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Uncertainty and Legislative Capacity
for Controlling the Bureaucracy

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INTRODUCTION

Are legislative oversight committees effective at influencing the behavior of administrative agencies? Before the early 1980s, the conventional wisdom among congressional scholars was that legislative committees were not successful at this task. This view was based on the observation that members did not invest much time and energy in the oversight function, because little electoral incentive existed to engage in such activities (Dodd and Schott 1979; Ogul 1976; Scher 1963; Wilson 1980). Relatedly, the information advantage enjoyed by administrative agencies made effective monitoring by legislative oversight committees highly impractical (Niskanen 1971).

This perspective, however, was directly challenged in a pair of seminal articles by Barry Weingast and Mark Moran (1982, 1983). The "legislative dominance" model developed by Weingast and Moran is based on the simple premise that changes in the ideological policy position of the median committee member will be positively associated with changes in agency behavior, in the form of either decision making or policy outputs.[1] The theoretical basis for this hypothesis is that administrative agencies' feasible set of policy-making activities are explicitly linked, and thus consistent, with the central tendency of legislator preferences for a

given oversight committee. They conclude that congressional influence over bureaucratic behavior is pervasive in a retrospective sense.[2] Numerous studies find corroborative empirical evidence in favor of this theoretical prediction (e.g., Faith, Leavens, and Tollison 1982; Grier 1991; Moe 1985; Morris and Munger 1998; Scholz, Twombly, and Headrick 1991; Wood and Waterman 1994). This body of empirical research concludes that legislative committees play an effective role in shaping the behavior of administrative agencies in a manner consistent with research by Weingast and Moran (1982, 1983).[3]

The main point of this chapter is simple. The theoretical conceptualization of legislative dominance models might not accurately capture the extent to which a legislative committee is capable of influencing the behavior of a bureaucratic agency, independent of any potential feedback relationships (see Krause 1996, 1999). The basis for this claim is twofold. First, a prerequisite for legislative control is the *capacity* of the oversight committee to accomplish this task in an effective manner. Legislative capacity for political control over an agency is distinct from the concept of control itself in that the former is a necessary precondition for the exercise of the latter. Thus, if a legislative committee fails to possess strong capacity for shaping bureaucratic behavior to begin with, then it cannot be expected to attain this goal successfully. Conversely, strong capacity for legislative control over policy administration should make it easier for the committee to adeptly shape agency behavior, ceteris paribus.

Second, existing scholarship on the subject of legislative influence over policy administration has only considered the effect of political signals emanating from the committee in the form of the mean or median policy preference. These signals, however, are part of a larger committee policy preference distribution that remains unexplored in existing research on legislative control of the bureaucracy. It is appropriate to infer that the degree by which committee policy preferences are diffuse within such a distribution will vary. Congressional scholars acknowledge that legislative committees differ based on the extent to which they reflect a unified view on policy matters under their jurisdiction. Richard Fenno's (1973) classic treatise on congressional decision making reveals varying degrees by which members disagree on policy matters across committees in the U.S. House of Representatives. For instance, Fenno finds that policy disagreement regarding committee reports among all House Education and Labor committee members is slightly more

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[2] Because this study focuses on oversight monitoring behavior by legislative committees, this study pertains to *ex post* (retrospective) mechanisms of political control as opposed to *ex ante* (prospective) methods. The seminal treatise on the latter topic is by McCubbins, Noll, and Weingast (1987, 1989).

[3] This issue is separate from Moe's (1987) claim that top-down political influence over the bureaucracy is a multi-institutional phenomenon that does not solely rest with the legislative branch.

than double than it is among all House Foreign Affairs committee members for the 1955–66 period. Moreover, this policy disagreement gap is approximately five times (in percentage terms) larger within each partisan group for the Education and Labor committee vis-à-vis the Foreign Affairs committee (Fenno 1973, 83–4). Because the diffuseness of policy preferences within a given legislative committee is not identical across various committees and at all points in time, it is imperative to consider the uncertainty (or *noise*) corresponding to political signals that has been ignored in existing scholarship on democratic control over the bureaucracy.

This conceptual omission is addressed by advancing the proposition that the distribution of committee policy preferences must be considered when investigating the capacity of legislative control over the bureaucracy within the context of a "top-down" principal-agent model of political influence. The means by which noise variations can result in the distortion and clarification of policy signals emanating from a legislative committee, the substance of such signals, and its subsequent theoretical impact on the capacity for legislative control of the bureaucracy are investigated in this chapter. In addition, the marginal effects of signal and noise changes on legislative oversight capacity attributable to the shifting distribution of policy preferences for a hypothetical legislative committee are examined. The overarching aim of this chapter is consistent with the general theme of this edited volume – that students of American politics need to take uncertainty seriously in analyzing political phenomena. Next, the logical basis underlying the signal to noise approach used to understand legislative capacity for controlling the bureaucracy is discussed.

THE DISTRIBUTION OF LEGISLATIVE COMMITTEE POLICY PREFERENCES IN BUREAUCRATIC POLITICS

The focus of spatial models of legislative-agency relations are centered on the ideal point of the median legislator serving on an oversight committee. This is often translated in a statistical sense to refer to the median (or perhaps, mean) roll-call ideology of a legislative oversight committee. This ideal point is referred to as a political or policy signal, as it is a summary measure of the ideological policy composition of a legislative committee. The median voter theorem that serves as the basis for standard spatial theoretical models, such as the work of Weingast and Moran, predicts that responsiveness would mirror the policy preferences of the median legislator and that any noise corresponding to this signal is of no practical consequence in determining policy outcomes (Black 1958; Downs 1957). Such analyses ignore the importance attached to the uncertainty or diffuseness of committee policy preferences.

An alternative view of policy influence based on signaling under uncertainty suggests that this omission is critical because existing theoretical models of legislative-bureaucratic relations typically provide us with only a partial

portrait of the *distribution* of policy preferences within a legislative oversight committee. Analyzing this phenomenon must involve both its signal (central tendency) and its noise (dispersion).

The main proposition contained in this chapter is straightforward. The degree of uncertainty corresponding to a policy signal is critical for understanding the capacity for political control over an administrative agency by a legislative oversight committee. Capacity for effective legislative control by a committee is a necessary precondition for it being successful in shaping agency behavior. This is distinct from addressing whether or not a legislative committee is influencing or controlling bureaucratic behavior. In general, capacity within the context of political control over the bureaucracy research refers to the capability of a legislative committee to influence agency behavior if it so desires. Thus, a legislative committee can possess considerable oversight capabilities in shaping policy but might find less need to utilize them (e.g., agriculture policy). Conversely, a committee may wish to exert notable oversight power yet has limited means to do so without taking monumental action that is often impractical (e.g., monetary policy).[4] Therefore, an agency may accrue greater discretion in one of two ways – either it has been explicitly granted such authority by political overseers, or it has been provided *de facto* authority where legislators purposefully act in a passive manner. The topic of capacity for legislative control is a critical substantive issue because a legislative committee that exhibits weak capacity in controlling agency behavior will be more apt to have a difficult time in actually shaping administrative behavior.

Two means exist by which diffuse committee policy preferences reduce legislative capacity for political control. One channel is that the legislative committee sends out noisy signals to an agency that dilute the force of its message. On an informational level, an agency will experience greater (less) difficulty in trying to ascertain what legislators prefer when committee preferences reflect policy disagreement (consensus), all else being equal. When policy disagreement abounds on a legislative committee, an agency will be unsure as to how to respond and thus they will move in a modest piecewise fashion, if at all. The other channel by which diffuse committee preferences decreased capacity for legislative control over the bureaucracy occurs through the strategic behavior of the agency with the intended purpose of obtaining greater autonomy (Bryner 1987; Dahl and Lindblom 1953; Hammond and Knott 1996; Wilson 1989). Under these circumstances, the agency will play committee members off against one another in order to acquire greater discretion in policy making and implementation. Either way, an agency will be

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[4] Other factors may also affect capacity for legislative control (e.g., agency design, policy type). With this said, it is assumed that all else being equal, committee signals that are more proximate to the agency's location and/or less noisy will enhance its ability to shape administrative behavior.

less (more) subject to political control by a legislative committee when the uncertainty surrounding the latter's policy preferences is high (low), ceteris paribus. Therefore, determining the capacity of legislative committees to control bureaucratic behavior is essential for understanding the likelihood that it does occur.

The distribution of a legislative committee's policy preferences can be thought of as consisting of a *signal* (central tendency) and *noise* (dispersion). The signal represents the stimulus intended to elicit a response, while noise represents the distortion of the signal as it is transmitted. The signal and noise concepts are steeped in a deep intellectual tradition that covers the study of diverse subjects ranging from the acoustics of audio devices in electrical engineering to product quality in operations research to the quality of communication between individuals in communications studies. In the present study, these concepts are applied to understanding a legislative committee's capacity for controlling bureaucratic behavior.

A useful metaphor relating to understanding the importance of the signal and noise components in the distribution of legislative committee policy preferences comes from the seminal research on product quality in operations research developed by Genichi Taguchi (e.g., see Albright and Roth 1992; Taguchi, Chowdhury, and Taguchi 1999; Taguchi and Clausing, 1990; Taguchi and Konishi 1986). Taguchi's thesis is simple. If product quality is represented by the degree of customer dissatisfaction with a product based on its performance, then a quadratic loss function can characterize this dissatisfaction irrespective of whether the mean value equals the variance. Larger deviations from an intended target result in greater customer dissatisfaction with the product. Relatedly, Tunner (1990) sets forth an approximation of ... mean loss that is given by:

$$\mu_{\text{Loss}} = k[\sigma^2 + (\bar{x} - x_{\text{Optimal}})^2] \tag{1}$$

where k is a scaling parameter (for simplicity purposes it can be set equal to unity), σ^2 is the amount of variance in customer dissatisfaction, $\bar{x}$ is the mean value of customer dissatisfaction, and x_{Optimal} is the target value where the customer is most satisfied. Mean loss from the distribution of customer responses rises when (1) the variance of product quality increases, or (2) the mean product quality deviates from its target of maximum consumer satisfaction or product quality. In the limiting case when average product quality is identical to the target value and all products are at this location in the distribution, then $\mu_{\text{Loss}} = 0$ by definition. Thus, the average loss in product quality is based on its mean quality relative to its target value of consumer satisfaction being maximized, as well as the amount of variance in product quality that is measured by customer satisfaction.

The logic underlying the Taguchi loss function is directly relevant for purposes of better understanding legislative committee oversight influence over

the bureaucracy. The capacity for effective legislative control is enhanced when the mean or median committee policy preference is closer to the behavior of the targeted group (i.e., an administrative agency), and also committee policy preferences exhibit less variance or volatility. Thus, variations in the signal and noise component underlying the distribution of policy preferences can alter the capability of legislative control over the bureaucracy. This is because administrative agencies are neither capable nor willing to respond to noisy signals, and to expect that they do overstates the capacity legislative committees possess in molding agency behavior. Omitting the dispersion present in the distribution of a legislative committee's policy preferences can provide a misleading view of the true capability legislative efforts at controlling the bureaucracy. The subsequent sections provide both a conceptual and theoretical treatment of this issue and its relevance for democratic accountability.

SIGNALS, NOISE, AND LEGISLATIVE CAPACITY FOR CONTROLLING ADMINISTRATIVE BEHAVIOR

Existing research on congressional control over the bureaucracy fails to consider the uncertainty surrounding a legislative committee's policy preferences, but instead focuses solely on policy signals. This view might overstate the efficacy of political control of administrative agencies. This is because greater committee "noise" – that is, more diffuse distribution of committee policy preferences – can hinder its capacity for shaping bureaucratic behavior, because an agency's ability to gauge the true policy signals of the committee becomes more difficult. Although lower noise or uncertainty surrounding committee policy preferences will bring about an absolute gain in the capacity for legislative control over the bureaucracy (ceteris paribus) across policy areas, it will have a differential comparative impact depending on the nature of legislative committees relative to the chamber floor. If one wishes to define democratic responsiveness in terms of clientelism, then homogeneously composed committees consisting of preference outliers will comparatively benefit more in terms of enhanced capacity for legislative control of the bureaucracy than heterogeneous committees that are more indicative of floor preferences. Conversely, the capacity for legislative control of administrative behavior will be comparatively greater for heterogeneous committees relative to homogeneous ones if a broader perspective of democratic responsiveness is held.[5] The next two subsections analyze the concept of "signal" and "noise" and "signal-to-noise ratio" in the context of the capacity of legislative control over an administrative agency.

[5] For different accounts of the heterogeneous versus homogenous legislative committee debate, please see Krehbiel 1990; Shepsle and Weingast 1987; and Hall and Grofman 1990.

TABLE 3.1 *Hypothetical Values of Legislative Committee Policy Signals and Noise*

(Symmetric Conservative and Liberal Policy Signals with Symmetrically Altered Noise Levels)							
Signal (μ)	−40	−40	−40	−40	40	40	40	40
Noise (σ)	0.25	0.50	2.00	10.00	10.00	2.00	0.50	0.25
$\dfrac{\text{Signal}}{\text{Noise}} \left(\dfrac{\mu}{\sigma}\right)$	−160	−80	−20	−4	4	20	80	160
	Clear Conservative Signal		Muted Conservative Signal		Muted Liberal Signal		Clear Liberal Signal	

Viewing Political Influence in Terms of "Signal" and "Noise" Processes

Both signals and noise play a vital role in determining the capacity of a given actor to influence others. As discussed earlier, existing research implicitly treats political signals to bureaucratic agencies as being crystal clear, and hence, are generally viewed as being potent. This might not be a problem for analyzing a unitary actor such as the president, because their policy preferences will be of a singular nature, and thus, investigation of the signal is sufficient.[6] But when examining a political body that consists of members who each have their own individual policy preferences (e.g., a legislative committee), the degree of variance in policy preferences among these individuals is an important measure of uncertainty that affects the effectiveness of this body's transmission of policy preferences in a way that can be acted on by the targeted group (e.g., an administrative agency). Thus, the degree of diffuseness or spread displayed in the legislative committee's policy preference distribution will directly affect its capacity for effective oversight monitoring of administrative agencies.

An illustration will help clarify this thesis. Let us assume that the policy preferences of a legislative committee bounded between −50 (most conservative) and +50 (most liberal). Table 3.1 presents a series of hypothetical values of legislative committee signals and noise, and its resulting ratio. These numbers are symmetrical for ease of exposition. In the first four columns, the political signal is −40 ($\mu_{Committee} = -40$) suggesting that the committee's mean policy preference is rather conservative. However, as the standard deviation surrounding the mean becomes larger, we notice that it dilutes the clarity of that signal. Therefore, a −160 signal to noise ratio ($\mu_{Committee} \times \sigma_{Committee} = -40 \div 0.25 = -160$) will make for a clearer conservative policy signal, and hence, enhance legislative control compared to a −4 signal to noise ratio

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[6] Alternatively, one might posit that policy signals emanating from a unitary actor such as the president may exhibit noise (i.e., a diffuse distribution of policy preferences) if conflicting or varying policy signals are emitted by administration officials.

TABLE 3.2 *The Consequences of the Signal to Noise Ratio for Understanding Legislative Committee Capacity to Induce Agency Responsiveness*

Nature of Signal to Noise Ratio	Substance of Signal	Legislative Committee Capacity for Political Control
$\dfrac{\text{Liberal Signal}}{\text{Low Noise}}$	Clear Liberal Policy Signal	Strong (Liberal Response)
$\dfrac{\text{Liberal Signal}}{\text{High Noise}}$	Muted Liberal Policy Signal	Weak (Liberal Response)
$\dfrac{\text{Moderate Signal}}{\text{Low Noise}}$	Clear Moderate Policy Signal	Strong (Centrist Response)
$\dfrac{\text{Moderate Signal}}{\text{High Noise}}$	Muted Moderate Policy Signal	Weak (Centrist Response)
$\dfrac{\text{Conservative Signal}}{\text{Low Noise}}$	Clear Conservative Policy Signal	Strong (Conservative Response)
$\dfrac{\text{Conservative Signal}}{\text{High Noise}}$	Muted Conservative Policy Signal	Weak (Conservative Response)

$(-40 \div 10 = -4)$. This point is true even though the committee's mean or median policy preference is identical $(\mu_{\text{Committee}} = 40)$. Likewise, the last four columns of Table 3.1 also have the same identical political signal of 40 reflecting a liberal legislative committee. The clarity of the signal, however, varies substantially, depending on the degree of volatility surrounding the committee median. The signal's clarity is proportionally reduced as this noise increases.

The basic logic of this illustration supports the main point of this chapter. The extent to which elected officials are capable of shaping administrative behavior is not only conditional on the policy signals or stimuli that they emit but also the degree of clarity by which these signals are transmitted to bureaucratic agencies. If bureaucratic agencies receive mixed signals from a legislative committee that impedes its ability or willingness to adapt to these political preferences, then greater heterogeneity of a legislative committee's policy preferences will necessarily weaken its capacity for effective political control, ceteris paribus.

To illustrate this point within the context of examining the ideological direction of signals emitted from legislative committees to bureaucratic institutions, a categorical typology appears in Table 3.2. This typology assesses each of the following: (1) the policy substantive or ideological nature of the signal to noise ratio, (2) the policy substance underlying the signal itself when considering uncertainty, and (3) legislative committee capacity for political control. The clarity of a given (fixed) signal is a function of

its noise. When noise is relatively high (low), policy signals become muted (clear). In turn, the nature of agency responsiveness is predicated not only on the (ideological) direction of the signal but also its clarity. When policy signals are clear in a given ideological direction, legislative committees become more capable of influencing agency behavior in its desired direction. Conversely, muted policy signals will lessen the capability for effective legislative control of the bureaucracy, and thus decrease the likelihood of agency responsiveness.

This basic categorical illustration is a simplification of reality. Nonetheless, this typology implies that in order for legislative committee signals to be conveyed and acted on by administrative agencies, the amount of dispersion in the committee's policy preferences must be relatively low, all else being equal. Otherwise, the agency will either be confused by the political signals that it receives from the legislative committee and/or might play committee members off one another with the intention of obtaining greater agency autonomy (Bryner 1987; Dahl and Lindblom 1953; Hammond and Knott 1996; Wilson 1989).

Next, the effects of changes in committee policy preference distributions on legislative capacity for influencing agency behavior are analyzed. This stylized deductive spatial analysis under conditions of uncertainty will provide generalizeable insights concerning the effect of altering a legislative committee's distribution of policy preferences on its capacity for influencing agency behavior.

LEGISLATIVE COMMITTEE POLICY SIGNALS AND NOISE: A SPATIAL ANALYSIS

Background

The key novel proposition advanced in this chapter is that the distribution of policy preferences on a legislative committee are vital for understanding its capacity to influence bureaucratic behavior. This means that both signals (i.e., location) and noise (i.e., uncertainty) must be jointly considered in such an analysis. In the context of this theoretical story, *signal* refers to the mean or median legislative committee policy preference and *noise* represents the uncertainty associated with the signal captured by the standard deviation of legislative committee policy preferences.

Assume that a legislative oversight committee consists of n individuals and their policy preferences follow a normal probability distribution with a mean equal to μ and a standard deviation equal to σ.[7] Furthermore,

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[7] The normal distribution is employed as it is a common continuous probability distribution that is consistent with my focus on the continuous treatment of uncertainty. The normal distribution also has the additional advantage of having the mean value equal the median

this preference distribution is based on the unidimensional policy scale assumption commonly employed in existing spatial models of legislative dominance (e.g., Morris and Munger 1998; Weingast and Moran 1983; Woolley 1993). Let μ represent the committee's policy signal, while σ characterizes the noise corresponding to this signal. Furthermore, let us assume that the noise is randomly distributed, and thus the effect of noise is not inclined to bias legislative committee policy signals in a systematic manner.[8] The capacity for effective legislative control over administrative behavior is a function of (1) the distance between the proximity of its signal (i.e., the mean committee member's ideal point) relative to the agency's location, and (2) the amount of uncertainty corresponding to this signal (i.e., standard deviation).

The joint proximity and noise theses are premised on both legislative and agency behavior. Because of the collective action problems systemic to the operation of legislatures, coordinated action within a committee will be made easier if it is closer to the agency's ideal point and also exhibits greater cohesion regarding policy preferences. Thus, the capacity for legislative control over the bureaucracy becomes enhanced when the distance between the committee policy signal and agency location is reduced, and also when the noise surrounding this signal decreases. Administrative behavior also will be consistent with the general thesis concerning signals and noise coming from legislative committees. It has been established that administrative organizations have a difficult time adjusting their behavior to external forces (e.g., Crozier 1964; Cyert and March 1963; Downs 1967; March and Simon 1958; Simon 1997; Stinchcombe 1990). As a result, one might expect that the capacity for legislative control being inversely related to the amount of change necessitated by the agency is consistent with the inertial and adaptive aspects of bureaucratic organizations. This proximity assertion is reasonable because an agency that is closer to the committee's ideal point will require less effort by the latter to control bureaucratic behavior.[9] As noted from the outset of this chapter, the

value, thus not making such distinctions substantively meaningful for the purposes of this analysis.

[8] This simplifying assumption makes the problem and subsequent analysis more tractable. It is reasonable in a rational actor sense in that one would not expect such systematic biases of policy signals to occur if policy-maker reputation matters. Moreover, this assumption is consistent with risk-neutrality insofar that the nature of uncertainty will not bias the responsiveness attributable to the legislative committee policy signal. The relaxation of this assumption and its consequences for legislative capacity for controlling agency behavior is left for future inquiry on this topic.

[9] This argument is especially valid if one assumes that an agency does not behave in a recreant manner. Otherwise, these agencies are subject to heavy oversight monitoring activity by legislative committee(s). There is little evidence to suggest that such behavior is commonplace, because agencies generally operate within a mutually agreed-on zone of acceptable behavior in relation to political superiors consistent with the broad parameters of the agency's policy

argument proposed here is predicated not on whether a legislative committee is willing to exert influence over agencies, but instead its capacity for such influence. Furthermore, closer proximity between the committee's signal and the agency also will allow for lower transaction costs in altering the former's behavior, because it requires relatively modest adjustments to be made by the organization rather than wholesale changes in its operations and task environment. In sum, the greater the spatial distance the signal must cover, the less potent it will be in obtaining desired results, ceteris paribus.

More formally, the capacity for legislative control ($LC_{Capacity}$) is:

$$LC_{Capacity} = \alpha(|A - \mu|) + \beta\sigma \qquad \text{where} \quad \alpha, \beta < 0 \qquad (2)$$

where δ represents a positive fixed level of legisaltive capacity, A equals the agency's location, μ is aggregate policy signal emitted by the legislative committee, σ is the noise (dispersion) corresponding to the policy signal, and α, β are corresponding parameters. Put simply, (2) shows that the extent to which a congressional committee is capable of controlling a bureaucratic agency is inversely related to the absolute difference between the committee's signal (μ) vis-à-vis the agency's location (A) and the former's corresponding standard deviation (σ).[10] Thus, in the limiting case, the maximum amount of capacity for political control by a legislative committee with respect to an administrative agency is given by:

$$LC_{Maximum\ Capacity} = |A - \mu| = 0, \quad \sigma = 0. \qquad (3)$$

This means that the committee's maximum political control capability occurs when its mean or median policy preference is the same as the agency's location *and* all committee policy preferences are identical so that no uncertainty is present. Obviously, this condition is a limiting case that is not observed in empirical practice. What can be done, however, is to analyze the comparative-static consequences involving changes in the distribution of a legislative committee's policy preferences under different scenarios. Thus, the impact of a change in the distribution of committee policy preferences, in terms of its signal and corresponding noise, on net changes in legislative

mandate (Barnard 1938; Krause 1999; Simon 1997). In the relatively rare instances when agency behavior is viewed as explicitly recalcitrant to democratic preferences, it is typically met with swift and stern punishment handed out by legislative overseers (e.g., removal of agency head within a given presidential administration; drastic budgetary changes; passage of new enacting legislation).

[10] If noise is incorporated into an empirical model, then the magnitude of the Ordinary Least Squares (OLS) coefficients – including the effects of legislative committee policy signals – might well be underestimated (especially if the signals are very noisy). If this is a statistical problem, then it necessitates employing an instrumental variable estimation strategy to arrive at unbiased estimates of these effects. I thank John Mark Hansen for bringing this point to my attention.

control capacity can be analyzed. The agency's location is treated as being fixed for simplification purposes. The remainder of this section discusses four distinct scenarios by which the capacity for legislative control over agency behavior can be altered because of changes in the distribution of committee policy preferences. Because a normal distribution is symmetric, all the subsequent comparative-static results presented here hold if the committee distributions and agency location were reversed along the unidimensional policy scale on the X-axis.

Case I: Identical Means, Different Variances – Signal Proximity is Fixed, Noise Augmentation ($|A - \mu_1| = |A - \mu_2|$; $\sigma_2 > \sigma_1$)

What happens to the legislative capacity for shaping agency behavior when the committee's policy signal remains unchanged, but the distribution of policy preferences become more diffuse? The first illustration deals with this particular case. In Figure 3.1, the noise corresponding to the signal rises while the signal itself remains unchanged when the committee's policy preference distribution shifts from C_1 to C_2, where $C_1 \sim (\mu_1, \sigma_1)$ and $C_2 \sim (\mu_2, \sigma_2)$. The Y-axis lists the probability density function (pdf) of legislative committee policy preferences and the X-axis captures the unidimensional ideological policy space. The uncertainty surrounding legislative committee policy preferences will rise in this instance, however, the signal will become neither more or less proximate to the agency. Therefore, the agency should experience greater difficulty in shaping agency behavior, all else being equal. Given a normal pdf, the net loss in capacity with respect to legislative control attributable to an increase in noise from σ_1 to σ_2 is given by the following definite integral consistent with Figure 3.1:

$$\text{Net Loss}_{\frac{\partial LC_{\text{Capacity}}}{\partial \sigma}} = \int_{\sigma_1[f_1(x_1)]}^{\tau[f_1(x_3)]} \frac{1}{\sigma_1\sqrt{2\pi}} \exp\left[\frac{(x - \mu_1)^2}{2\sigma_1^2}\right] dx$$

$$+ \int_{\tau[f_2(x_3)]}^{\sigma_2[f_2(x_2)]} \frac{1}{\sigma_2\sqrt{2\pi}} \exp\left[\frac{(x - \mu_2)^2}{2\sigma_2^2}\right] dx$$

$$\text{where } \frac{\partial LC_{\text{Capacity}}}{\partial \sigma} < 0. \qquad (4)$$

The marginal loss in the capacity for political control, as a result of an increase in noise from σ_1 to σ_2 attributable to the committee policy preference signal, is graphically portrayed as the adjacent gray-shaded regions contained in Figure 3.1. Because $\mu_1 = \mu_2$ in this case, there is neither a net gain or loss in capacity regarding legislative control over an agency attributable to the committee policy preference signal by definition. In this case, the marginal change in the signal to noise ratio will decline in value from C_1 to C_2 by the area given by (4).
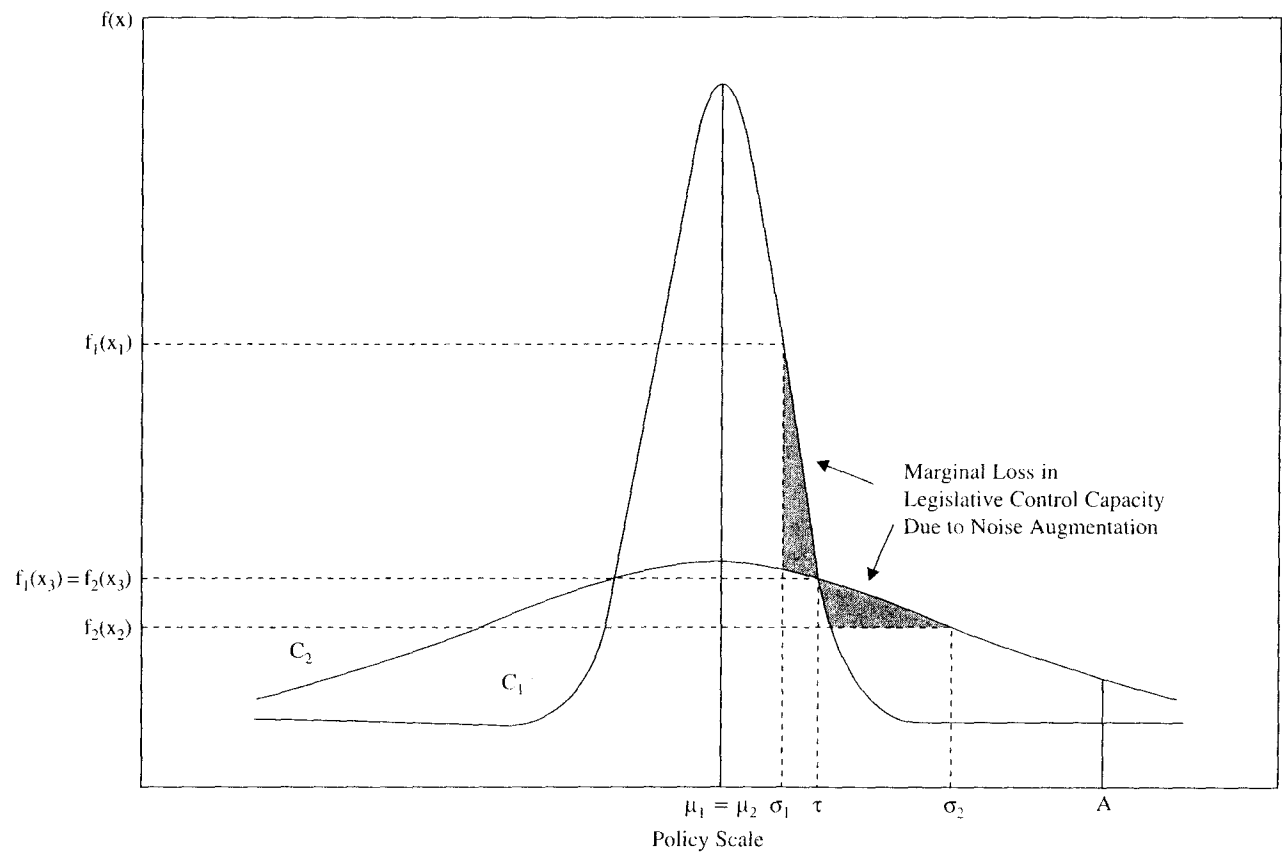
FIGURE 3.1. Fixed Signal Proximity and Noise Augmentation $(A - \mu_1 = A - \mu_2; \sigma_2 > \sigma_1)$

Case II: Different Means, Identical Variances – Greater Signal Proximity, Noise is Fixed ($|A - \mu_1| > |A - \mu_2|$; $\sigma_1 = \sigma_2$)

What are the consequences regarding legislative capacity for control over an agency when its distribution of policy preferences shifts so that uncertainty remains the same but the signal becomes more proximate to the agency's location as one moves from C_1 to C_2? The ability of the legislative committee to influence agency behavior will be enhanced, because its signal becomes more proximate as a result of this distributional shift. Assuming a normal pdf, the net gain in legislative control capacity because of an increase in the proximity of the committee preference policy signal relative to the agency's ideal point from C_1 to C_2:$|A - \mu_1| > |A - \mu_2|$ is given by the following definite integral consistent with Figure 3.2:

$$\text{Net Gain}_{\frac{\partial LC_{\text{Capacity}}}{\partial |A - \mu|}} = \left\{ \int_{\mu_1[f_1(x_2)]}^{\sigma_1[f_1(x_1)]} \frac{1}{\sigma_1 \sqrt{2\pi}} \exp\left[\frac{(x - \mu_1)^2}{2\sigma_1^2} \right] dx \right\}$$

$$+ \left\{ \int_{\sigma_1[f_2(x_1)]}^{\mu_2[f_2(x_2)]} \frac{1}{\sigma_2 \sqrt{2\pi}} \exp\left[\frac{(x - \mu_2)^2}{2\sigma_2^2} \right] dx \right\}$$

$$\text{where } \frac{\partial LC_{\text{Capacity}}}{\partial |A - \mu|} < 0. \tag{5}$$

The net gain in capacity for legislative control from the more proximate signal is simply the first brace, which represents the cross-hatched area in distribution C_1, plus the second brace comprising of the similarly marked region from distribution C_2 in Figure 3.2. Therefore, summing these areas provides us with a net gain in legislative capacity to shape administrative behavior as a result of an increase in the proximity of the committee's policy preference signal from μ_1 to μ_2, holding agency location (A) constant. The area of this net gain is portrayed by the dual cross-hatched regions displayed in Figure 3.2. Because $\sigma_1 = \sigma_2$ in this case, there is no change in legislative control capacity due to the committee policy preference noise by definition. In this case, the marginal change in the signal-to-noise ratio will rise in total value from C_1 to C_2 by the area given by (5).

Case III: Different Means, Different Variances – Greater Signal Proximity, Noise Reduction ($|A - \mu_1| > |A - \mu_2|$; $\sigma_2 < \sigma_1$)

The legislative committee's ability to shape administrative behavior will be enhanced as its policy signals become both more proximate to the agency and less noisy consistent with its distribution of policy preferences shifting from C_1 to C_2. Assuming a normal pdf, the net gain involving legislative control capacity attributable to a more proximate change in the signal
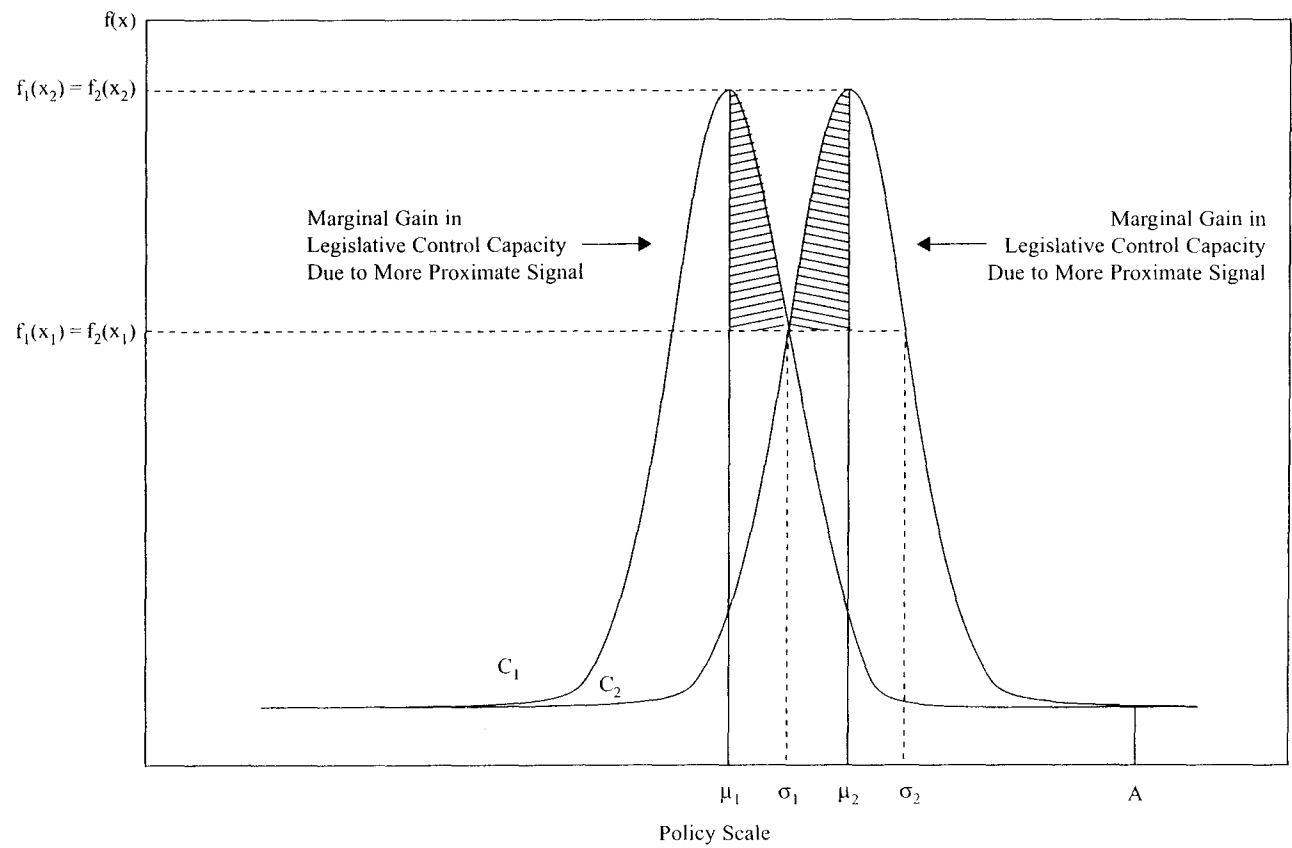
FIGURE 3.2. Greater Signal Proximity and Fixed Level of Noise ($A - \mu_1 > A - \mu_2$; $\sigma_1 = \sigma_2$)

from μ_1 to μ_2 is given by the following definite integral consistent with Figure 3.3:

$$\text{Net Gain}_{\frac{\partial LC_{\text{Capacity}}}{\partial |A-\mu|}} = \int_{\delta[f_2(x_2)]}^{\mu_2[f_2(x_3)]} \frac{1}{\sigma_2\sqrt{2\pi}} \exp\left[\frac{(x-\mu_2)^2}{2\sigma_2^2}\right] dx$$

$$\text{where } \frac{\partial LC_{\text{Capacity}}}{\partial |A-\mu|} < 0. \tag{6}$$

The net gain in legislative control capacity from the more proximate signal is simply the definite integral expression that encompasses the cross-hatched area in distribution C_2. This area represents the net gain in capacity for legislative control as a result of an increase in the proximity of the committee's policy preference signal from μ_1 to μ_2, holding agency location (A) constant.

A similar corresponding net gain also arises from noise reduction in the distribution of legislative committee policy preferences from σ_1 to σ_2 based on movement from distributions C_1 to C_2 reflected in the gray-shaded regions in Figure 3.3. The definite integral consistent with this area is:

$$\text{Net Gain}_{\frac{\partial LC_{\text{Capacity}}}{\partial \sigma}} = \int_{\delta[f_2(x_1)]}^{\sigma_2[f_2(x_2)]} \frac{1}{\sigma_2\sqrt{2\pi}} \exp\left[\frac{(x-\mu_2)^2}{2\sigma_2^2}\right] dx$$

$$+ \int_{\sigma_1[f_2(x_1)]}^{\delta[f_2(x_2)]} \frac{1}{\sigma_2\sqrt{2\pi}} \exp\left[\frac{(x-\mu_2)^2}{2\sigma_2^2}\right] dx$$

$$\text{where } \frac{\partial LC_{\text{Capacity}}}{\partial \sigma} < 0. \tag{7}$$

The marginal gain in the capacity for political control, as a result of legislative committee noise reduction from σ_1 to σ_2, is attributable to decreased uncertainty surrounding the legislative committee's policy preference signal. The total effect of a marginal change in the signal-to-noise ratio on a rise in legislative capacity for controlling administrative behavior is due to both noise reduction and a more proximate signal that is given by the sum of the areas consisting of (6) and (7).

Case IV: Different Means, Different Variances – Greater Signal Proximity, Noise Augmentation ($|A - \mu_1| > |A - \mu_2|$; $\sigma_2 > \sigma_1$)

Assuming a normal probability distribution, the net gain in for legislative control over an agency because of a (more proximate) change in the signal

f(x)

$f_2(x_3)$

Marginal Gain in
Legislative Control Capacity ⟶
Due to More Proximate Signal

$f_2(x_2)$

Marginal Gain in
⟵ Legislative Control Capacity
Due to Noise Reduction

$f_2(x_4)$

$f_1(x_1) = f_2(x_1)$

C_1 C_2

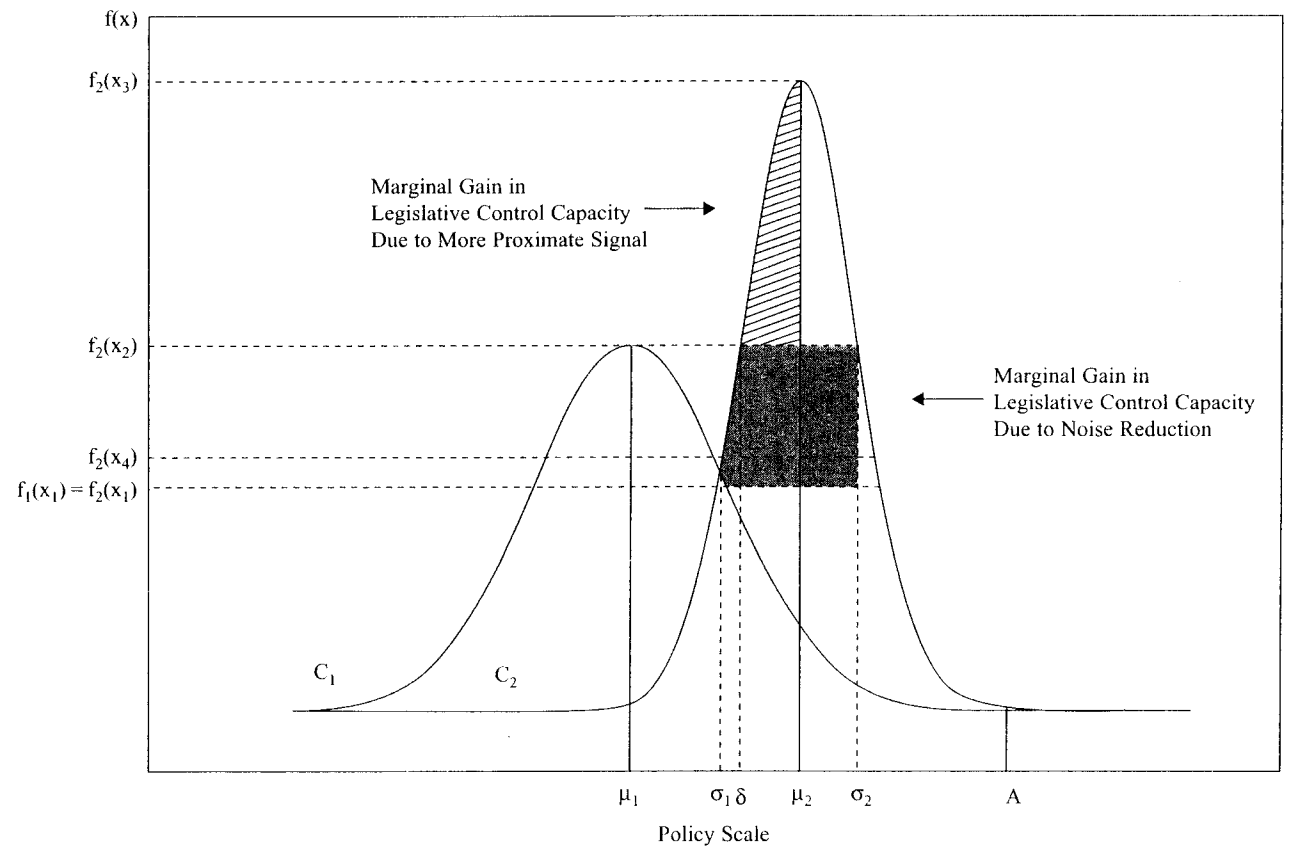μ_1 $\sigma_1 \delta$ μ_2 σ_2 A

Policy Scale

FIGURE 3.3. Greater Signal Proximity and Noise Reduction ($A - \mu_1 > A - \mu_2$; $\sigma_2 < \sigma_1$)

from μ_1 to μ_2 is given by the following definite integral consistent with Figure 3.4:

$$\text{Net Gain}_{\frac{\partial LC_{\text{Capacity}}}{\partial |A - \mu|}} = \int_{\mu_1[f_1(x_2)]}^{\delta_1[f_1(x_3)]} \frac{1}{\sigma_1\sqrt{2\pi}} \exp\left[\frac{(x - \mu_1)^2}{2\sigma_1^2}\right] dx$$

$$\text{where } \frac{\partial LC_{\text{Capacity}}}{\partial |A - \mu|} < 0. \tag{8}$$

The net gain from in enhanced legislative control capacity from a more proximate signal is represented by (8), and is graphically portrayed by the gray-shaded region in distribution C_1 in Figure 3.4. This area simply represents the rise in legislative control capacity as a result of an increase in the proximity of the committee's policy preference signal from μ_1 to μ_2, holding the agency's ideal point, A, constant.

The corresponding net loss in capacity due to an increase in legislative committee noise from σ_1 to σ_2 based on movement from distribution C_1 to C_2 is given by the definite integral consistent with this area portrayed in Figure 3.4:

$$\text{Net Loss}_{\frac{\partial LC_{\text{Capacity}}}{\partial \sigma}} = \int_{\delta_2[f_2(x_1)]}^{\sigma_2[f_2(x_2)]} \frac{1}{\sigma_2\sqrt{2\pi}} \exp\left[\frac{(x - \mu_2)^2}{2\sigma_2^2}\right] dx$$

$$+ \int_{\phi[f_2(x_2)]}^{\delta_2[f_2(x_1)]} \frac{1}{\sigma_2\sqrt{2\pi}} \exp\left[\frac{(x - \mu_2)^2}{2\sigma_2^2}\right] dx$$

$$+ \int_{\sigma_1[f_1(x_1)]}^{\tau[f_1(x_2)]} \frac{1}{\sigma_1\sqrt{2\pi}} \exp\left[\frac{(x - \mu_1)^2}{2\sigma_1^2}\right] dx$$

$$\text{where } \frac{\partial LC_{\text{Capacity}}}{\partial \sigma} < 0. \tag{9}$$

This net loss in legislative control capacity resulting from more diffuse committee policy preferences from σ_1 to σ_2 reflects increased uncertainty surrounding its policy signal. This area is graphically portrayed in Figure 3.4 as the cross-hatched region. In this case, the capacity for legislative influence over an agency rises when the distribution moves from C_1 to C_2 as long as the net gain from having a more proximate signal given by the total cross-hatched area (8) is *greater* than the noise increase reflected in the total shaded area denoted by (9). Conversely, the effect of a marginal change in the signal-to-noise ratio from C_1 to C_2 will result in a decline in legislative capacity in shaping administrative behavior, because the net gain from having a more proximate signal given by the cross-hatched area given by (8) is *less* than the rise in noise reflected in the shaded area denoted by (9). If the net gain from having a more proximate signal given by the area (8) is *equal* to the noise increase captured in the area denoted by (9), then the marginal impact of a
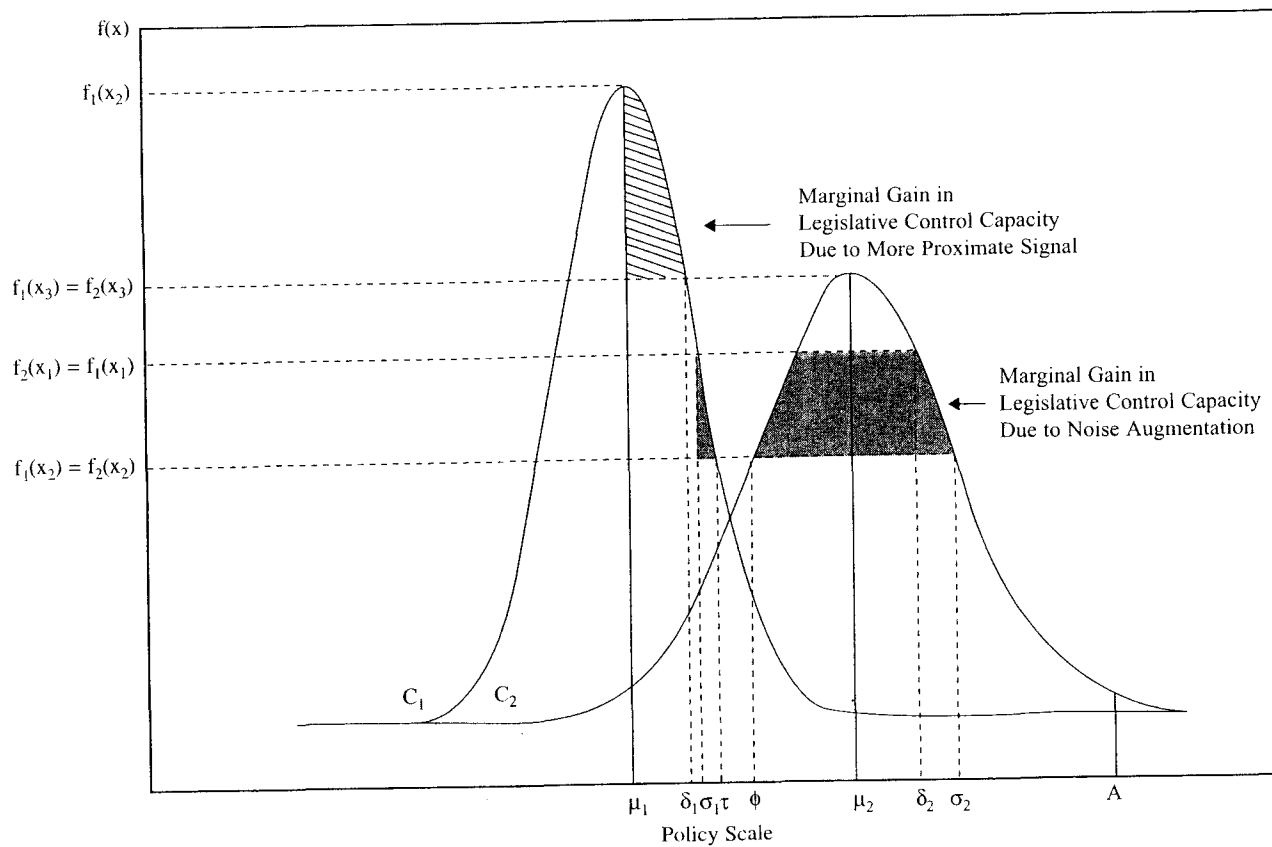
f(x)

f₁(x₂)

Marginal Gain in
Legislative Control Capacity
Due to More Proximate Signal

$f_1(x_3) = f_2(x_3)$

$f_2(x_1) = f_1(x_1)$

Marginal Gain in
Legislative Control Capacity
Due to Noise Augmentation

$f_1(x_2) = f_2(x_2)$

C_1 C_2

μ_1 $\delta_1\sigma_1\tau$ ϕ μ_2 δ_2 σ_2 A

Policy Scale

FIGURE 3.4. Greater Signal Proximity and Noise Augmentation $(A - \mu_1 > A - \mu_2; \sigma_2 > \sigma_1)$

change in the signal-to-noise ratio on legislative capacity for influence agency behavior will become zero as the committee's policy preference distribution shifts from C_1 to C_2.

Summary

Changes in the distribution of policy preferences on a legislative committee can have direct consequences for its capability to influence agency behavior. This does not only refer to the central tendency of this distribution (i.e., signal) as is commonly analyzed but also the amount of dispersion contained in the legislative committee. The four illustrations show the comparative-static conditions by which political control for a legislative oversight committee becomes either easier or more difficult. All else being equal, a reduction in noise from a legislative committee's policy signal results in a decline in their capability of shaping agency behavior consistent with its own preferences. This is because not only is it cognitively easier for an agency to process such information and adjust accordingly but also more difficult to shirk by playing members off of one another. A closer (distant) policy signal, based on the legislative committee's mean or median, enhances (diminishes) its adeptness at obtaining desired agency behavior, ceteris paribus. This is due to less effort being expended by both legislators and agencies to behave in tandem when their respective policy preferences more closely mirror one another, all else being equal. Simply, policy signals that are more proximate to the agency and contain less noise or uncertainty are more likely to be effective in seeking to obtain agency responsiveness to legislative preferences. Because the proximity of committee policy signals relative to the agency and level of noise each exert a countervailing impact on the efficacy of legislative control, both the first (μ) and second moments (σ) of a legislative committee's distribution of policy preferences must be considered when analyzing its capacity for successful monitoring of administrative behavior.

IMPLICATIONS

Scholars studying problems of principal agency involving political-bureaucratic relationships have subsumed that legislative committees send unfettered policy signals to administrative agencies. Whether or not bureaucratic agencies are responsive to a legislative committee is based on this fundamental assumption. Much of the theoretical analysis and statistical evidence over the past two decades indicates that oversight committees are effective at monitoring agency behavior. The insights gleaned from this perspective provide limited information on this topic because it fails to consider variations in the clarity of the policy signal being emitted from the legislative oversight committee. This chapter has made an initial attempt to investigate the consequences of varying policy signals and noise on legislative-bureaucratic relationships consistent with the common "top-down" principal-agent paradigm.

The goal of this chapter is a simple one – not all policy signals coming out of legislative committees are alike and, hence, should not be viewed as such. This is true with respect to the signal itself as well as its subsequent impact on the group for which it is intended. This is because the noise surrounding such policy signals reflects the degree of uncertainty contained therein. Based on the present investigation, one should expect legislative control of the bureaucracy to be the most vibrant when the legislative committee's policy signal is both close relative to the agency's location and also contains little noise or uncertainty, all else being equal. Those instances in which the committee signal is distant from the agency and contains considerable noise should translate into a weakened capacity for garnering bureaucratic responsiveness, ceteris paribus. In all likelihood the omission of noise or uncertainty as a meaningful component of explaining agency-political relationships likely overstates the capacity of elected officials to mold administrative behavior toward its own preferences.

The topic of signaling influence under uncertainty has important ramifications for understanding issues of responsiveness in a representative democracy. Thus, the political responsiveness of administrative agencies to legislatures might vary depending on the nature of the signal and noise associated with the distribution of committee policy preferences. Specifically, democratic accountability of administrative agencies by legislative committees is conditioned to the extent by which the latter has cohesive policy preferences that enable it to engage in effective collective action, and is also sufficiently proximate for agencies to adapt accordingly. In situations in which high policy disagreement is present among legislators and it is also distant from the agency's ideal point to begin with, bureaucratic organizations will be able to exercise greater autonomy from oversight monitoring activity. As a result, policy behavior is least subject to this form of democratic control in policy environments that tend to be conflictual and isolated from the agency's view of its policy mandate. For instance, this might mean that an agency engaged in distributive policy (e.g., agriculture policy) is more naturally ripe for legislative control compared to if they implemented a redistributive policy (e.g., tax policy). This is because committee preferences in the former case tend to be more homogenous and closely correspond to those of the implementing agency in question (e.g., House Agriculture Committee and U.S. Department of Agriculture), while they are more heterogeneous and out of sync with the agency (e.g., House Tax Committee and Internal Revenue Service) in the latter case.

The purpose of this chapter has been to show that the degree to which a legislative committee can shape administrative behavior is a function of its capacity for such control efforts reflected by the distribution of its policy preferences. Students of institutional politics focusing on issues of legislative control over the bureaucracy must consider seriously the precise nature of policy signals emitted by legislative committees and its subsequent impact on agency behavior.

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