figure 4 about here \*\*\*

But what if there is policy uncertainty, so that the Politician knows only that  $\varepsilon \sim U[-E, E]$ , with  $E > 0$ ? If  $E = E_1$ , for example, then  $\bar{x} - \varepsilon$  must lie in the interval  $[\bar{x} - E_1, \bar{x} + E_1]$ , and the Bureaucrat's optimal action lies between  $a_1$  and  $a_2$ . The Politician's policy uncertainty makes it impossible for the Politician to ensure the best possible action,  $a_1$ , but the fact that the Politician does not have too much uncertainty allows the Politician to keep the Bureaucrat's action reasonably close to what is optimal for the Politician.

Now suppose the Politician has even less information, so that  $E = E_2 > E_1$ . In this case,  $\bar{x} - \varepsilon$  is in the relatively wide interval,  $[\bar{x} - E_2, \bar{x} + E_2]$ , which implies the action will be between  $a_1$  and  $a_3$ . Thus, the Politician's lack of policy expertise has made it much more difficult for the Politician to control Bureaucrat's action, implying a substantial cost. At the extreme, where policy uncertainty is so large that  $E > \Omega$  (as is the case for  $E_2$ , the upper and lower bounds on  $\bar{x} - \varepsilon$  will span all regions described in Proposition 1. In such a case, the Politician cannot avoid realizations of  $\varepsilon$  that trigger a response by the Bureaucrat to adopt his most preferred policy. In such cases of extreme uncertainty, the Politician's decision problem in

designing her statute is trivial because all she can do is center  $\bar{x}$  so as to ensure that the interval  $[x_B - \Omega, x_B + \Omega]$  is spanned by  $\bar{x} - \varepsilon$ . For this reason, in what follows, we focus on the case where  $\Omega > E$ , as assumption which is also consistent with our focus on polities with low-capacity bureaucrats.

It is important to note that the consequences of policy uncertainty for the Politician depend on the Bureaucrat's capacity. As noted above, a high-capacity Bureaucrat is much more responsive to his policy information than a low-capacity Bureaucrat. This can be seen in Figure 4, where the slope of the "v" for  $\Omega_1$  is much steeper than the slope for  $\Omega_2$ . This implies a relationship between the value to the Politician of bureaucratic capacity and policy expertise, which we discuss below. In the Appendix, we characterize the expected utilities for the Politician for all possible  $\bar{x}$  given feasible combinations of the parameters in the model. The main point we wish to underline here is that the ability of the Politician to influence the Bureaucrat depends fundamentally on the Politician's level of policy expertise.

### **Political reform in polities with low-capacity bureaucracies**

We now examine how low bureaucratic capacity influences the incentives politicians have to undertake political reform. Since our interest lies specifically in countries that suffer low capacity, we focus on cases where  $\Omega$  is large. We assume that  $\Omega$  is large relative to the informational asymmetry between the Politician and Bureaucrat (i.e.  $\Omega > E$ , which is necessary to make the Politician's action strategically interesting, as noted above), and that  $\Omega$  is large relative to punishment costs for non-compliance (i.e.  $\Omega > \frac{\delta\gamma}{x_B}$ , which eliminates a host of cases that are tedious to examine and which add few substantive insights to our argument).

As we show in the Appendix, when these conditions are met, the *ex ante* expected utility of the Politicians is summarized by a single equation:

$$EU_P = \left\{ -\frac{1}{2} \left( x_B - \frac{\gamma\delta}{\Omega} \right)^2 - \frac{1}{2} \left( x_B - \frac{\gamma\delta}{\Omega} \right) E \frac{\gamma\delta}{\Omega^2} - \frac{1}{6} E^2 \left( \frac{\gamma\delta}{\Omega^2} \right)^2 \right\} - \frac{\sigma_\omega^2}{2}. \quad [2]$$

The bracketed term in equation [2] is the Politician's "control" losses (i.e., the extent to which the Bureaucrat's intended action moves away from the Politician's ideal point) and the remaining term is the direct loss of incapacity due to implementation errors. We can use the equation to examine how bureaucratic capacity influences the Politicians' willingness to pay for different types of institutional reforms.

Our first proposition concerns the "trap" created by the interaction of policy expertise and bureaucratic capacity.

**Proposition 2.** When bureaucratic capacity is low,

- the Politician's benefit of increasing bureaucratic capacity increases as policy expertise increases; and
- the Politician's benefit of increasing policy expertise decrease as bureaucratic capacity declines.

Return to Figure 4 to see the logic of Proposition 2. The figure depicts two levels of bureaucratic capacity,  $\Omega_1$  (a relatively high capacity Bureaucrat) and  $\Omega_2$  (a relatively low capacity Bureaucrat) and, and two levels of policy expertise,  $E_1$  (a relatively informed Politician) and  $E_2$  (a relatively uninformed Politician).

First consider how the value of improving bureaucratic capacity depends on the Politician's level of policy expertise. If policy expertise is relatively low (as characterized by  $E_2$ ), then what is the policy benefit of increasing bureaucratic capacity from  $\Omega_2$  to  $\Omega_1$ ? Given  $E_2$ , the Bureaucrat's attempted action when bureaucratic capacity is low will be in the interval  $[a_4, a_6]$ , whereas when bureaucratic capacity is high, the Bureaucrat's attempted action will be in

the interval  $[a_1, a_3]$ . Clearly, the Politician prefers many actions when bureaucratic capacity is high, but because of the higher responsiveness of the high-capacity Bureaucrat to  $\varepsilon$ , for some (extreme) realizations of  $\varepsilon$ , the attempted action by the Bureaucrat will actually be better for the Politician if the Bureaucrat has low capacity.

Now consider the benefit of shift from  $\Omega_1$  to  $\Omega_2$  when the Politician's expertise is higher, as characterized by  $E_1$ . Given  $\Omega_2$ , the Bureaucrat's attempted action will be in the interval  $[a_4, a_5]$ , which is only slightly better than the  $[a_4, a_6]$  interval of attempted actions achieved with lower policy information. But given  $\Omega_1$ , the Bureaucrat's attempted action is in the interval  $[a_1, a_2]$ , which is much better (for all realization of  $\varepsilon$ ) than the  $[a_1, a_3]$  interval achieved with low information. The sensitivity of the Bureaucrat's action to the policy environment (i.e., to the value of  $\varepsilon$ ) makes the expected benefit of increasing bureaucratic capacity much higher when the Politician has policy expertise.

The same basic logic applies to the second part of the proposition regarding the benefits of expertise. If the Bureaucrat has relatively high capacity then an increase in policy expertise can have substantial benefits. Increasing policy expertise (by reducing  $E$  from  $E_2$  to  $E_1$ ) has a very small positive impact on the Bureaucrat's action if the Bureaucrat has relatively low capacity. Given  $\Omega_2$ , the Bureaucrat's action will be in the interval  $[a_4, a_6]$  when  $E = E_2$ , and will be in the very similar interval  $[a_4, a_5]$  when policy expertise of the Politician is higher, with  $E = E_1$ . But if there is a higher level of bureaucratic capacity,  $\Omega_1$ , an increase in expertise from  $E_2$  to  $E_1$  has a very large impact on the actions that the Bureaucrat can be induced to take. In this case, if  $E = E_2$  the Bureaucrat's action will be in the interval  $[a_1, a_3]$ , and if  $E = E_1$ , the Bureaucrat can be induced to take an action in the interval  $[a_1, a_2]$ . The Politician will therefore be least willing to pay for bureaucratic capacity when he has low expertise, but he will be the

least willing to pay for expertise when bureaucratic capacity is low. This is one reason, our model suggests, that policymaking incentives may make it difficult for democracies with low levels of bureaucratic capacity to emerge from this condition.

Next consider reforms related to enforcement. In our model, this enforcement, which is typically done by courts but may also be done by politicians themselves, is represented by  $\delta\gamma$ , the probability that bureaucratic actions which do not comply with a statute are discovered, multiplied by punishment cost for non-compliance. A country with a judiciary that rigorously enforces statutes will have a large value of  $\delta\gamma$ . We want to understand how reforms of bureaucracy are related to the quality of the judiciary, and how incentives to create strong judiciaries are influenced by bureaucratic capacity. Our main result is summarized in Proposition 3.

**Proposition 3.** When bureaucratic capacity is low,

- the Politician's benefit of increasing bureaucratic capacity increases as enforcement becomes more effective; and
- the Politician's benefit of increasing the effectiveness of enforcement decreases as bureaucratic capacity declines.

The logic of this proposition is straightforward. First, we have noted several times that the actions of a high-capacity Bureaucrat are more sensitive to the location of statutes. The Politician can therefore best take advantage of a high-capacity Bureaucrat when strong *ex post* enforcement intensifies the relationship between actions and punishment. But the Politician has the least gain from improving *ex post* enforcement when bureaucratic capacity is low.

Another way to see this is to recall that the best policy the Politician can ever induce the bureaucrat to take is given by  $x_B - \frac{\delta\gamma}{\Omega}$ . Thus, the Politician can push policy toward its ideal

point by improving enforcement (increasing  $\delta\gamma$ ) or by increasing bureaucratic capacity (decreasing  $\Omega$ ). But as the equation makes clear, the benefit of improving enforcement will decline as  $\Omega$  increases, and the benefit of improving bureaucratic capacity will decline as  $\delta\gamma$  decreases.

Finally, consider how bureaucratic capacity influences incentives to “politicize” the bureaucracy. Our model speaks to this issue in the following respect. The preferences of bureaucrats are largely determined by the rules and structures that politicians adopt. If the rules and procedures give politicians great latitude to appoint, promote, and dismiss bureaucrats, then we might expect bureaucrats to have preferences that are relatively close to the politicians. By contrast, if bureaucratic hiring and promotion is largely governed by neutral rules and procedures of administrative law, then we might expect bureaucrats to have preferences that are more divergent from the politicians (at least in comparison to bureaucrats who are chosen by a more politicized process). We can therefore ask how bureaucratic capacity influences the value of having a “politicized” bureaucracy – that is, of having a Bureaucrat with preferences aligned with the Politician.

Our main result is summarized in Proposition 4.

**Proposition 4.** When bureaucratic capacity is low,

- the Politician’s benefit of decreasing policy divergence with the Bureaucrat increases as bureaucratic capacity declines; and
- the Politician’s benefit of increasing bureaucratic capacity declines as policy divergence with the Bureaucrat decreases.

Proposition 4 describes another trap that is created by low bureaucratic capacity. When bureaucratic capacity is low, the benefit to the Politician of an “allied” bureaucrat (with policy

preferences similar to the Politician's) is greatest. But as a Bureaucrat's ideal point moves closer to the Politician's, the Politician's benefit from reforming the bureaucracy (decreasing  $\Omega$ ) declines.

### **Using statutes to delegate to low capacity bureaucrats**

We now turn to the final substantive issue of the paper: delegation strategies in polities with low-capacity bureaucracies. The contemporary literature on bureaucratic policymaking has developed a number of standard predictions about delegation to highly competent bureaucracies:

*The uncertainty principle:* Politicians should delegate more policymaking autonomy to bureaucrats when politicians are more uncertain about which policy will yield the best outcome.

*The ally principle:* Politicians should delegate more policymaking autonomy to bureaucrats when politicians and bureaucrats share similar policy preferences.

*The monitoring principle:* Politicians should delegate more policymaking autonomy to bureaucrats when politicians have more opportunities for ex post monitoring and sanctions.

Our model suggests that neither the ally nor the monitoring principle should hold in polities with low capacity bureaucrats.

In the Appendix, we show that in the lowest capacity systems, the optimal statutory upper bound is given by:

$$\bar{x}^* = x_B - \frac{\gamma\delta}{\Omega^2}(\Omega - E)$$

Note that an increase in  $\bar{x}^*$  implies greater policymaking discretion for the Bureaucrat in our model. Direct inspection of this result therefore shows that the uncertainty principle holds in our model (i.e.,  $\bar{x}^*$  is increasing in  $E$ ). However, neither the ally principal nor the monitoring principal hold since  $\bar{x}^*$  is increasing  $x_B$  and decreasing in  $\gamma\delta$ .

The reason the allied principal fails is straightforward. As we have demonstrated, low

capacity bureaucrats are especially unresponsive to their information about the policy shock since they are concerned that responding to extreme values of the shock will result in non-compliance with the statute. As a result, the Bureaucrat's action is biased towards his ideal point for all values of the policy shock. Thus, given this bias, the Politician values responsiveness to the shock most when the Bureaucrat's preferences diverge from her own. However, the primary way that the Politician can make the bureaucratic action more responsive to the policy shock is to make the statute more lax. Consequently she is more willing to trade a lax statute for more responsiveness to the shock when the Bureaucrat has more divergent policy preferences.

The mechanism that leads to a violation of the monitoring principal is similar. As *ex post* enforcement improves, the Bureaucrat will be more responsive to his information about the policy shock because the cost of non-compliance increases. Effective *ex post* enforcement therefore creates opportunities for the Politician to use policy details in statutes to induce greater responsiveness by a low capacity bureaucrat to the policy environment. This turns the standard monitoring principal from studies of high-capacity bureaucrats on its head. With high-capacity bureaucracies, policy details and *ex post* enforcement are substitutes for each other, but with low capacity bureaucracies, they are complements.

Given these findings, our empirical predictions about delegation in developing systems are quite different from those of the advanced democracies for whom the bulk of the empirical knowledge about delegation has originated. Our model clearly suggests that findings consistent with the ally and monitoring principals are contingent on high bureaucratic capacity and that these principals should be applied to developing systems with a great degree of caution.

### **Conclusion**

In any polity governed by the rule of law, bureaucratic behavior during policy implementation is conditioned by the bureaucrats' fear that they could be punished if caught taking actions that the law forbids (or not taking actions that the law requires). This fear is central to a politician's ability to use laws to successfully delegate policymaking authority to bureaucrats. Without it,

bureaucrats could ignore, willy nilly, the policy goals of politicians, thereby severing any democratic link between citizens and the policymaking process.

Factors that influence bureaucrats' concern about the consequences of non-compliance with legislation therefore have a significant influence on delegation and policymaking. Our analysis identifies one such factor – low bureaucratic capacity – that has received little attention in formal studies of delegation. Our model indicates that low bureaucratic capacity diminishes the ability of politicians to influence the actions of bureaucrats. As bureaucratic capacity declines, bureaucrats recognize that their ability to take actions that comply with legislation also declines, diminishing their incentive to try to do so. Politicians, then, are less able to use legislation to influence bureaucratic actions when bureaucratic capacity is low.

We argue that this diminished ability of politicians to control bureaucrats with low capacity has a significant impact on how we understand delegation and political reform in developing democracies. Our analysis suggests, for example, that when bureaucratic capacity is low, well-established principles in the existing delegation literature no longer operate. In particular, the “monitoring principle” is turned on its head, as is “ally principle.”

With respect to political reform, we argue that polities with low bureaucratic capacity are caught in a “development trap.” Although politicians always benefit from reforming low-capacity bureaucracies, they will be most willing to pay for such reforms when politicians themselves have technical expertise, and when *ex post* enforcement is effective. But politicians will be least willing to improve their technical expertise or *ex post* enforcement when bureaucratic capacity is low. In addition, when bureaucratic capacity is low, politicians have the greatest incentives to politicize the bureaucracy, and this politicization diminishes incentives to improve bureaucratic capacity.

The existence of this trap suggests that “comprehensiveness” is crucial to successful political reform. In studies of political development, scholars often underline the importance of reforming courts to enhance enforcement, or reforming bureaucracies to enhance capacity, or

reforming legislatures or executives to enhance technical expertise. While each of these reforms is valuable, what prior research neglects is the relationship of such reforms to each other. Politicians will have little incentive to enhance bureaucratic capacity if they lack the technical expertise necessary to influence bureaucrats to implement policies politicians desire, or if *ex post* enforcement is too ineffective to condition bureaucratic behavior. Politicians will have little incentive to improve their own technical expertise if they are delegating to low capacity bureaucrats who ignore statutory details, or if lax enforcement makes the content of statutes largely irrelevant. And politicians will have little incentive to improve enforcement by the judiciary if low bureaucratic capacity diminishes the incentives of bureaucrats to comply with the law in the first place. The benefits of reform in any one area, such as the bureaucracy, then, depend crucially on reforms in other areas, such as the courts.

This argument suggests an avenue for empirical study of political reform in polities with low bureaucratic capacity. Our model suggests that reforms will be most successful when they are comprehensive, with simultaneous efforts focusing on bureaucracies, courts, and politicians themselves. While such comprehensiveness is a tall order, our argument suggests the contrary as well – reforms that are not comprehensive are likely to fail. Efforts to improve bureaucratic capacity in polities with ineffective enforcement by judiciaries, for example, are likely to flounder and unravel. This need for comprehensiveness, we suspect, may help explain the substantial difficulties polities face as they attempt to develop politically.

Since there has been little effort to model policymaking in polities with low bureaucratic capacity, there is clearly a need to develop additional theoretical models that can further explore the issues raised here. As noted in the Introduction, bureaucratic capacity can be conceptualized in a number of ways, and our analysis focuses narrowly on only one of the possibilities. A particularly interesting issue to introduce would be policy uncertainty by bureaucrats themselves. In addition, our policymaking model is “institution-free,” and it would be useful to consider how the constitutional setting, such as whether there is separation of legislative and executive power,

influence delegation to low-capacity bureaucrats. We feel that the further development of such models can play a central role in improving our understanding of the challenges faced in governing those polities that are in the process of political development.

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## Appendix

**Proposition 1:** The following intended actions by the Bureaucrat are optimal given  $\bar{x}$  :

- v) If  $\bar{x} - \varepsilon \leq x_B - \Omega$ ,  $a^* = x_B + \varepsilon$
- vi) If  $x_B - \Omega < \bar{x} - \varepsilon \leq x_B - \frac{\gamma\delta}{\Omega}$ ,  $a^* = \frac{\Omega^2(x_B + \varepsilon) - \gamma\delta(\bar{x} + \Omega)}{\Omega^2 - \gamma\delta}$
- vii) If  $x_B - \frac{\gamma\delta}{\Omega} < \bar{x} - \varepsilon \leq x_B + \Omega$ ,  $a^* = \frac{\Omega^2(x_B + \varepsilon) + \gamma\delta(\bar{x} - \Omega)}{\Omega^2 + \gamma\delta}$
- viii) If  $\bar{x} - \varepsilon \geq x_B + \Omega$ ,  $a^* = x_B + \varepsilon$

*Proof.* The Bureaucrat's expected utility is

$$EU_B(a|\bar{x}) = -\frac{1}{2}(a - \varepsilon - x_B)^2 - \frac{1}{2}\sigma_\omega^2 - \gamma\delta F(a - \bar{x}),$$

where  $F(\bullet)$  is the cumulative distribution function for  $\omega$ . Thus, the Bureaucrat's optimal

implementation strategy  $a^*$  solves the first order condition

$$\frac{\partial EU_B(a|\bar{x})}{\partial a} = -(a^* - \varepsilon - x_B) - \frac{\gamma\delta}{\Omega} + \frac{\gamma\delta|a^* - \bar{x}|}{\Omega^2} = 0$$

Due to the absolute values operator, there are two relevant cases depending on the relationship between  $a$  and  $\bar{x}$ .

Case 1:  $a < \bar{x}$

In this case the first order condition becomes

$$a = x_B + \varepsilon - \frac{\gamma\delta\Omega}{\Omega^2} + \frac{\gamma\delta(\bar{x} - a)}{\Omega^2}$$

which implies that

$$a^* = \frac{\Omega^2(x_B + \varepsilon) + \gamma\delta[\bar{x} - \Omega]}{\Omega^2 + \gamma\delta}$$

We can verify that the solution  $a^* < \bar{x}$  when

$$x_B + \varepsilon - \frac{\gamma\delta}{\Omega} < \bar{x}$$

Since it is dominated strategy for the Bureaucrat to choose an action higher than her ideal

action, we must also verify that  $a^* \leq x_B + \varepsilon$ . This is guaranteed by  $\bar{x} - \Omega \geq x_B + \varepsilon$  or

$$\bar{x} \geq x_B + \varepsilon + \Omega.$$

Case 2:  $a > \bar{x}$

In this case, the first order conditions becomes

$$a = \varepsilon + x_B - \frac{\gamma\delta\Omega}{\Omega^2} + \frac{\gamma\delta(a - \bar{x})}{\Omega^2}$$

so that

$$a^* = \frac{\Omega^2(x_B + \varepsilon) - \gamma\delta[\bar{x} + \Omega]}{\Omega^2 - \gamma\delta}$$

Similar to above, we must establish that  $a^* > \bar{x}$ . This inequality will hold when  $x_B + \varepsilon - \frac{\gamma\delta}{\Omega} > \bar{x}$ .

It can be verified that  $a^* < x_B + \varepsilon$  if and only if  $\bar{x} > x_B + \varepsilon - \Omega$ .

**Lemma 1:** Equilibrium statutes and the Politician's expected utilities are defined in Figure A1.

\*\*\* Figure A1 here \*\*\*

*Proof.* The figure defines necessary (but not sufficient) conditions for  $\bar{x}$  to be optimal. In cases where multiple sets of necessary conditions are met, sufficiency could be obtained by comparing the Politician's expected utilities. We do not offer these comparisons here. Instead, in Lemma 2, below, we show that under our maintained conditions,  $\Omega > E$  and  $x_B > \frac{\gamma\delta}{\Omega}$ , only the necessary conditions for case 5 in Figure A1 are satisfied.

Note that the expected utility of politician is

$$E\left[-(a^*(\bar{x}, \varepsilon) - \varepsilon - \omega)^2\right] = \left[E\left[-(a^*(\bar{x}, \varepsilon) - \varepsilon)^2\right] - \sigma_\omega^2\right]$$

From the results of Proposition 1, we can compute  $a^*(\bar{x}, \varepsilon) - \varepsilon$ :

$$\text{If } \bar{x} - x_B + \frac{\delta\gamma}{\Omega} > \varepsilon > \bar{x} - x_B - \Omega, \quad a^*(\bar{x}, \varepsilon) - \varepsilon = \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta}$$

$$\text{If } \bar{x} + \Omega - x_B > \varepsilon > \bar{x} - x_B + \frac{\gamma\delta}{\Omega}, \quad a^*(\bar{x}, \varepsilon) - \varepsilon = \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta}$$

$$\text{If } \bar{x} - x_B - \Omega \geq \varepsilon \text{ or } \varepsilon \geq \bar{x} - x_B + \Omega, \quad a^*(\bar{x}, \varepsilon) - \varepsilon = x_B$$

There are 12 possible cases depending on  $\bar{x}$ .

Case 1:  $\bar{x} \geq E + \Omega + x_B$  and Case 2:  $\bar{x} \leq -E - \Omega + x_B$

In both of these cases, the Bureaucrat implements his ideal policy for all values of the policy shock so that  $E\left[-\frac{1}{2}(a^*(\bar{x}, \varepsilon) - \varepsilon)^2\right] = -\frac{1}{2}x_B^2$ . Therefore,

$$EU_L = -\frac{1}{2}(x_B^2 + \sigma_\omega^2)$$

Case 3:  $\bar{x} > E + x_B - \frac{\gamma\delta}{\Omega}$  and  $E + x_B + \Omega > \bar{x} > -E + x_B + \Omega$

The politician's expected utility from any  $\bar{x}$  satisfying the above conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x} - \Omega - x_B} x_B^2 d\varepsilon + \int_{\bar{x} - \Omega - x_B}^E \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta} \right)^2 d\varepsilon \right] - \frac{1}{2} \sigma_\omega^2.$$

Thus, the first order condition for the optimal choice of  $\bar{x}$  is

$$\frac{1}{4E} \left[ -x_B^2 + \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - E)}{\Omega^2 + \gamma\delta} \right)^2 \right] = 0. \quad \text{Therefore, the optimal solution is}$$

$\bar{x}^* = E + \Omega - \frac{(2\Omega^2 + \gamma\delta)}{\gamma\delta} x_B$ . Given this solution, the conditions on corresponding to this case

require  $E > \frac{\Omega^2 + \gamma\delta}{\gamma\delta} x_B$  and  $\frac{\gamma\delta}{2\Omega} > x_B$ . Therefore, the Politician's expected utility in

equilibrium is

$$EU_P = -\frac{1}{2}x_B^2 + \frac{\Omega^2 + \gamma\delta}{3\gamma\delta E} x_B^3 - \frac{1}{2} \sigma_\omega^2$$

Since by assumption,  $x_B > 0$  this dominates cases 1 and 2 when  $E > \frac{\Omega^2 + \gamma\delta}{\gamma\delta}x_B$  and  $\frac{\gamma\delta}{2\Omega} > x_B$

hold.

Case 4:  $-E > \bar{x} - x_B - \Omega$  and  $E < \bar{x} - x_B + \frac{\gamma\delta}{\Omega}$

The set  $\bar{x}$  satisfying these conditions is non-empty if and only  $\Omega > E$ . The politician's expected utility for any  $\bar{x}$  satisfying the conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^E \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta} \right)^2 d\varepsilon \right] - \frac{1}{2} \sigma_\omega^2.$$

Thus, the first order condition for the optimal choice of  $\bar{x}$  is

$$\frac{1}{4E} \left[ \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - E)}{\Omega^2 + \gamma\delta} \right)^2 - \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega + E)}{\Omega^2 + \gamma\delta} \right)^2 \right] = 0$$

The only solution to the first order conditions is  $\bar{x}^* = \Omega - \frac{\Omega^2}{\gamma\delta}x_B$ . Thus, the conditions of the

case require  $E < \frac{\Omega^2 + \gamma\delta}{\gamma\delta}x_B$  and  $E < \frac{\Omega^2 + \gamma\delta}{\Omega} - \frac{\Omega^2 + \gamma\delta}{\gamma\delta}x_B$ . When these conditions hold,

the expected utility of  $P$  is

$$EU_P = -\frac{1}{6} \left( \frac{\gamma\delta E}{\Omega^2 + \gamma\delta} \right)^2 - \frac{1}{2} \sigma_\omega^2$$

Case 5:  $-E + x_B - \frac{\gamma\delta}{\Omega} < \bar{x} < -E + x_B + \Omega$  and  $E + x_B - \Omega < \bar{x} < E + x_B - \frac{\gamma\delta}{\Omega}$

Note that the set  $\bar{x}$  satisfying these conditions is non-empty if and only  $\Omega > E$ . The politician's expected utility for  $\bar{x}$  satisfying the conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B} \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B}^E \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon \right] - \sigma_\omega^2$$

Thus, the first order condition for the optimal choice of  $\bar{x}$  is

$$-\frac{1}{4E} \left[ \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - E)}{\Omega^2 - \gamma\delta} \right)^2 - \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega + E)}{\Omega^2 + \gamma\delta} \right)^2 \right] = 0$$

There are two roots which satisfy the first order condition which also may satisfy the second order condition for some values:

$$\bar{x} = x_B - \frac{\gamma\delta}{\Omega} + \frac{\gamma\delta}{\Omega^2} E$$

$$\bar{x} = \frac{\Omega^4}{(\gamma\delta)^2} x_B - \frac{\Omega^2}{(\gamma\delta)} (\Omega - E)$$

It is easily checked that the first root always satisfies the conditions of this case when  $\Omega^2 > \gamma\delta$  and  $\Omega > E$ . Therefore, the expected utility is

$$EU_P = -\frac{1}{2} \left[ \left( x_B - \frac{\gamma\delta}{\Omega} \right)^2 + \left( x_B - \frac{\gamma\delta}{\Omega} \right) E \frac{\gamma\delta}{\Omega^2} + \frac{1}{3} E^2 \left( \frac{\gamma\delta}{\Omega} \right)^2 - \sigma_\omega^2 \right]$$

The second root only satisfies the second order condition when  $E > \Omega - \frac{\Omega^2 - \gamma\delta}{\gamma\delta} x_B - \frac{\gamma\delta}{\Omega}$ . The expected utility in this case is

$$EU_P = -\frac{1}{6E} \left[ \frac{\Omega^2}{\gamma\delta} \left( x_B - \frac{\gamma\delta}{\Omega} \right)^3 - \left( \frac{\Omega^2}{\gamma\delta} x_B - (\Omega - E) \right)^3 \right] - \frac{1}{2} \sigma_\omega^2$$

To satisfy the conditions of the case, this root also requires  $\frac{\Omega^2 - \gamma\delta}{\gamma\delta} x_B + \frac{\gamma\delta}{\Omega} > \Omega - E$  and

$$\frac{\Omega^2 + \gamma\delta}{\gamma\delta} x_B > \Omega - E.$$

Case 6: If  $-E + x_B - \frac{\pi}{\Omega} > \bar{x}$  and  $E + x_B - \Omega < \bar{x}$ ,

The politician's expected utility for  $\bar{x}$  satisfying the above conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^E \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon \right] - \sigma_\omega^2.$$

Thus, the first order conditions is

$$\frac{1}{4E} \left[ \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - E)}{\Omega^2 - \gamma\delta} \right)^2 - \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} - \Omega + E)}{\Omega^2 - \gamma\delta} \right)^2 \right] = 0$$

The only solution is  $\bar{x} = \frac{\Omega^2}{\gamma\delta} x_B - \Omega$  which gives a utility of  $EU_P = -\frac{1}{6} \left( \frac{\gamma\delta}{\Omega^2 - \gamma\delta} \right)^2 E^2 - \sigma_\omega^2$ .

This utility is strictly lower than that of case 4. Any set of parameters for which the conditions of case 6 hold, the conditions of case 4 will also hold. Therefore, case 6 is never optimal.

Case 7: If  $-E + x_B + \Omega < \bar{x} < E + x_B - \frac{\gamma\delta}{\Omega}$  and  $E + x_B - \Omega < \bar{x}$ ,

The politician's expected utility for  $\bar{x}$  satisfying the above conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x}-x_B-\Omega} x_B^2 d\varepsilon + \int_{\bar{x}-x_B-\Omega}^{\bar{x}-x_B+\frac{\gamma\delta}{\Omega}} \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x}-x_B+\frac{\gamma\delta}{\Omega}}^E \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon \right] - \sigma_\omega^2.$$

Thus, the first order conditions is

$$\frac{1}{4E} \left[ -x_B^2 + \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} - \Omega + E)}{\Omega^2 - \gamma\delta} \right)^2 \right] = 0$$

The only solution satisfying the second order condition is  $\bar{x} = x_B - \Omega + E$  which violates the conditions of the case. Therefore, no  $\bar{x}$  satisfying the conditions of this case is optimal.

Case 8:  $-E + x_B - \frac{\gamma\delta}{\Omega} > \bar{x} > -E + x_B - \Omega$  and  $E + x_B - \Omega > \bar{x}$

The politician's expected utility for  $\bar{x}$  satisfying the above condition is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x}+\Omega-x_B} \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x}+\Omega-x_B}^E x_B^2 d\varepsilon \right] = 0$$

so that the first condition is

$$\frac{1}{4E} \left[ x_B^2 - \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} - \Omega + E)}{\Omega^2 - \gamma\delta} \right)^2 \right] = 0.$$

There are two roots,  $\bar{x} = x_B - \Omega - E$  and  $\bar{x} = \frac{2\Omega^2 - \gamma\delta}{\gamma\delta} x_B - \Omega - E$ . The first one violates the conditions of the case. The second one produces an expected utility of

$$EU_P = -\frac{1}{2} x_B^2 + \frac{1}{3} \frac{\Omega^2 - \gamma\delta}{E\gamma\delta} x_B^2 - \frac{1}{2} \sigma_\omega^2$$

When the conditions for case 3 hold, the solution for case 2 dominates this case. If the conditions for case 3 do not hold, then the conditions for case 4 hold and its solution is preferred to

$\bar{x} = \frac{2\Omega^2 - \gamma\delta}{\gamma\delta} x_B - \Omega - E$  as well. So the solution to this case is never optimal.

Case 9: If  $E - \Omega + x_B \geq \bar{x} \geq -E + \Omega + x_B$ ,

The politician's expected utility for  $\bar{x}$  satisfying the above condition is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x} - \Omega - x_B} x_B^2 d\varepsilon + \int_{\bar{x} - \Omega - x_B}^{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B} \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B}^{\bar{x} + \Omega - x_B} \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x} + \Omega - x_B}^E x_B^2 d\varepsilon \right] - \sigma_\omega^2$$

This utility is constant in  $\bar{x}$  and equals

$$EU_P = -\frac{1}{2} \left[ (x_B^2 + \sigma_\omega^2) - \frac{\gamma\delta}{E} x_B + \frac{(\gamma\delta)^2}{3E\Omega} - \sigma_\omega^2 \right]$$

The condition for this case requires  $E > \Omega$ .

Case 10: If  $\bar{x} < -E + \Omega + x_B$  and  $E - \Omega + x_B > \bar{x}$ ,

The politician's expected utility for  $\bar{x}$  satisfying the above conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B} \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B}^{\bar{x} + \Omega - x_B} \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x} + \Omega - x_B}^E x_B^2 d\varepsilon \right] - \sigma_\omega^2$$

The first order condition for the optimal choice of  $\bar{x}$  is

$$\frac{1}{4E} \left[ x_B^2 - \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega + E)}{\Omega^2 + \gamma\delta} \right)^2 \right] = 0 .$$

The only solution satisfying the second order condition is  $\bar{x} = \Omega - E + x_B$  which lies outside the interval of the case. Thus, no  $\bar{x}$  from this case can be optimal.

Case 11: If  $\bar{x} > -E + \Omega - x_B$  and  $E - \Omega + x_B < \bar{x}$ ,

The politician's expected utility for  $\bar{x}$  satisfying the above conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x} - \Omega - x_B} x_B^2 d\varepsilon + \int_{\bar{x} - \Omega - x_B}^{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B} \left( \frac{\Omega^2 x_B + \gamma\delta(\bar{x} - \Omega - \varepsilon)}{\Omega^2 + \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x} + \frac{\gamma\delta}{\Omega} - x_B}^E \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon \right] - \sigma_\omega^2$$

Thus, the first order condition for the optimal choice of  $\bar{x}$  is

$$\frac{1}{4E} \left[ -x_B^2 + \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - E)}{\Omega^2 - \gamma\delta} \right)^2 \right] = 0$$

The only solution which satisfies the second order condition is  $\bar{x} = E - \Omega + x_B$  which lies outside the interval spanned by the case.

Case 12:  $\bar{x} < -E + x_B - \frac{\gamma\delta}{\Omega}$  and  $E > \bar{x} - x_B + \Omega$

The politician's expected utility for  $\bar{x}$  satisfying the above conditions is

$$-\frac{1}{4E} \left[ \int_{-E}^{\bar{x} + \Omega - x_B} \left( \frac{\Omega^2 x_B - \gamma\delta(\bar{x} + \Omega - \varepsilon)}{\Omega^2 - \gamma\delta} \right)^2 d\varepsilon + \int_{\bar{x} + \Omega - x_B}^E x_B^2 d\varepsilon \right] - \sigma_\omega^2$$

Thus, the first order condition for the optimal choice of  $\bar{x}$  is

$$\frac{1}{2E} \left[ x_B^2 - \left( \frac{\Omega x_B - \gamma\delta(\bar{x} + \Omega + E)}{\Omega - \gamma\delta} \right)^2 \right] = 0 .$$

The solution is  $\bar{x} = -E - \Omega + \frac{(2\Omega^2 - \delta\gamma)}{\delta\gamma} x_B$  and the expected loss is  $-\frac{1}{2} x_B^2 + \frac{\Omega^2 - \gamma\delta}{3\gamma\delta E} x_B^3$  which is

greater than that of case 3.

**Lemma 2.** If  $\Omega > \min \left\{ E, \frac{\delta\gamma}{x_B}, \sqrt{\gamma\delta} \right\}$ , only the necessary conditions for case 5 in Lemma 1 are

satisfied, and thus 
$$EU_P(\bar{x}^*) = -\frac{1}{2} \left[ \left( x_B - \frac{\gamma\delta}{\Omega} \right)^2 + \left( x_B - \frac{\gamma\delta}{\Omega} \right) E \frac{\gamma\delta}{\Omega^2} + \frac{1}{3} E^2 \left( \frac{\gamma\delta}{\Omega^2} \right)^2 + \sigma_\omega^2 \right]$$

*Proof.* By the proof of Lemma 1, cases 1, 2, 6, 7, 8, 10, 11 and 12 can never describe an equilibrium in the game. This leaves cases 3, 4, 5 (which has two possible solutions), and 9 as candidates for describing equilibrium statutes and their expected utilities. The assumption  $\Omega > E$  implies the necessary conditions for case 9 are not satisfied. Similarly, when  $x_B > \frac{\gamma\delta}{\Omega}$  it can never be true that

$$\frac{\gamma\delta}{2\Omega} > x_B \text{ (eliminating case 3); it can never be true that } E < \frac{\Omega^2 + \gamma\delta}{\Omega} - \frac{\Omega^2 + \gamma\delta}{\gamma\delta} x_B \text{ (eliminating case 4);}$$

$$\text{and it can never be true that } \Omega - E > \frac{\Omega^2}{\gamma\delta} x_B \text{ (eliminating case 5 when } \bar{x} = \frac{\Omega^4}{(\gamma\delta)^2} x_B - \frac{\Omega^2}{(\gamma\delta)} (\Omega - E)).$$

Thus, case 5 and  $\bar{x}^* = x_B - \frac{\gamma\delta}{\Omega} + \frac{\gamma\delta}{\Omega^2} E$  describes the unique equilibrium when  $\Omega > E$  and  $x_B > \frac{\gamma\delta}{\Omega}$ .  $\square$

*Proofs of Propositions 2-4:* Each of Propositions 2-4 relates to the interaction of  $\Omega$  with one other substantive variable in our model. Proving the propositions therefore involves (a) examining the first-order partial derivatives of  $EU_P$  with respect to  $\Omega$  and with respect to the substantive variable of interest, and (b) demonstrating that the cross-partial derivative of these two variables has the correct sign (given the signs of the first order partials). In Proposition 2, for example, we claim (i) the benefit to the Politician of increasing bureaucratic capacity increase as policy expertise increases; and (ii) that the marginal benefits to the Politician of increasing policy

expertise decrease as bureaucratic capacity declines. As we show below,  $\frac{\partial EU_P}{\partial \Omega} < 0$ . Thus, to

show that the benefit to the Politician of increasing bureaucratic capacity increases as policy

expertise increases, we need to show that  $\frac{\partial^2 EU_P}{\partial E \partial \Omega} > 0$ . By a similar logic, given that

$\frac{\partial EU_P}{\partial E} < 0$ , we again need to establish that  $\frac{\partial^2 EU_P}{\partial E \partial \Omega} > 0$ . For Propositions 2-4, we simply

establish a sufficient condition on the size of  $\Omega$  to ensure that the various partial derivatives have the correct sign. In so doing, each of the three propositions takes advantage of Lemma 3.

**Lemma 3.** For  $\Omega > \min \left\{ E, \frac{\delta \gamma}{x_B}, \sqrt{\gamma \delta} \right\}$ ,  $\frac{\partial EU_P}{\partial \Omega} < 0$ .

*Proof.* From Lemma 2,

$$\frac{\partial EU_P}{\partial \Omega} = -\frac{\gamma \delta}{\Omega^2} \left( 1 - \frac{E}{\Omega} \right) \left( x_B - \frac{\gamma \delta}{\Omega} \right) - \frac{E (\gamma \delta)^2}{2 \Omega^4} \left( 1 - \frac{4 E}{3 \Omega} \right) - \frac{1}{6} \Omega$$

Note that the first term is clearly negative since  $\Omega > E$ . The sum of the second and third terms term is negative so long as

$$E (\gamma \delta)^2 (4E - 3\Omega) < \Omega^6$$

Since  $\Omega > E$ , the left hand side of this inequality can be no larger than  $\Omega^2 (\gamma \delta)^2$ . Since

$\Omega^2 > \gamma \delta$ , the inequality holds and the partial is negative.  $\square$

**Proposition 2.**

***Informal Statement***

When bureaucratic capacity is low,

- the benefit to the Politician of increasing bureaucratic capacity increases as policy expertise increases; and

- the benefit to the Politician of increasing policy expertise decreases as bureaucratic capacity declines.

**Formal Statement**

$$\text{If } \Omega > \min \left\{ E, \frac{3\delta\gamma}{2x_B}, \sqrt{\delta\gamma} \right\}, \quad \frac{\partial EU_P}{\partial E} < 0 \text{ and } \frac{\partial^2 EU_P}{\partial E \partial \Omega} > 0$$

*Proof.* As noted above, given Lemma 3, both parts of the proposition are true if for sufficiently

low bureaucratic capacity if  $\frac{\partial EU_P}{\partial E} < 0$  and  $\frac{\partial^2 EU_P}{\partial E \partial \Omega} > 0$ . Let  $\Omega^* = \min \left\{ E, \frac{3\delta\gamma}{2x_B}, \sqrt{\delta\gamma} \right\}$ . If

$\Omega \geq \Omega^*$ , then the conditions from Lemma 2 hold which implies that the Politician's expected utility is

$$EU_P = -\frac{1}{2} \left[ \left( x_B - \frac{\gamma\delta}{\Omega} \right)^2 + \left( x_B - \frac{\gamma\delta}{\Omega} \right) E \frac{\gamma\delta}{\Omega^2} + \frac{1}{3} E^2 \left( \frac{\gamma\delta}{\Omega^2} \right)^2 + \sigma_\omega^2 \right].$$

Thus,

$$\frac{\partial EU_P}{\partial E} = -\frac{1}{2} \frac{\gamma\delta}{\Omega^2} \left[ \left( x_B - \frac{\gamma\delta}{\Omega} \right) + \frac{2}{3} E \frac{\gamma\delta}{\Omega^2} \right] < 0, \text{ and}$$

$$\frac{\partial^2 EU_P}{\partial E \partial \Omega} = \frac{\gamma\delta}{\Omega^3} \left[ \left( x_B - \frac{3\gamma\delta}{2\Omega} \right) + \frac{4}{3} E \frac{\gamma\delta}{\Omega^2} \right] > 0. \quad \square$$

**Proposition 3.**

**Informal Statement**

When bureaucratic capacity is low,

- the benefit of increasing bureaucratic capacity increases as enforcement becomes more effective; and
- the benefit of increasing the effectiveness of enforcement decreases as bureaucratic capacity declines.

**Formal Statement**

For  $\Omega > \min \left\{ \hat{\Omega}, \frac{5\delta\gamma}{3x_B}, \sqrt{\delta\gamma} \right\}$ ,  $\frac{\partial EU_P}{\partial(\delta\gamma)} > 0$  and  $\frac{\partial^2 EU_P}{\partial(\delta\gamma)\partial\Omega} < 0$  where  $\hat{\Omega}$  is defined implicitly

$$\text{by } \Gamma(\hat{\Omega}) \equiv \hat{\Omega} - E - \frac{\gamma\delta}{x_B} \left( 2 + \frac{8E^2}{6\hat{\Omega}^2} - \frac{3E}{2\hat{\Omega}} \right) = 0.$$

*Proof.* Given Lemma 3, both parts of the proposition are true if for sufficiently low bureaucratic

capacity,  $\frac{\partial EU_P}{\partial(\delta\gamma)} < 0$  and  $\frac{\partial^2 EU_P}{\partial(\delta\gamma)\partial\Omega} < 0$ . Note that  $\Gamma' \equiv 1 - \frac{\gamma\delta}{x_B} \left( \frac{3E}{2\hat{\Omega}^2} - \frac{8E^2}{3\hat{\Omega}^3} \right) > 0$  since

$\frac{\gamma\delta\Omega}{x_B} > 1$ . Since  $\Gamma(E) \equiv -\frac{11\gamma\delta}{6x_B} < 0$  and  $\Gamma' > 0$ ,  $\hat{\Omega} > E$ . Therefore, if

$\Omega > \min \left\{ \hat{\Omega}, \frac{5\delta\gamma}{3x_B}, \sqrt{\delta\gamma} \right\}$ , then  $\Omega > \min \left\{ E, \frac{\delta\gamma}{x_B}, \sqrt{\delta\gamma} \right\}$  so that from Lemma 2:

$$EU_P = -\frac{1}{2} \left[ \left( x_B - \frac{\gamma\delta}{\Omega} \right)^2 + \left( x_B - \frac{\gamma\delta}{\Omega} \right) E \frac{\gamma\delta}{\Omega^2} + \frac{1}{3} E^2 \left( \frac{\gamma\delta}{\Omega^2} \right)^2 + \sigma_\omega^2 \right]$$

The marginal benefit of  $\gamma\delta$  is then

$$\frac{\partial EU_P}{\partial(\delta\gamma)} = \left[ \frac{2\Omega - E}{2\Omega^2} \left( x_B - \frac{\gamma\delta}{\Omega} \right) - \frac{1}{3} \frac{E^2 \gamma\delta}{\Omega^4} \right]$$

For  $\Omega \geq E$  and  $\Omega > \frac{5\delta\gamma}{3x_B}$ , this marginal utility must be positive. These conditions are also

implied by  $\Omega > \hat{\Omega}$ .

The cross partial of  $\Omega$  and  $\gamma\delta$  is

$$\frac{\partial^2 EU_P}{\partial(\delta\gamma)\partial\Omega} = \frac{1}{\Omega^3} \left[ (E - \Omega) \left( x_B - \frac{\gamma\delta}{\Omega} \right) + \gamma\delta + \frac{8E - 3\Omega}{6\Omega^2} \gamma\delta E \right]$$

This cross partial is negative if  $\Omega - E - \frac{\gamma\delta}{x_B} \left( 2 + \frac{8E^2}{6\Omega^2} - \frac{3E}{2\Omega} \right) \equiv \Gamma(\Omega) > 0$ . By definition of  $\hat{\Omega}$

and the fact that  $\Gamma' > 0$ , this implies that the cross partial will be negative so long as  $\Omega > \hat{\Omega}$ .  $\square$

**Proposition 4.**

***Informal Statement***

When bureaucratic capacity is low,

- the Politician's benefit of decreasing policy divergence with the Bureaucrat increases as bureaucratic capacity declines; and
- the Politician's benefit of increasing bureaucratic capacity declines as policy divergence with the Bureaucrat decreases.

***Formal Statement***

If  $\Omega > \min \left\{ E, \frac{3\delta\gamma}{2x_B}, \sqrt{\delta\gamma} \right\}$ ,  $\frac{\partial EU_P}{\partial x_B} < 0$  and  $\frac{\partial^2 EU_P}{\partial x_B \partial \Omega} < 0$

Proof: Given Lemma 3, to prove both parts of the proposition we need to show that  $\frac{\partial EU_P}{\partial x_B} < 0$

and  $\frac{\partial^2 EU_P}{\partial x_B \partial \Omega} < 0$ . If  $\Omega > \min \left\{ E, \frac{3\delta\gamma}{2x_B}, \sqrt{\delta\gamma} \right\}$ , then the conditions for Lemma 2 hold implying

that

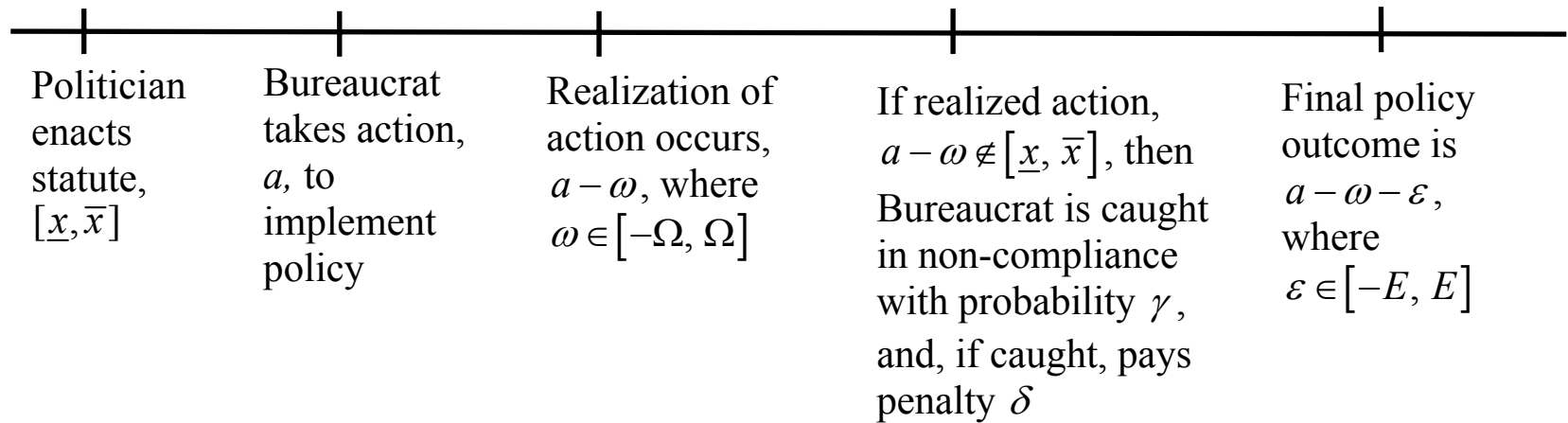
$$\frac{\partial EU_P}{\partial x_B} = - \left( x_B - \frac{\gamma\delta}{\Omega} \right) - E \frac{\gamma\delta}{2\Omega^2} < 0$$

and

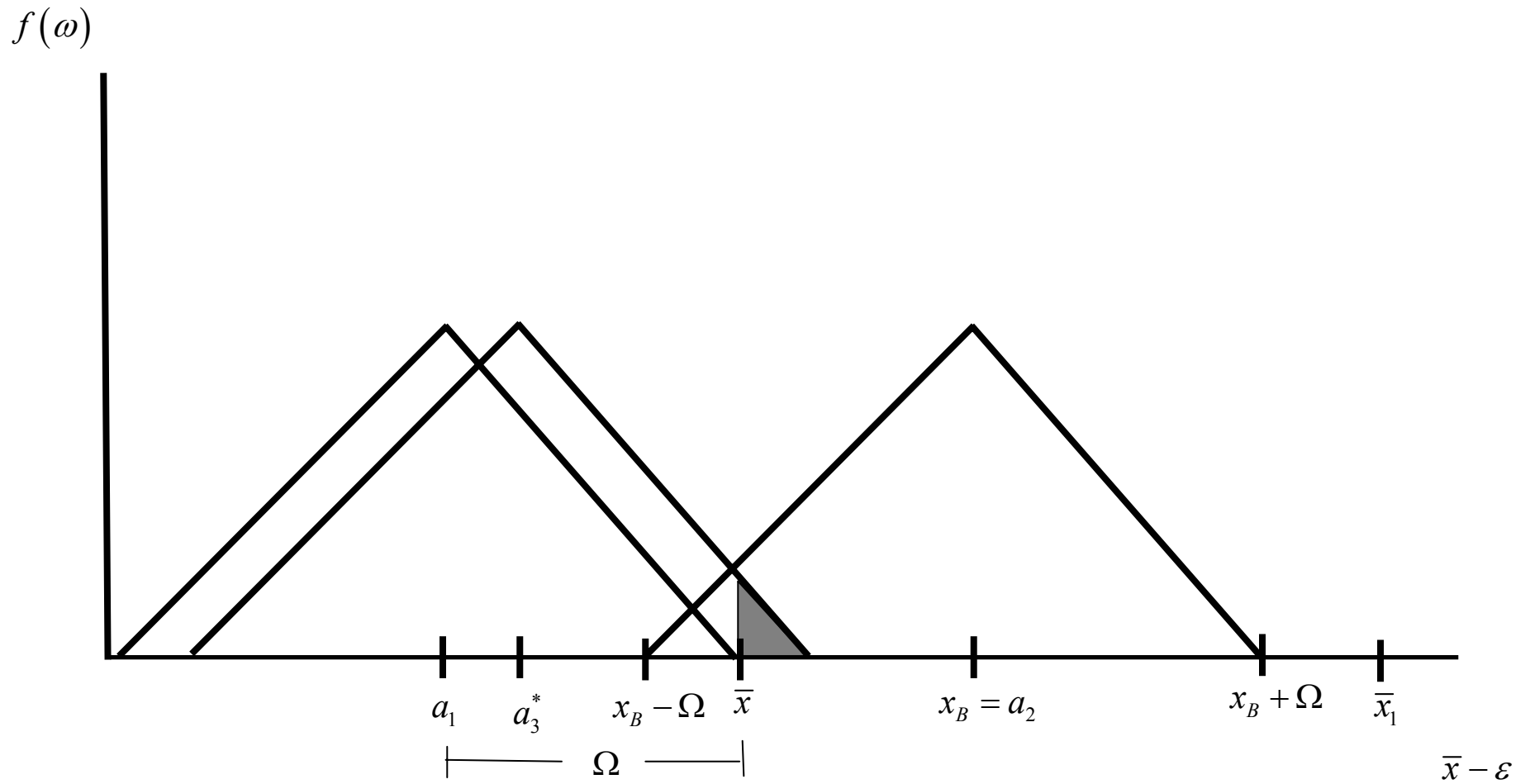
$$\frac{\partial^2 EU_P}{\partial x_B \partial \Omega} = - \frac{\gamma\delta}{\Omega^2} + E \frac{\gamma\delta}{\Omega^3} < 0$$

since  $E < \Omega$ .  $\square$

**Figure 1: Sequence of interactions in the model**



**Figure 2: The Bureaucrat's optimal response to  $\bar{x}$**



Note: Example in this figure assumes  $\epsilon = 0$

**Figure 3::Bureaucratic Capacity and Implementation Actions**

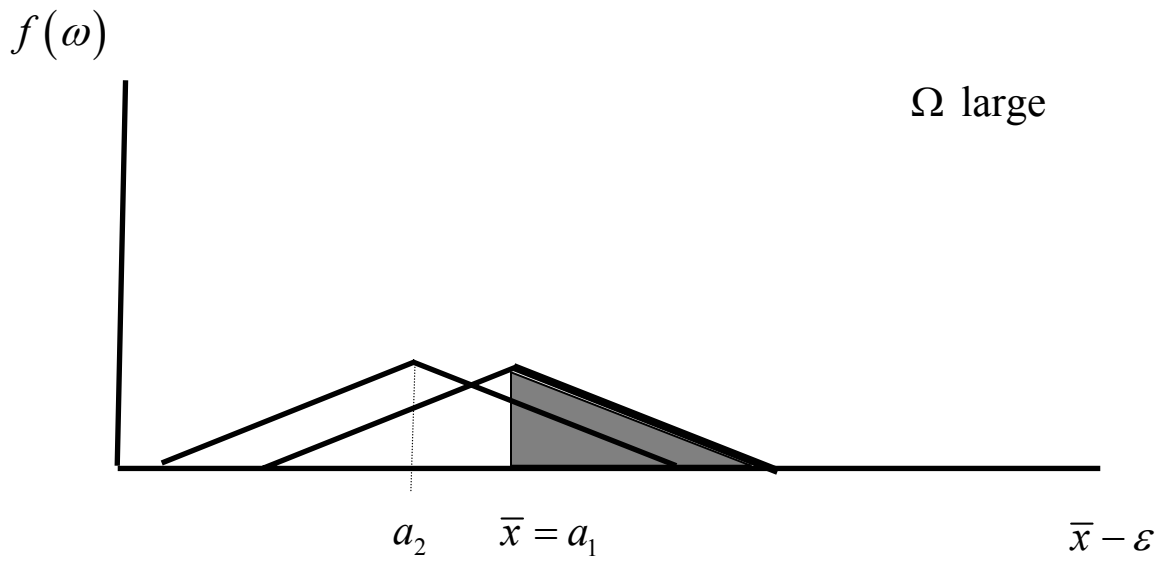
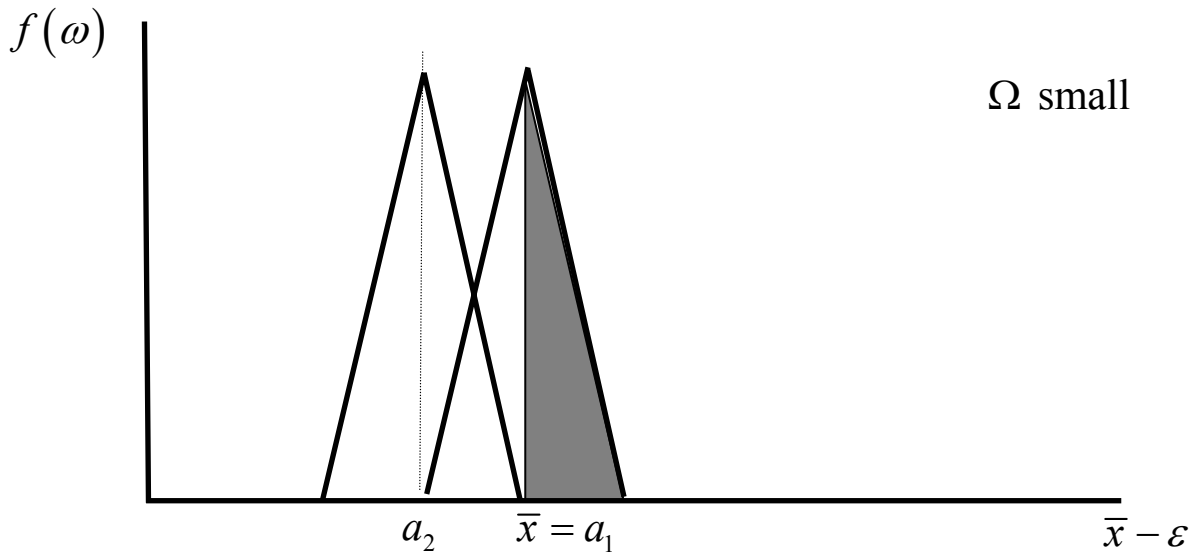
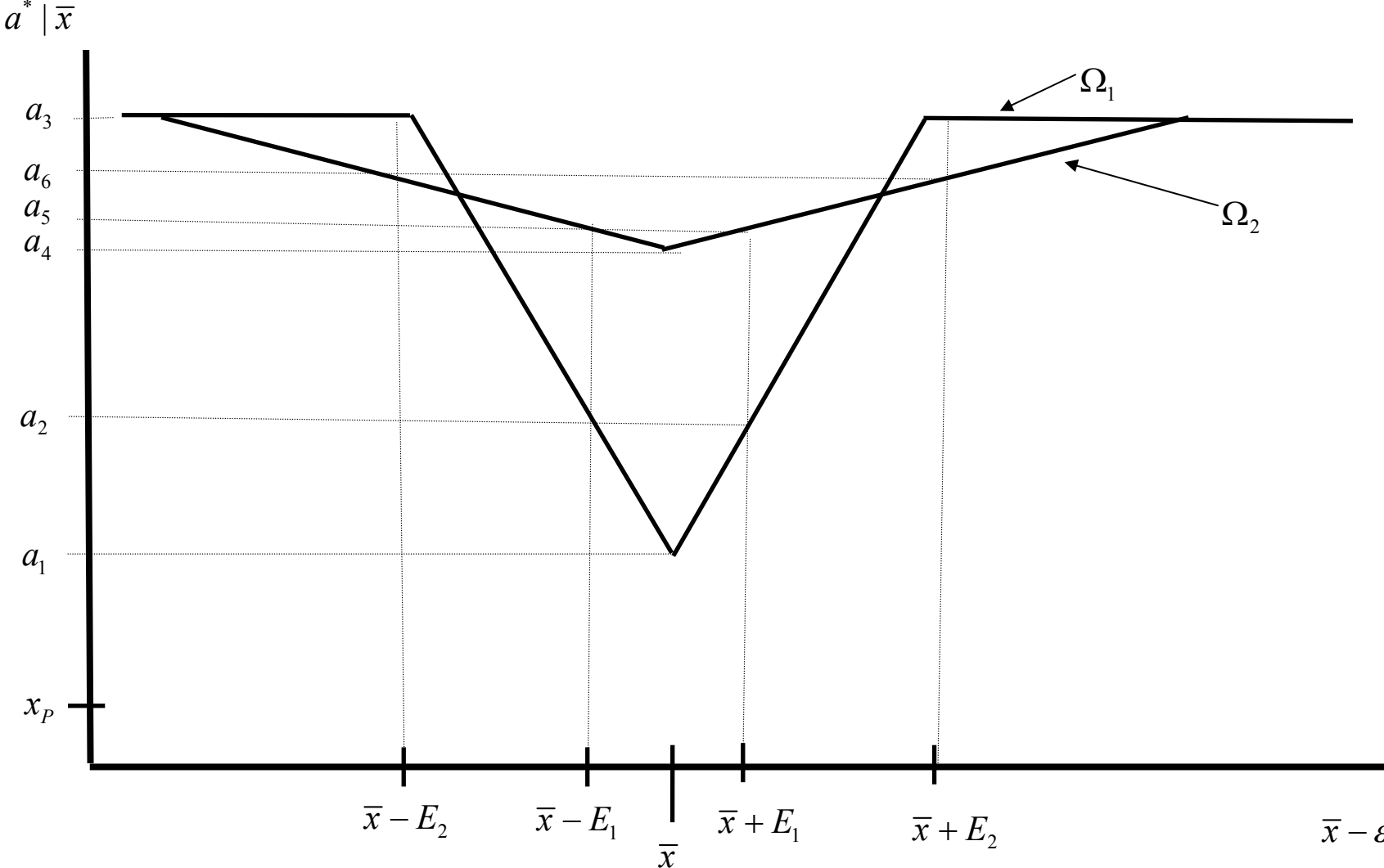


Figure 4: Bureaucratic capacity and policy expertise



**Figure A1:** Lemma 1's necessary conditions for optimal statutes and the Politician's expected utility from these statutes

Case Number and Necessary Conditions	$\bar{x}$	Expected Utility to Politician
Cases 1,2, 6, 7, 8, 10, 11 and 12	No such $\bar{x}$ can ever be optimal	
Case 3, $E > \frac{\Omega^2 + \gamma\delta}{\gamma\delta} x_B$ $\frac{\gamma\delta}{2\Omega} > x_B$	$E + \Omega - \frac{(2\Omega^2 + \gamma\delta)}{\gamma\delta} x_B$	$-\frac{1}{2}x_B^2 + \frac{\Omega^2 + \gamma\delta}{3\gamma\delta E}x_B^3 - \frac{1}{2}\sigma_\omega^2$
Case 4 $\Omega > E$ $E < \frac{\Omega^2 + \gamma\delta}{\gamma\delta} x_B$ $E < \frac{\Omega^2 + \gamma\delta}{\Omega} - \frac{\Omega^2 + \gamma\delta}{\gamma\delta} x_B$	$\Omega - \frac{\Omega^2}{\gamma\delta} x_B$	$-\frac{1}{6}\left(\frac{\gamma\delta E}{\Omega^2 + \gamma\delta}\right)^2 - \frac{1}{2}\sigma_\omega^2$

(Figure A1 continues on next page)

Figure A1 (continued from previous page)

<p>Case 5 (first root)</p> <p><math>\Omega^2 &gt; \delta\gamma</math></p> <p><math>\Omega &gt; E</math></p>	$x_B - \frac{\gamma\delta}{\Omega} + \frac{\gamma\delta}{\Omega^2}E$	$-\frac{1}{2} \left[ \left( x_B - \frac{\gamma\delta}{\Omega} \right)^2 + \left( x_B - \frac{\gamma\delta}{\Omega} \right) \frac{E\gamma\delta}{\Omega^2} + \frac{E^2}{3} \left( \frac{\gamma\delta}{\Omega} \right)^2 - \sigma_\omega^2 \right]$
<p>Case 5 (second root)</p> <p><math>\Omega &gt; E</math></p> <p><math>\frac{\Omega^2 - \gamma\delta}{\gamma\delta} x_B + \frac{\gamma\delta}{\Omega} &gt; \Omega - E</math></p> <p><math>\frac{\Omega^2 + \gamma\delta}{\gamma\delta} x_B &gt; \Omega - E &gt; \frac{\Omega^2}{\gamma\delta} x_B</math></p>	$\frac{\Omega^4 x_B}{(\gamma\delta)^2} - \frac{\Omega^2 (\Omega - E)}{(\gamma\delta)}$	$-\frac{1}{6E} \left[ \left( \frac{\Omega^2}{\gamma\delta} x_B - (\Omega - E) \right)^3 - \frac{\Omega^2}{\gamma\delta} \left( x_B - \frac{\gamma\delta}{\Omega} \right)^3 \right] - \frac{1}{2} \sigma_\omega^2$
<p>Case 9</p> <p><math>E &gt; \Omega</math></p>	$E - \Omega + x_B \geq \bar{x}$ $\geq -E + \Omega + x_B$	$-\frac{1}{2} \left[ \left( x_B^2 + \sigma_\omega^2 \right) - \frac{\gamma\delta}{E} x_B + \frac{(\gamma\delta)^2}{3E\Omega} - \sigma_\omega^2 \right]$