Bureaucrats, Judges, and Policy Quality

Peter Bils Lawrence S. Rothenberg

December 18, 2017

Abstract

In many policymaking environments experts' choices are subject to oversight by superiors. One notable example is bureaucratic policymaking, which is subject to judicial scrutiny. As such, bureaucrats must strategically anticipate the motivations of judges when making policy, and judges must incorporate the incentives of bureaucrats when reviewing what the bureaucrat proposes. To better understand this agency-court interplay, we formulate a game-theoretic model of policymaking. In our model, a bureaucrat both acquires information and selects policy, while a judge has the authority to overturn the bureaucrat's policy choice. Analysis of our model produces myriad insights, some nonintuitive, into what we should observe. For example, we find that in many instances bureaucrats with moderate policy preferences are most likely to expend effort acquiring information; that reducing an agency's information acquisition costs should reduce shirking and improve information transmission; that moderate costs of judicial review motivate biased bureaucrats to expend effort; that the bureaucrat's behavior is strongly conditioned on whether the judge has aligned preferences; and that delegating greater authority to a judge can incentivize the bureaucrat to acquire more information.

In many environments experts make important policy decisions and their superiors can exercise oversight to help steer the choices in a direction that they prefer. For instance, while bureaucratic agencies enjoy considerable leeway in implementing their delegated discretion, their choices are subject to oversight from other political institutions. Of such oversight, judicial review represents a particularly important constraint, especially in the United States where gridlock has been the norm for multiple decades, undercutting the ability to redefine policy and discretion statutorily. As such, agency decision-makers possess incentives to factor their expectations regarding how courts will react into their choices of bureaucratic rules and proposals. The potential importance of agency actors developing and integrating expectations about how the courts will respond implies that the motivations of both bureaucrats and judges, and how they interact with other institutional features, are likely key for understanding what we observe and for making recommendations to improve expert incentives.

With this in mind, we provide a better understanding relative to past analyses of the oversight process generally and of this interaction specifically by developing a formal model of institutional decision-making where bureaucrats and judges interact over a policy choice. In our base model, the bureaucrat decides how much effort to expend to privately learn about the effects of a potential policy change on society. Specifically, the policy change may be of high or low quality compared to the status quo and higher effort by the bureaucrat generates a signal with more accurate information about the state of the world. She then decides whether to propose the policy change or to retain the status quo, with any proposed change subject to judicial review. As part of this review process, the judge may receive information from sources other than the bureaucrat, after which he either upholds the policy or overturns the change in favor of the status quo staying place.[1]

While the bureaucrat's policy preferences in our model depend on the state of the world,

[1]In extensions to the base model we analyze the effect of making the bureaucrat's signal public information and relax the assumption that the bureaucrat can select the status quo and exclude the judge from the decision process.

she is biased toward implementing policy change. This policy motivation stems from the political nature of agency work and that, while the ability of bureaucrats to improve their financial compensation is frequently limited (net of departing for the private sector via the so-called revolving door), many perform tasks with policy consequences about which they have strong opinions.[2] However, the bureaucrat weights this policy preference against her incentive to minimize effort. Indeed, compared to private market workers, for a bureaucrat this balancing between preferred policy choice and effort is especially important because most agency employees are insulated by civil service protection and, therefore, may have considerable room for both effort shirking and championing policy preferences (e.g., Johnson and Libecap (1994)). Consistent with previous models of judicial-bureaucratic interactions, (e.g., Gailmard and Patty (2013), Turner (2015)), we assume that the bureaucrat is averse to having her chosen policy overturned in the courts and incurs a cost if this occurs.

The judge in our model also has preferences over policy outcomes that can depend on the state but, in contrast to the bureaucrat, may be biased in favor of either the policy change or the status quo. This setup is flexible enough to accommodate the judge being motivated by personal policy preferences, jurisprudence considerations, or both.

Under the former view, judges make decisions based on their preexisting ideological beliefs — with legal guidelines serving as a constraint rather than as a motivation.[3] Indeed, judges are often modeled as having ideal points (e.g., Shipan (2000), Rogers (2001), and Dragu and Board (2015)). Furthermore, this assumption is consistent with past empirical research showing that judges have ideological preferences[4] and sometimes are influenced by ideology in voting on agency policies (e.g., Revesz (1997), Eskridge and Baer (2007), Miles

[2]Bureaucrats are often modeled as having policy motivations, with a growing empirical literature situating bureaucrats and agencies on a common ideological scale, e.g., Meier and Nigro (1976), Crewson (1997), Clinton et al. (2012), Bonica et al. (2012), Bertelli et al. (2015), and Chen and Johnson (2015).

[3]Judges' ideological preferences may be interpreted in different ways and arise from a number of sources. One interpretation stipulates that a judge (and an agency) has a preferred level of regulation (e.g., Stephenson (2006, 2007), while another postulates that judges weigh the welfare of interests differently (e.g., Garvie and Lipman (2000)). Finally, in the so-called case space approach (for a review, see Lax (2011)), judges are assumed to differ on the cut-point that separates legal from illegal actions. This formulation conceptualizes differences in ideology as actually differences in standards for cases.

[4]For examples, see: Martin and Quinn (2002), Sunstein et al. (2004), Epstein et al. (2007), Bailey (2016).

and Sunstein (2008).)

Alternatively, under the jurisprudence framework getting the law right is an end in itself. To capture this motivation judges have been modeled as caring about getting policy correct in terms of picking policies that are objectively right or that maximize social policy (e.g., Cameron and Kornhauser (2005), Gailmard and Patty (2013)).[5] We allow for this motivation, which can be conceptualized as a reduced form that captures a lower court judge's desire to be sustained rather than overturned by a higher court (e.g., Hübert (2015)), by assuming that the judge's payoffs can depend on the quality of the policy change.

Analyzing our model allows us to study normatively and positively the hierarchical process in which bureaucrats and judges operate. Normatively, we assess whether having bureaucrats and/or judges with strong policy preferences upon which they act is desirable in the sense of leading to the implementation of high quality policies.[6] Positively, we draw implications from the interaction of bureaucratic and judicial preferences and generate predictions about how ideological bias (both its left-right direction and its extent) affects bureaucratic effort and policy choices.

In equilibrium, we find that judicial behavior is conditioned by the bureaucrat's effort, how much information can be gleaned from the bureaucrat's policy choice, and the judge's access to outside information. In turn, the bureaucrat considers a variety of factors both in deciding how much effort to exert and what policy to propose, and has behavior that can be broadly characterized by three types. In the first type she expends positive effort learning the state and submits a policy based on the information gathered, i.e., she is willing to separate based on the signal received. In the second she is ideologically intransigent, accumulating no new information, and always proposes the policy change. In the final type she places the

[5] In general, making decisions consistent with legal guidelines may not always overlap with upholding high quality policy choices. However, this assumption provides a useful benchmark for understanding the role of the judiciary when it comes to overseeing bureaucratic policies. Indeed, according to the hard look doctrine courts are supposed to review agency actions for arbitrariness — including ensuring that decisions do not run contrary to available evidence.

[6] However, our principle results assume a judge whose preferences are somewhat responsive to the quality of the policy.

cost of being overturned by the judge above all else, opting to do nothing by generating no information and retaining the status quo.

Overall, our results are nuanced and, in some circumstances, quite surprising. Two findings, in particular, stand out.

First, while arguing that bureaucrats with policy preferences work harder is commonplace,[7] a result which partially holds in our model as well, we find conditions under which bureaucrats with strong policy motives can be more likely to shirk and that moderate bureaucrats are more likely to exert effort. Key are the interactions between the bureaucrat and the judge, particularly conditioned by whether the judge is favorably or unfavorably inclined towards the policy change, and that at the policy choice stage the bureaucrat only makes informed policy choices when her information is sufficiently precise. Regarding the latter, and consistent with the conventional wisdom, for the bureaucrat with weak policy motivations to propose the policy change requires that the signal be highly precise because, otherwise, her potential costs from judicial review make it too costly. Consequently, the low motivation bureaucrat will forgo expending effort in the first place in favor of keeping the status quo. Similarly, a bureaucrat with a strong policy bias must receive a highly precise signal to separate based on information. In this instance, the bureaucrat must be very certain that the policy change will be overturned to find it incentive compatible to keep the status quo.

As for how this result is conditioned by the judge's favorability or opposition, if the judge is favorably inclined towards the policy change, bureaucratic "zealots" with overly strong policy preferences are likely to shirk. The highly motivated bureaucrat just pushes for the policy change, as the judge will uphold the proposal absent new information, making the high level of effort needed for her to separate not worth expending. Given that the bureaucrat with low bias has little motivation to ever propose a policy change and risk being

[7] For example, Besley and Ghatak (2005) shows that matching workers in a like-minded organization can increase worker output; Prendergast (2007, 2008) demonstrates that effort increases when a bureaucrat or worker is biased toward one task relative to another; and Gailmard and Patty (2007) shows that policy preferences can increase effort.

overturned and the bureaucrat with high bias is likely to always propose a change, with a favorable judge a bureaucrat with a moderate level of bias will work harder than either her high or low bias counterparts. Conversely, if the judge is biased against the policy change then the bureaucrat greatly improves the chances of this choice being upheld if she separates in her policy choice. This makes a bureaucrat with strong policy motivations more willing to expend effort, potentially at a greater level than her moderate counterpart. Even under an opposed judge, however, if the policy change is low quality then the bureaucrat must not be too biased towards the change, or else she always proposes it while expending no effort.

Second, we show that, with one notable exception, it is difficult to make clear predictions about when altering institutional factors or the non-ideological motivations of the bureaucrat produces higher bureaucratic effort and more informed policy choices. For instance, the effects of changing the costs of being overturned or the effectiveness of other sources of information depends on the strength of the bureaucrat's policy motivations. Also, in situations where such interventions increase the level of effort that the bureaucrat expends, assuming effort is non-zero, the probability that she puts forth effort in the first place may diminish. Only decreasing the costs to the bureaucrat of information acquisition unambiguously improves incentives for the bureaucrat to expend effort and make informed policy choices. Furthermore, if the bureaucrat prefers the policy change regardless of the policy's quality then the bureaucrat is least likely to shirk when the costs of being overturned are moderate.

Additionally, extensions to our base model produce several other insights. For one thing, we show that making the bureaucrat's signal public, so that the judge can observe it, may produce instances where the bureaucrat exerts effort and separates when she would not if the signal was private. Also, building on analyses of the role of authority in principal-agent relationships (e.g., Aghion and Tirole (1997), Dessein (2002)), when we allow the judge's policymaking authority to include the option of overturning the bureaucrat even if she opts for the status quo, we demonstrate that there are conditions which can induce positive outcomes in contrast to the base model. Specifically, a more powerful judge incentivizes bureaucrats with low policy motivations to expend effort acquiring information rather than shirk.

Before turning to our model and its implications, several comments regarding the contributions of our analysis are in order. One is that, while previous models have also studied judicial review of the bureaucracy, our results depend on distinguishing features of our model which should be appropriate in many contexts. Most related to our analysis are Stephenson (2007) and Gailmard and Patty (2013), as they also incorporate information acquisition by the bureaucrat. However, in Stephenson (2007) the judge commits ex ante to influencing the bureaucrat's costs for adopting a policy change; as such, the signal stemming from the bureaucrat's policy choice, crucial to our model, is unimportant. As for Gailmard and Patty (2013), while the agency and court in their latter model have no policy preferences, our analysis follows much of the empirical literature that considers such preferences as quite important. Furthermore, while the judge can verify the bureaucrat's information in Gailmard and Patty (2013), in ours he cannot. While it is certainly possible that a judge may be able to verify information in some instances, there are many circumstances where a lack of judicial expertise and resources should make such verification imperfect or impossible.

Finally, while we focus on bureaucratic-judicial interactions, we should underscore that our model and its extensions can be applied to a number of other political interactions: bureaucrat-supervisor relationships, lower court decisions subject to review by a higher court, policy proposals by a congressional committee to the floor, or interest group lobbying of a policymaker. As such, our paper relates to the broader literature, too large to summarize here, on principal-agent relationships in which the agent's information is endogenously acquired.

In particular, our analysis can be contrasted with that of Argenziano et al. (2016), which considers information acquisition by an agent who either sends a cheap talk message to a principal or chooses policy freely. As do we, they show that ascribing more authority to the principal can be beneficial. The bureaucrat's policy choice in our model, however, is not quite cheap talk, as she can incur costs from being overturned. Further, a significant point of departure between our model and that in Argenziano et al. (2016) is that we adopt a sparser policy space but focus on the intensity of the bureaucrat's policy payoffs and not just on the alignment of policy preferences between the principal and agent. Thus, in contrast to Argenziano et al. (2016), our set-up allows the bureaucrat's preferences to be insensitive to the state of the world, and any responsiveness must be through endogenous influence via the judge which, given our assumption of a status quo option with a known payoff in our base model, is largely a function of his veto authority.

The Model

There are two strategic actors, a bureaucrat (B) and a judge (J). Additionally, there is a status quo policy q, and an alternative policy a which represents a policy change from the status quo. There is also an unknown state of the world which affects the players' payoffs for the policy change. Denote this state as $\omega \in \{H, L\}$. If $\omega = H$, we say a is high quality. On the other hand, if $\omega = L$ we say that the policy change is low quality. We assume that players have a common prior and believe with probability $m \in (0,1)$ that policy a is high quality and with probability $1 - m$ that it is low quality.

The game begins with B choosing to exert *observable* effort, $e \in [0,1]$, to learn about the effects of the policies on society. This generates a *private* signal for the bureaucrat $s_B \in \{H, L\}$. Thus, the judge is able to observe some measure of the bureaucrat's output but does not have the expertise, time, or means to actually learn the information. Let $p(e)$ be the probability that the signal matches the state of the world, i.e., for $y \in \{H, L\}$ we have $p(e) = Pr(s_B = y|\omega = y)$. We assume that this function has the form $p(e) = \frac{1+e}{2}$. Therefore, the signal is perfectly informative when $e = 1$ and it is uninformative if B exerts no effort.[8]

[8] A similar information acquisition technology is used in Prendergast (2003, 2007). More general formulations of this technology outside the bureaucracy literature can be found in Zermeno (2011) and Chade and Kovrijnykh (2016). The benefit of this setup is that it allows the bureaucrat to acquire more precise information without assuming that she either perfectly observes the state of the world or learns nothing.

After observing the signal, B chooses a policy $x \in \{a, q\}$.

If $x = q$ the game ends and the status quo is retained. If $x = a$, however, the game proceeds to the judicial review stage. First, the judge receives outside information. This can represent any information provided by outside groups (such as through legal briefs or amicus filings) or research done by the judge's office. The judge learns the true state of the world with probability $\sigma \in (0, 1)$ and gains no useful information with probability $1 - \sigma$.

Finally, the judge reviews the bureaucrat's proposed policy change. He may either uphold or overturn the policy. Let $\rho = 0$ if the policy is upheld and $\rho = 1$ if it is overturned. Furthermore, let $z \in \{a, q\}$ denote the final policy outcome. If the policy is upheld then the final outcome is the policy change, $z = a$. If the policy is overturned then the final outcome reverts to the status quo policy, $z = q$.

If the final policy outcome is $z = a$ and the state of the world is $\omega \in \{H, L\}$ then player $i \in \{J, B\}$ receives a payoff of θ_i^ω; if the outcome is the status quo, $z = q$, then each player receives a payoff of 0, regardless of the state. We summarize each actor's policy utility by

$$u_i(z|\omega) = \begin{cases} 0 \text{ if } z = q, \\ \theta_i^H \text{ if } z = a \text{ and } \omega = H, \\ \theta_i^L \text{ if } z = a \text{ and } \omega = L. \end{cases}$$

We can now give the bureaucrat's utility for the final outcome as

$$u_B(z|\omega) - \rho k - \gamma c(e).$$

We assume that $\theta_B^H \geq |\theta_B^L|$. Thus, the bureaucrat always prefers the policy change when it is high quality. Furthermore, the bureaucrat is biased toward enacting a policy change in that her highest policy payoff occurs when $z = a$ and the policy is high quality. Outside of this restriction, however, the bureaucrat's payoffs can vary with the state. This formulation captures a number of interesting special cases, as we find instances where a bureaucrat:

prefers the policy regardless of the state, $\theta_B^L > 0$; has policy preferences matching society, $\theta_B^H = -\theta_B^L > 0$; or places some weight on quality but has a constant bias toward policy change, $\theta_B^H = \beta + \alpha$ and $\theta_B^L = \beta - \alpha$. Throughout, we refer to θ_B^H as the *bureaucrat's bias*, as it is always positive, and reference θ_B^L explicitly as needed.

The function $c(e)$ represents the costs of investigation, and we assume $c' > 0$, $c'' > 0$, and $\lim_{e \to 1} c'(e) = \infty$. Additionally, let $\gamma > 0$, where γ is a measure of how much the bureaucrat weights her effort costs. The parameter k represents the costs to the bureaucrat of having her policy choice overturned by the judge.

The judge's utility from the final policy outcome is simply $u_J(z|\omega)$. Analogous to the bureaucrat's utility, this accommodates a range of motivations for the judge. These include a policy quality maximizing judge, a judge with state insensitive policy preferences, and a judge who cares about the state but is biased toward the status quo or the policy change. We focus on the most interesting case, where the judge is sensitive to the quality of the policy but may be biased towards one of the policies, and assume $\theta_J^H > 0 > \theta_J^L$.[9]

To recap, the timing of the game is as follows:

1. B exerts effort e, and generates a signal $s_B \in \{H, L\}$,
2. B chooses a policy $x \in \{a, q\}$,
3. If $x = q$ the game ends and players get their status quo payoff. Otherwise, if $x = a$ the game continues to the next step,
4. With probability σ, J learns ω and, with probability $1 - \sigma$, J does not observe the state, and
5. J chooses to overturn policy a or not.

Players update (whenever possible) according to Bayes' rule. Thus, if $s_B = H$ then the

[9] In the appendix we analyze the case where the judge prefers the same policy regardless of the policy's quality.

bureaucrat's updated belief that policy a is high quality is

$$\mu_B^H(e) = \frac{p(e)m}{\pi(e)},$$

where $\pi(e) = p(e)m + (1 - p(e))(1 - m)$ is the probability of observing the high quality signal given effort e. On the other hand, if $s_B = L$ then the bureaucrat's updated belief that policy a is high quality is

$$\mu_B^L(e) = \frac{(1 - p(e))m}{1 - \pi(e)}.$$

In general, let μ_B be the bureaucrat's updated belief that $\omega = H$ after the signal is realized.

As the bureaucrat attains private information about the state of the world, we employ perfect Bayesian equilibria (hence equilibrium) as a solution concept.

Judicial Review

Our first proposition characterizes the judge's behavior. We let μ_J be the judge's updated belief that $\omega = H$ after the policymaking subgame.

Proposition 1. *When $x = a$ the judge upholds the policy if $\mu_J \geq \frac{-\theta_J^L}{\theta_J^H - \theta_J^L}$ and overturns it otherwise.*

Analysis of the judge's decision is straightforward. As the status quo results in a payoff of 0 he allows policy a if: $\mu_J \theta_J^H - (1 - \mu_J)\theta_J^L \geq 0$. It is given that the judge's preferred policy depends on the state of the world $\frac{-\theta_J^L}{\theta_J^H - \theta_J^L} \in (0, 1)$. This implies the following result, which defines an important cut-point in effort based on the judge's preferences.

Corollary 1. *There exists $\overline{e}_J \in (0, 1)$ such that if $e \geq \overline{e}_J$ then the judge upholds $x = a$ if $s_B = H$ and overturns $x = a$ if $s_B = L$.*

As the judge's payoff is sensitive to the state of the world, if he is sufficiently certain that the policy change is of high quality then he upholds the policy. If the judge is ex ante biased in favor of the policy change then he is willing to uphold the policy even if he believes it is unlikely that it is high quality. Similarly, if the judge's preferences are biased against the policy change then he requires significantly stronger evidence to sustain the policy. As the judge's payoff becomes less sensitive to the state, perhaps because he weights his personal ideology more compared to quality, his evidence standards for allowing each policy diverge more. When $\theta_J^H = -\theta_J^L > 0$ the judge is purely motivated by policy quality. Of course, if through outside information the judge learns the state of the world then all types of judges act identically by making the decision maximizing policy quality.

An important factor is whether the judge allows a policy to pass when the bureaucrat exerts no effort, so that the judge retains his prior. Using our first result, if $\mu_J = m$ then the judge allows policy a to pass if $m\theta_J^H + (1-m)\theta_J^L > 0$ and overturns it otherwise. We say that the judge is *favorable* if the judge allows the policy when uninformed and say the judge is *opposed* if he rejects it when uninformed.

The judge's acceptance decision is also affected by m — the prior belief that the alternative policy is high quality. If m increases, the amount of evidence needed to be produced by the bureaucrat for the judge to approve policy a decreases. If $m = 1/2$ then the judge has no ex ante informational bias and his decision depends solely on his ideological bias.

On the path of play the judge's belief about the signal received by the bureaucrat is found using Bayes' rule. Thus, if the bureaucrat separates then the judge's belief about the quality of the alternative policy is $\mu_J(e) = \mu_B(e)$ and if the bureaucrat pools then $\mu_J(e) = m$. We place no off the path of play restriction on the judge's belief about the signal observed by the bureaucrat. Of course, his belief about the actual quality of the policy has an upper bound based on believing that the bureaucrat observed $s_B = H$ with probability 1 and a lower bound associated with believing that $s_B = L$ was observed with probability 1. Thus, off the path of play $\mu_J \in [\mu_B^L, \mu_B^H]$.

Policy Choice

We begin our analysis of the bureaucrat's behavior by studying the policymaking subgame. As the judge does not observe the bureaucrat's signal, the bureaucrat's decision whether or not to push for a policy change can provide the judge with information. In turn, the bureaucrat's choice is complicated by the judge's decision being endogenous to the policy choice. We look for when a separating equilibrium exists, so that the decision to opt for a policy change or retain the status quo is informative. A separating equilibrium refers to one in which the bureaucrat chooses $x = a$ when $s_B = H$ and $x = q$ when $s_B = L$. When a separating equilibrium does not exist we study an equilibrium in which the bureaucrat chooses the same policy regardless of her signal. We split our analysis of the bureaucrat's behavior depending on whether the judge is favorable or opposed.

Proposition 2. *Assume the judge is favorable. There exist cut-points θ'_B and θ^*_B characterizing the bureaucrat's policy choice as follows:*

1. *For $\theta^L_B < \theta'_B$ there exists $\hat{e}_B < 1$ such that if $e \geq \hat{e}_B$ then a separating equilibrium exists.*
2. *When a separating equilibrium does not exist, the bureaucrat pools on $x = a$ if $\theta^H_B > \theta^*_B$ and pools on $x = q$ if $\theta^H_B \leq \theta^*_B$.*
3. *If $\theta^H_B \leq \theta^*_B$ then $\hat{e}_B$ is decreasing in θ^H_B; if $\theta^H_B > \theta^*_B$ then $\hat{e}_B$ is increasing in θ^H_B.*

Under a favorable judge, if the bureaucrat has a very strong bias for the policy change in the low state she does not separate for any precision level. In this case, even if the bureaucrat knows for certain that $\omega = L$ she pools on $x = a$ and hopes that the judge observes no outside information and upholds the change.

The bureaucrat's effort affects the precision of her signal. From proposition 2 we find that increasing the precision of the bureaucrat's signal incentivizes the bureaucrat to choose policy according to her signal. Greater precision discourages a bureaucrat with strong bias from proposing $x = a$ when $s_B = L$, as she is more certain that it will be overturned should

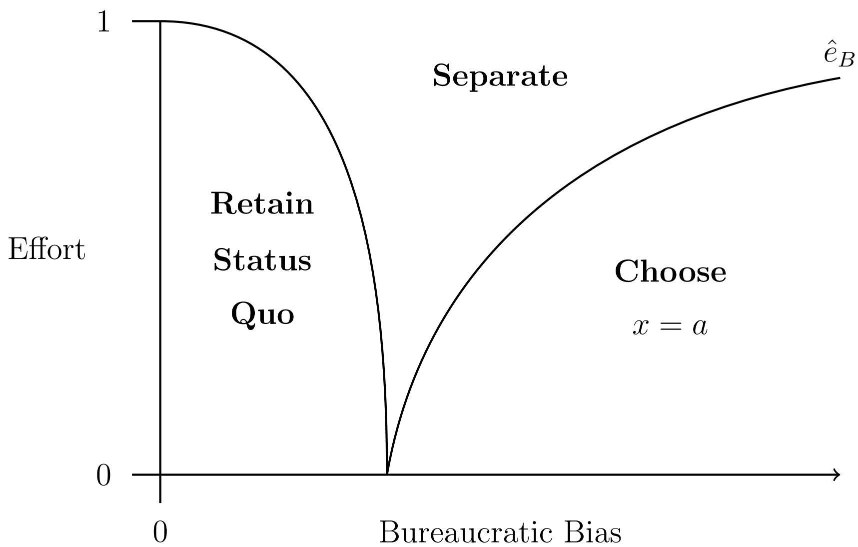


Figure 1: A summary of the bureaucrat's policy choice based on her bias, θ_B^H, and effort, e, assuming $\theta_B^L < \theta_B'$ with a favorable judge.

the judge learn the state. Alternatively, a bureaucrat with a weak bias is encouraged to propose the policy change when $s_B = H$, as she thinks that it is less likely to be overturned.

Figure 1 depicts the bureaucrat's policy choice under a favorable judge. There is a non-monotonic effect of changing θ_B^H on whether or not the bureaucrat separates. For low levels of policy bias the bureaucrat is likely to keep the status quo. Although she is more willing to communicate her information, she places little value on the policy change and, thus, must be fairly certain that proposing $x = a$ will not cause her to be overturned. Increasing her bias in this case makes her more willing to push for the policy change, lowering the level of effort needed to make her separate. When the bureaucrat has a strong bias she is particularly incentivized to choose $x = a$ and hope that it ends up getting upheld, even if the probability is low. Furthermore, it is difficult for her to separate due to her incentive to try and manipulate the judge's belief. This leads her to pool on $x = a$. In this case, increasing her bias strengthens these incentives and so the signal must be more precise to get the bureaucrat to retain the status quo.

Our next proposition analyzes the bureaucrat's policy choices when the judge is opposed.

Proposition 3. *Assume the judge is opposed. There exist cut-points $\theta_B^{**}, \theta_B^-, \theta_B^+, \tilde{\theta}_B^-$, and $\tilde{\theta}_B^+$*

which characterize the bureaucrat's policy choice as follows:

1. *Assume* $e \geq \overline{e}_J$

   (a) *For* $\theta_B^L < \theta_B'$ *there exists* $\overline{e}_B \in [\overline{e}_J, 1)$ *such that if* $e \geq \overline{e}_B$ *then a separating equilibrium exists.*

   (b) *When a separating equilibrium does not exist the bureaucrat pools on* $x = a$ *if* $\theta_B^H > \theta_B^+$ *and pools on* $x = q$ *if* $\theta_B^H < \theta_B^-$.

   (c) *If* $\theta_B^H < \theta_B^-$ *then* $\overline{e}_B$ *is decreasing in* θ_B^H. *If* $\theta_B^H \in [\theta_B^-, \theta_B^+]$ *then* $\overline{e}_B$ *is unchanging in* θ_B^H *and* $\overline{e}_B = \overline{e}_J$. *If* $\theta_B^H > \theta_B^+$ *then* $\overline{e}_B$ *is increasing in* θ_B^H.

2. *Assume* $e < \overline{e}_J$

   (a) *For* $\theta_B \in [\tilde{\theta}_B^-, \tilde{\theta}_B^+]$ *there exists* $\underline{e}_B < \overline{e}_J$ *such that if* $e \in [\underline{e}_B, \overline{e}_J)$ *then a separating equilibrium exists.*

   (b) *When a separating equilibrium does not exist, the bureaucrat pools on* $x = a$ *if* $\theta_B^H > \theta_B^{**}$ *and pools on* $x = q$ *if* $\theta_B^H \leq \theta_B^{**}$.

   (c) *If* $\theta_B \leq \theta_B^{**}$ *then* $\underline{e}_B$ *is decreasing in* θ_B^H*; if* $\theta_B > \theta_B^{**}$ *then* $\underline{e}_B$ *is increasing in* θ_B^H.

The bureaucrat's incentives to separate under an opposed judge are, for much of the parameter space, similar to her incentives under a favorable judge. For example, if effort, or the signal's precision, is sufficiently high the bureaucrat separates. However, as Figure 2 depicts, there are clear differences in the bureaucrat's choice when the judge is opposed rather than favorable which depend crucially on the strength of the judge's bias.

In particular, when $e < \overline{e}_J$ the judge rejects $x = a$ absent outside information, whereas he upholds it for $e \geq \overline{e}_J$. This creates an interval of the bureaucrat's bias for which her strategy in non-monotonic in effort. This occurs because for a moderately low level of effort the judge rejects $x = a$, incentivizing the bureaucrat to choose $x = q$ when her signal is low, but if the signal is precise enough the bureaucrat chooses $x = a$ when the signal is high and hope that the judge observes favorable outside information. However, if the effort becomes too high, i.e., $e \geq \overline{e}_J$, then the bureaucrat can no longer credibly separate as the judge would uphold

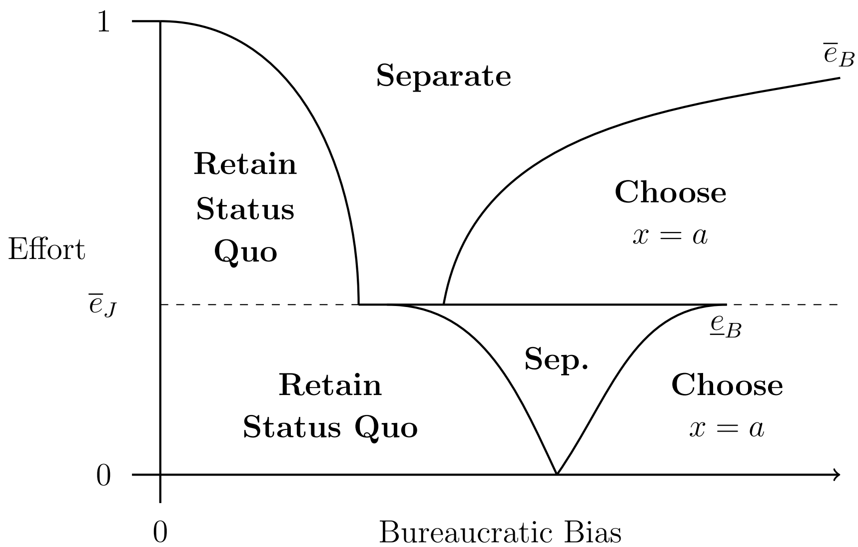


Figure 2: A summary of the bureaucrat's policy choice based on her bias and effort, assuming $\theta_B^L < \theta_B'$ with an opposed judge.

$x = a$ if she deviates. An additional change from the favorable judge is the existence of the flat region where changes in bias make no difference. Thus, when the judge is opposed the strength of his preference matters, unlike under a favorable judge where just the direction is important.

Information Acquisition

We now study how much effort the bureaucrat expends acquiring information in the first place and the impact of her bias on this effort choice. As the previous section makes clear, the effort choice strongly influences whether or not the bureaucrat selects policy based on her signal. Our first proposition examines her effort choice when the judge is favorable.

Proposition 4. *Under a favorable judge the bureaucrat's effort choice is characterized as follows:*

1. *If $\theta_B^L > \theta_B'$ then the bureaucrat always expends 0 effort.*
2. *If $\theta_B^L \leq \theta_B'$ then for all θ_B^H there exists $\hat{\gamma} \in (0, \infty)$ such that if $\gamma \leq \hat{\gamma}$ then the bureaucrat expends effort $\hat{e}^* \geq \hat{e}_B$. Otherwise, the bureaucrat expends no effort.*

3. *For $\theta_B^H < \theta_B^*$ we have that $\hat{\gamma}$ is increasing in θ_B^H. If $\theta_B^H > \theta_B^*$ then $\hat{\gamma}$ is decreasing in θ_B^L instead.*

Intuitively, if the bureaucrat places sufficiently low weight on her effort costs then she is willing to expend high enough effort that a separating equilibrium exists at the policy choice stage. Note that the bureaucrat either spends effort above the cut-point $\hat{e}_B$ or no effort at all. There is no reason to expend any effort below $\hat{e}_B$ as neither signal influences her policy. Further, when the bureaucrat pools this effort does not influence the judge's decision either.

Combining this insight with our previous result on the bureaucrat's policy choice, it is clear that if θ_B^L is sufficiently large she never expends effort. This is true even if effort is "free", i.e., if $\gamma \to 0$, as a separating equilibrium does not exist at the policy choice stage even for $e = 1$.

Outside of this extreme case, bureaucrats with either weak or strong policy motivations are still likely to pool on one policy and exert no effort. That is, $\hat{\gamma}$, while positive, is low for these bureaucrats. Of course, a bureaucrat with low policy motivation proposes a different policy than her high motivation counterpart.

A bureaucrat with a low bias does not care what gets passed and therefore is strongly incentivized to retain the status quo as a means of avoiding judicial review and minimizing effort costs. Thus, for her to be willing to propose $x = a$ she must expend a high level of effort. In turn, she must place a low weight on costs. Alternatively, a highly biased bureaucrat must be fairly certain that proposing $x = a$ will lead to her being overturned should the judge learn the true state. Again this implies that effort costs must be low for her to expend enough effort to separate.

The decision of a bureaucrat with low policy motivation is primarily driven by her consideration of effort's cost. Thus, increasing her bias makes her more willing to expend effort to try and pass the policy change. On the other hand, the decision of a bureaucrat with strong policy motivation is impacted most by her actual ability to signal information through her policy choice. Here, increasing the bureaucrat's bias makes signaling information harder,

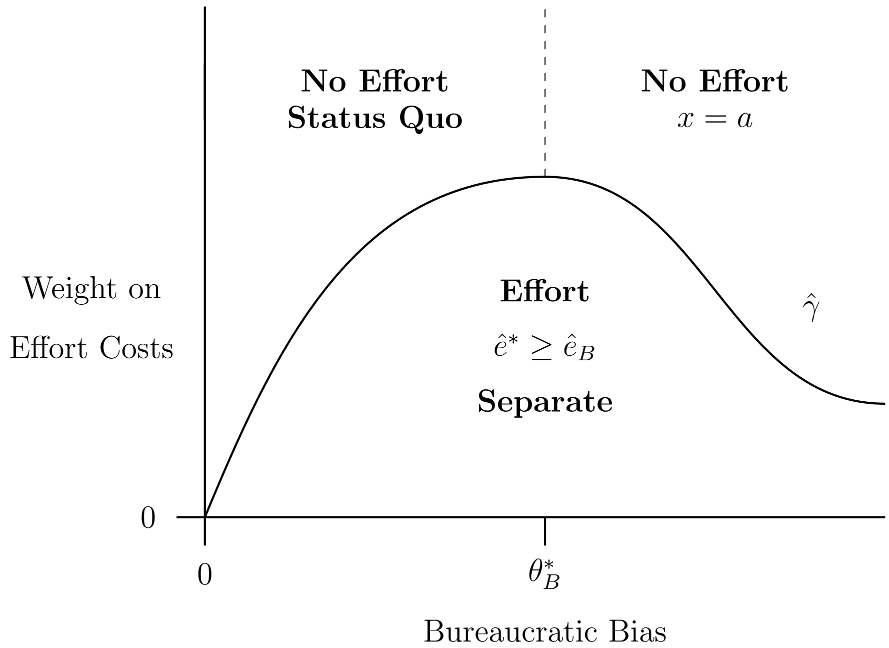


Figure 3: A summary of the bureaucrat's effort and policy choice as a function of θ_B^H and γ when the judge is favorable.

lowering her willingness to expend effort in the first place.

Combining these tradeoffs, proposition 4 shows that a bureaucrat with a moderate bias for the policy change is most likely to expend effort and make an informative policy choice. Figure 3 depicts this non-monotonicity of $\hat{\gamma}$ in θ_B^H.

Having examined the case where the judge is favorable, our next proposition studies a bureaucrat's information acquisition when the judge is ex ante opposed to the policy change.

Proposition 5. *When the judge is opposed, the bureaucrat's effort choice is characterized by the cut-points $\overline{\gamma}$ and $\underline{\gamma}$ as follows:*

1. *If $\theta_B^L \leq \theta_B'$ then $\underline{\gamma} > 0$. For all $\gamma < \underline{\gamma}$ the bureaucrat expends effort $\overline{e}^* \geq \overline{e}_B$.*
2. *If $\theta_B^H \in [\tilde{\theta}_B^-, \tilde{\theta}_B^+]$ then an open set of parameters exists for which $\overline{\gamma} > \underline{\gamma}$. For all $\gamma \in [\underline{\gamma}, \overline{\gamma}]$ the bureaucrat expends effort $\underline{e}^* \in [\underline{e}_B, \overline{e}_J]$.*
3. *Otherwise, the bureaucrat expends no effort.*
4. *If $\theta_B^H < \theta_B^{**}$ then $\underline{\gamma}$ is increasing in θ_B^H. Furthermore, there exists $\overline{\theta}_B$ such that $\underline{\gamma}$ is increasing in θ_B^H for all $\theta_B^H > \overline{\theta}_B$.*

5. If $\theta_B^H < \theta_B^{**}$ then $\overline{\gamma}$ is increasing in θ_B^H; if $\theta_B^H \geq \theta_B^{**}$ then $\overline{\gamma}$ is decreasing in θ_B^H.

With a judge who is opposed the bureaucrat faces many of the same tradeoffs as when the judge is friendly. If the bureaucrat places a low enough weight on her costs of effort then she is willing to expend sufficiently high effort to separate at the policymaking stage and induce the judge to uphold the policy change.

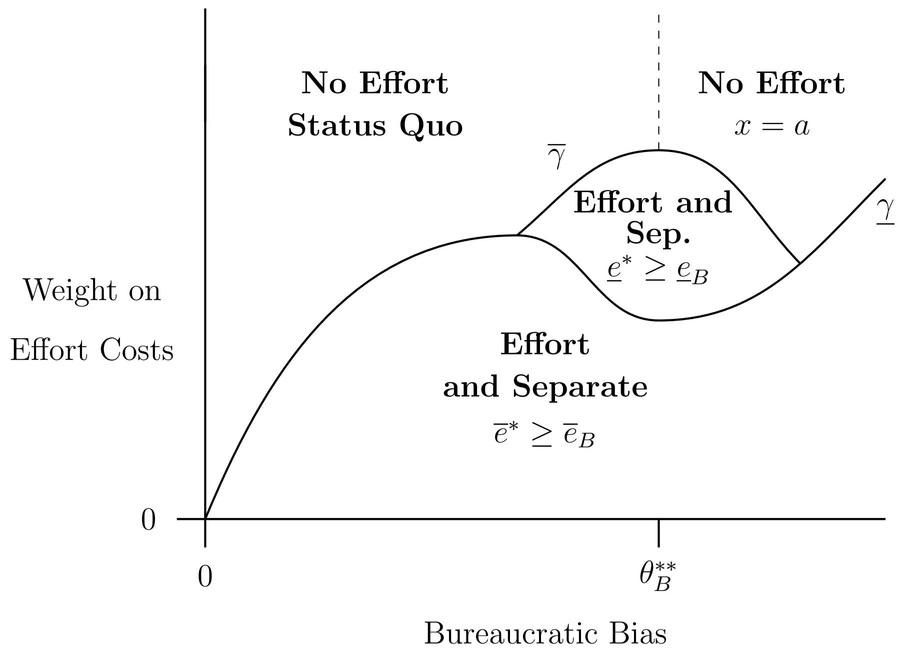


Figure 4: A summary of the bureaucrat's effort and policy choice as a function of θ_B^H and γ when the judge is opposed.

However, there are differences from when the judge is favorable. Now if the bureaucrat's bias is sufficiently strong, $\theta_B^H > \overline{\theta}_B$, the set of γ for which she separates is increasing. Thus, with an opposed judge a bureaucrat with a strong bias becomes more likely to expend positive effort and separate. This is because the bureaucrat now is in a position where if she expends no effort the policy change is only ever implemented if the judge observes outside information and the state is high. Alternatively, if she expends a high level of effort and the state is high the policy change is upheld when the judge does not observe outside information *and* the change is likely to be upheld when the judge observes outside information. The bureaucrat's payoff for the policy change in the low state, however, must still not be too strong and so, in this sense, the bureaucrat cannot be overly biased towards the policy change. Note, for $\theta_B^H \in (\theta_B^{**}, \overline{\theta}_B)$ the cut-point $\underline{\gamma}$ may be increasing or decreasing in θ_B^H.

Finally, an additional situation arises when the judge is opposed. For a range of biases the bureaucrat may want to expend enough effort that she separates, but not enough for the judge to uphold the policy change unless he receives favorable outside information. In this case the bureaucrat gambles that the judge will observe favorable outside information, but is only willing to incur the costs associated with a modest level of effort. Figure 4, which depicts the bureaucrat's effort choice as a function of θ_B^H and γ, includes the case where the bureaucrat may exert this intermediate level of effort (when $\underline{e}^* \geq \underline{e}_B$).

Comparative Statics

We now leverage our characterization of equilibria to consider how changes in bureaucratic motivations and institutional parameters impact the bureaucrat's incentives to expend effort and to separate when choosing policy. In doing so, we highlight how changes in the parameters of the model influence the bureaucrat's behavior through two channels. The first is via changing the cut-points in γ characterizing whether or not the bureaucrat expends effort and separates in the first place. We interpret an increase in the cut-point as raising the ex ante probability of realizing a bureaucrat that expends effort and separates. The second channel pertains to how much effort the bureaucrat expends, conditional on exerting positive effort. Changes in parameters can increase this conditional effort, improving the accuracy of the bureaucrat's information. These two channels may work at cross-purposes, and assessing how they interact is key for understanding how changes in the parameters influence the bureaucrat's incentives. When studying the impact of changes in the parameters under an opposed judge we focus on the case where the bureaucrat's behavior is characterized by $\underline{\gamma}$ and abstract from the special case where $\overline{\gamma} > \underline{\gamma}$. See the appendix for proofs and details.

Bureaucratic Policy Preferences As characterized in proposition 4, with a favorable judge varying the bureaucrat's bias effects her willingness to separate non-monotonically. Starting from low motivations, a neutral bureaucrat can expend no effort and retain the status quo, while increasing the bias can lead the bureaucrat to end up with sufficiently moderate preferences that she separates. However, starting from moderate preferences, increasing the bias can result in overly strong policy motivations, again leading to no effort and pooling. On the other hand, if the judge is opposed then increasing the bias of an already strongly biased bureaucrat increases the probability that he works hard and makes informed policy choices.

If the bureaucrat has a moderate to strong bias, increasing her bias heightens her conditional effort level. When the judge is favorable, this leads to a cross-cutting effect, with the bureaucrat becoming less likely to expend effort in the first place. If the judge is opposed, however, and the bureaucrat's bias is sufficiently strong, then increasing her bias causes her to be both more likely to expend effort and expend more total effort. If the bureaucrat's bias is low to moderate, increasing θ_B^H may increase or decrease her conditional effort, depending on if the lower bound on her effort is binding. Thus, increasing her bias either makes her both more likely to expend effort and to put forth a greater effort conditional on making an effort or these forces are conflicting so that a greater likelihood of making an effort is associated with a lesser effort level or vice versa.

We can also look at the effect of changing θ_B^L, the bureaucrat's payoff for the policy change when the state is low. If the bureaucrat still has a strong preference for the policy change in the low state then she is unwilling to separate no matter how precise of a signal she observed and expends no effort. Whether or not the bureaucrat's preferred policy depends on the state, i.e., if θ_B^L is positive or negative, also has a large impact on her behavior. A bureaucrat who always prefers the policy change, $\theta_B^L \geq 0$, is disincentivized from incurring costs to learn the state unless the likelihood of the judge learning the true state from outside informants induce her to exert effort. On the other hand, a bureaucrat whose preferred policy depends on the state, $\theta_B^L < 0$, is always intrinsically motivated to expend effort. In particular, if the bureaucrat does not face costs for being overturned, or if the judge was to not observe outside information, or if the judge has state-independent preferences, then only a bureaucrat with state-dependent preferences ever expends effort.

Empirically, whether or not we should expect the bureaucrat's preferences to depend on which policies are of higher or lower quality is non-obvious, i.e., what we should observe in the real world is unclear. On the one hand, many bureaucrats are highly expert and might, therefore, be oriented toward making the right choices for society. Conversely, bureaucrats may be unduly influenced by outside interests such that they go native and develop beliefs about best policies that are inconsistent with social welfare, or they may have professional training that leads them to favoring policy options not consistent with social welfare, e.g., biologists might prefer environmental quality without weighting economic costs or engineers may care about construction projects without valuing environmental damages.

Effort Costs In contrast to our other comparative static results, and notable for proposals about improving choice behavior, the weight the bureaucrat places on effort costs for information gathering influences whether or not she expends effort in a straightforward manner. Decreasing γ increases the probability that the bureaucrat expends effort and separates because a lower weight on costs makes choosing high effort more attractive relative to no effort and pooling. Additionally, decreasing γ lowers the marginal cost of effort which drives up the amount of effort she expends. Overall, decreasing information acquisition costs provides a clear path for improving bureaucratic incentives.

Outside Information. By contrast, the effect of σ, the probability that the judge learns the true state of the world from outside sources, is more nuanced. In particular, increasing σ may increase or decrease the probability that the bureaucrat expends effort depending on her bias, θ_B^H, and on her payoff in the low state, θ_B^L.

We focus on changes in σ when the judge is favorable. Assume that $\theta_B^L > -k$. Thus, the bureaucrat either always prefers the policy change or her distaste for the change is not too great in the low state. In this case, increasing σ increases the conditional effort of the bureaucrat, if the lower bound on her effort is not binding. This is because the bureaucrat expends effort in order to offset the increased probability that the judge observes information to the contrary. If the bureaucrat's bias is moderate to strong, and $\theta_B^L \geq 0$, her conditional effort always increases in σ, even if the lower bound on effort is binding.

The effect of σ on the probability that the bureaucrat expends effort in the first place depends strongly on her bias. If $\theta_B^H < \theta_B^*$ then increasing σ decreases the probability that she separates, while if $\theta_B^H > \theta_B^*$ then it increases the probability of her separating. The reason for this contrast is that when θ_B^H is low increasing σ raises the probability of her being overturned by the judge, incentivizing her to choose the status quo and avoid judicial review, but when θ_B^H is high the bureaucrat is deciding between separating with high effort or blindly proposing the policy change. In this latter instance, separating lowers the bureaucrat's chance of getting overturned and so higher σ incentivizes her to expend effort. Conversely, if $\theta_B^L < -k$ increasing σ has the exact opposite effects on the probability of effort and effort levels, as the bureaucrat is now determined to have the correct policy implemented even if choosing it comes with the risk of judicial reversal.

Under an opposed judge many of the results found for the favorable judge hold if the bureaucrat's bias is low. However, if the bureaucrat is strongly biased then we lack clear conclusions about the effect of σ.

Finally, if $\sigma \to 0$ so that the judge will not be receiving outside information, a bureaucrat who prefers the policy change in both states of the world never expends effort and either always chooses $x = a$ or $x = q$. The reason for this extreme behavior is that, without the possibility of outside information, a favorable judge always upholds the policy change and an opposed judge always overturns it. A bureaucrat whose policy preferences depend on the state, however, remains incentivized to acquire information to try and choose the highest quality policy.

Review Costs. Increasing the costs to the bureaucrat for getting overturned incentivizes the bureaucrat, given that she is expending effort, to work harder as long as the lower bound on effort is not binding. The bureaucrat wants to be more certain when she does propose the policy change that the judge will not veto this decision. Even if the lower bound on effort is binding, the bureaucrat still works harder given her bias is moderate to strong. The impact of k on the bureaucrat's decision to expend effort in the first place, however, always depends on the bureaucrat's bias. If θ_B^H is low then increasing k makes the bureaucrat less likely to separate, as her higher cost of getting overturned increases the attractiveness of retaining the status quo. Conversely, if θ_B^H is high then increasing k makes the bureaucrat more likely to expend effort, as always proposing the policy change and facing a high chance of getting overturned becomes costlier.

Although these comparative statics consider small changes in the parameters, we can provide some insight into the impact of k more globally. In particular, if the bureaucrat always prefers the policy change there must be an interior level of k that maximizes the probability of the bureaucrat expending effort. If $k \to \infty$ the bureaucrat always chooses the status quo to avoid judicial review, while if $k \to 0$ the bureaucrat has no incentive to acquire information and always proposes the policy change as rejection is costless. In the latter instance, there is a clear benefit for having a bureaucrat with state-dependent preferences, as she still has an incentive to gather information when review costs are low.

Public Signal

While thus far we have assumed that the bureaucrat's signal is private, we now consider an extension to our base model by allowing the bureaucrat's signal to be public information. For example, suppose that the bureaucrat receives a study that becomes part of the public domain. In this case, the judge's belief depends only on the bureaucrat's effort and the resulting signal; as such, the judge and bureaucrat possess the same belief at each stage of the game.

The following proposition describes the bureaucrat's behavior with public information;

in discussing it, we focus on the differences that can arise between the public and private information cases. Additionally, we focus on the case of an opposed judge, as this is where the greatest change in behavior can occur. A complete characterization of the bureaucrat's behavior is in the appendix.

Proposition 6. *There exist cut-points $\overline{e}_P$ and $\overline{\gamma}_P$ such that*

1. *If $e \geq \overline{e}_P$ then the bureaucrat chooses $x = a$ following the high signal and $x = q$ following the low signal. Furthermore, $\overline{e}_P \leq \overline{e}_B$.*
2. *If $\gamma \leq \overline{\gamma}_P$ then the bureaucrat expends positive effort.*
3. *There exists parameters such that if γ is sufficiently low then the bureaucrat expends effort in $[\overline{e}_J, \overline{e}_P]$.*

Compared to the private signal case, with public information the bureaucrat is willing to separate for lower levels of effort. Separation is easier relative to when signals are private because private information can incentivize the bureaucrat to deviate to trick the judge while the judge knows the signal given public information and such trickery is no longer feasible. Additionally, with a public signal it is always possible to find a level of effort, e, such that the bureaucrat is willing to choose policies based on her signal, even if θ_B^L is large.

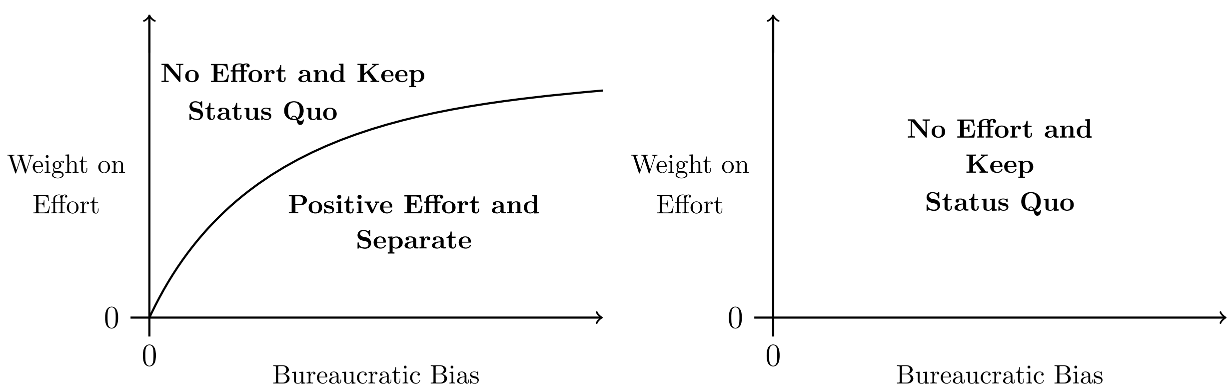
A new behavior also arises with public information, in that it is possible for the bureaucrat to choose $x = a$ following both signals. This is because when $s_B = H$ the judge's belief is not influenced by the bureaucrat choosing the same policy regardless of the signal; hence, the judge upholds the policy unless he receives outside information to the contrary. Furthermore, following the low signal the bureaucrat can still choose $x = a$ and gamble that the judge receives positive outside information and upholds the policy.

To further highlight the role of outside information and private signals, consider the case where the judge relies entirely on the bureaucrat for information.

Corollary 2. *Assume $\theta_B^L \geq 0$ and let $\sigma \to 0$.*

1. *When the signal is private information the bureaucrat never expends effort and chooses $x = q$.*
2. *When the signal is public information, if γ is sufficiently low then the bureaucrat expends positive effort and choosing policy in accordance with her signal.*

If the bureaucrat prefers the policy change regardless of the state then the difference between public and private information is stark. When the signal is private she never separates and never expends positive effort when $\sigma \to 0$. This is because she can never credibly separate when there is no potential to be caught by the judge. Conversely, if information is public, and γ is sufficiently low, the bureaucrat still expends effort and choose policy based on her signal even if she always prefers the policy alternative. This is because the bureaucrat is unable to try and trick the judge by deviating when the signal is public. Figure 5 depicts how the publicness or privateness of information conditions the implications of bias and the weight accorded to effort for a bureaucrat who always prefers the policy change.



(a) Signal is public information. (b) Signal is private information.

Figure 5: A summary of the bureaucrat's effort and policy choice when the judge does not observe outside information and the bureaucrat always prefers the policy change.

Note, in contrast to Figure 5, when the bureaucrat's preferred policy depends on the state of the world there is little difference in her behavior under public and private signals. Even though the judge never has a chance to learn the true state the bureaucrat's intrinsic policy preferences are enough to get her to sometimes separate under private information. Thus, as long as γ is sufficiently low the bureaucrat is willing to expend high effort.

Notice also that other types of bureaucratic behavior disappear when $\sigma \to 0$. Specifically, the bureaucrat never chooses $x = a$ following the low signal and never chooses $x = a$ if e is less than $\overline{e}_J$. As the judge observes no new information the policy is always overturned, and so gambling that the policy change will be vindicated by outside information never pays off.

Judicial Authority

In our base model the judge is only able to overturn a policy change, he cannot force a policy change if the status quo is kept. We now adjust the model so that the judge is able to choose the final policy. Thus, the bureaucrat can be overturned even if she keeps the status quo. This may occur if the bureaucrat is forced to propose a new policy and the judge is able to force the bureaucrat to consider a different alternative. For example, there could be a circumstance where the bureaucrat keeps the status quo, subsequently gets sued by a party with standing, and the judge forces the bureaucrat to consider the alternative.[10] We focus on differences under expanded judicial authority when the judge is favorable. We show that the bureaucrat has an incentive to expend effort under this expanded judicial policymaking authority compared to the analogous situation where the judge only has veto power. The appendix presents the complete characterization of the bureaucrat's behavior and shows that a similar result holds when the judge is opposed.

Proposition 7. *For $\theta_B^H < \theta'_B$ there exists $\overline{e}_A \in [\overline{e}_J, 1)$, $\overline{\gamma}_A > 0$, and $\underline{\theta}^A > 0$ such that:*

1. *If $e > \overline{e}_A$ then the bureaucrat separates.*
2. *If $\gamma \leq \overline{\gamma}_A$ then the bureaucrat expends effort $\overline{e}_A^* \geq \overline{e}_A$.*
3. *If $\theta_B^H \leq \underline{\theta}^A$ then $\overline{\gamma}_A \geq \hat{\gamma}$.*

[10] Note that we could reconceptualize this setup to fit other applications. For example, we could employ it to analyze hierarchical agency decisions, where a lower-level bureaucrat may have to propose a new policy to her supervisor who possesses the authority to choose the final policy. Or, alternatively, we could apply it to study legislative committee proposals under an open rule (while the original model would approximate where the committee is advantaged by a closed rule). Our result is in contrast to Gilligan and Krehbiel (1987), who show that a closed rule rather than an open rule encourages greater information acquisition by a committee.

When the bureaucrat has low policy motivations placing more authority with the judge can encourage greater information acquisition by the bureaucrat. This is a function of the bureaucrat being unable to avoid judicial review by choosing the status quo and that a mostly neutral bureaucrat has little incentive to distort the information transmitted through her policy choice. Hence, the judge's final decision making authority eliminates the status quo inertia that is produced in the previous setup when the bureaucrat has low policy motivations and the judge has veto power. This result suggests that allocating more authority to the judge can improve policy outcomes when the bureaucrat has low policy motivations.

Discussion and Conclusions

Especially in our current era of gridlock, interactions between bureaucrats and agencies are incredibly important for understanding government policymaking and its implications for society. Our results yield key insights into how judicial review impacts bureaucrat incentives and the production of high quality policies.

In particular, we have shown that the interplay between bureaucrats and judges is nuanced and far from straightforward, as this interplay alters the incentives of bureaucrats to shirk and choose policy. Rather than recapitulating our findings, we will conclude by discussing the implications of what we have learned for producing better policy choices relative to the status quo for society at large and what normative implications go along with these results.[11]

Our analysis and results make offering large-scale policy prescriptions or conducting social welfare analysis difficult. The conditional nature of our findings makes unambiguous statements about large policy interventions problematic — rather we can look to our comparative static results to provide insights into the desirability of policy prescriptions that make small changes to the preferences of the bureaucrat, judge, or environment in which she

[11]In general, the state of the world may represent the quality of the policy change for the organization or institution in which the principal and agent operate.

operates.

Related to these conditional results, studying social welfare is complicated. Of special importance is the fundamental asymmetry between retaining the status quo and policy change: If the policy change is proposed either policy may still be implemented, whereas if the status quo is retained there is no chance for the policy change to be enacted and, furthermore, there is no possibility for observing outside information to help make better decisions.

This asymmetry has ramifications for what our comparative statics tell us about whether interventions improve social welfare. For instance, changes leading to greater expenditure of positive effort and separating by the bureaucrat may actually be inferior to the bureaucrat always pushing for the policy change. Assume, for example, that ex ante whether the policy change is high or low quality is equally likely. If the bureaucrat has a low to moderate policy bias then our comparative static results describing when the bureaucrat becomes more likely to separate also imply that social welfare is increasing with an effort-increasing policy intervention. On the other hand, if the bureaucrat has a moderate to strong bias then the implications of our comparative statics results on social welfare are less clear, as social welfare will decrease if the judge is very likely to observe outside information, may or may not increase if this likelihood is intermediate, and increases if the judge is very unlikely to observe outside information. Hence, there is no related policy intervention that is likely to be globally improving social welfare.

In a similar spirit, since increased effort improves social welfare if the costs of information acquisition are low and the bureaucrat is already expending effort, our comparative static results show how to raise social welfare under these conditions. Increasing the bureaucrat's bias, increasing the costs of being overturned, or decreasing the costs of acquiring information (which generally raises social welfare) all improve policy outcomes by incentivizing the bureaucrat to acquire more accurate information.[12] Furthermore, as long as the bureaucrat's

[12]Note, this is only the case if information acquisition costs are low enough that the bureaucrat's effort choice is not at the constraint. Recall from the comparative statics section that if the constraint is binding

preferences are not very sensitive to the state, increasing the probability the judge observes additional information results in better policy outcomes.

Our most promising result in terms of social welfare is that significantly reducing the cost of information acquisition to bureaucrats should yield positive results. If costs of information acquisition are sufficiently low then the bureaucrat expending effort and separating overcomes the asymmetry in the policies and maximizes social welfare. Furthermore, our comparative statics indicate that in this case further reductions unambiguously improve social welfare. For example, in practice it has been long maintained that establishing a semi-independent Bureau of Environmental Statistics would be a valuable means of providing needed information to the Environmental Protection Agency (e.g., Morgenstern and Portney (2004)). In our parlance, such a Bureau would effectively reduce bureaucratic information costs, γ, and if this reduction is large this would improve social welfare.

In the future, there are obvious areas to explore to enrich the model and extensions we have presented in this paper. One possibility is to consider a bureaucrat who must allocate effort and make policy over multiple issue areas. A second possibility is to endogenize the non-bureaucratic source of information by either allowing the judge himself to expend effort or explicitly incorporating an outside actor. Finally, our analysis has focused on how adverse selection arises in bureaucratic-judicial interactions due to the bureaucrat's expertise in gathering information; however, it may be of interest to, instead, focus on issues of moral hazard where the judge cannot perfectly observe the bureaucrat's effort but can observe the signal that the bureaucrat receives. While we conjecture that, given the structure of incentives defined in our model, our main intuitions would continue to hold in some form these extensions would represent significant departures from our main model and additional substantive insights could be generated.

then these effects depend on the strength of the bureaucrat's bias.

A Proofs

A.1 Policy Choice

Given that the bureaucrat has expended effort e we find conditions under which a separating equilibrium exists. When a separating equilibrium does not exist we show that there exists a unique pooling equilibrium.

Proof of proposition 2. If the judge is favorable for a separating equilibrium to exist requires that if $s_B = H$ then the bureaucrat's utility for choosing $x = a$ is greater than her utility for $x = q$ and that if $s_B = L$ she prefers to choose $x = q$ over $x = a$. We write these two conditions as

$$0 \geq \sigma(\mu_B^L \theta_B^H - (1-\mu_B^L)k) + (1-\sigma)(\mu_B^L \theta_B^H + (1-\mu_B^L)\theta_B^L),$$
$$0 \leq \sigma(\mu_B^H \theta_B^H - (1-\mu_B^H)k) + (1-\sigma)(\mu_B^H \theta_B^H + (1-\mu_B^H)\theta_B^L).$$

Rearranging yields

$$\frac{\sigma k - (1-\sigma)\theta_B^L}{\theta_B^H - \theta_B^L + \sigma(k + \theta_B^L)} \geq \mu_B^L,$$
$$\frac{\sigma k - (1-\sigma)\theta_B^L}{\theta_B^H - \theta_B^L + \sigma(k + \theta_B^L)} \leq \mu_B^H.$$

Define $C_f = \frac{\sigma k - (1-\sigma)\theta_B^L}{\theta_B^H - \theta_B^L + \sigma(k+\theta_B^L)}$ and rewrite the bureaucrat's incentive compatibility constraint as

$$C_f \geq \mu_B^L, \tag{1}$$

$$C_f \leq \mu_B^H. \tag{2}$$

If $\theta_B^L > \frac{\sigma k}{1-\sigma}$ then C_f is less than 0 and so constraint (1) cannot be satisfied, as $\mu_B^L \in [0,1]$ for all e. Thus, no separating equilibrium exists for any $e \in [0,1]$. Define $\theta'_B = \frac{\sigma k}{1-\sigma}$. and assume $\theta_B^L < \theta_B'$.

For a given bureaucrat only one of the two constraints is binding. Which equation binds depends on whether the bureaucrat prefers to choose $x = a$ or $x = q$ when $e = 0$. Thus, we compare $\sigma(m\theta_B^H - (1-m)k) + (1-\sigma)(m\theta_B^H + (1-m)\theta_B^L)$ to 0. Solving, we get that if $\theta_B^H \geq \frac{(1-m)(\sigma k - (1-\sigma)\theta_B^L)}{m}$ then the bureaucrat pools on $x = a$, and constraint (1) is binding; otherwise she pools on $x = q$ and (2) binds. Therefore, in terms of proposition 2, define $\theta_B^* = \frac{(1-m)(\sigma k - (1-\sigma)\theta_B^L)}{m}$.[13] In either situation, as C_f is unchanging in effort while μ_B^L and μ_B^H are strictly decreasing and increasing in effort, respectively, there exists a unique effort level $\hat{e}_B$ that solves each equation.

If constraint (1) is binding then $\hat{e}_B$ solves equation (1) at equality. Clearly C_f is decreasing in θ_B^H. Thus, as μ_B^L is strictly decreasing in effort it must be that $\hat{e}_B$ is increasing in θ_B^H, for $\theta_B^H > \theta_B^*$.

Next, if $\theta_B^H \leq \theta_B^*$ then equation (2) is binding. In this case, because C_f is decreasing in θ_B^H and μ_B^H is increasing in effort, it must be that $\hat{e}_B$ is decreasing in θ_B^H. Therefore, the characterization given in proposition 2 holds.

Proof of proposition 3. When the judge is opposed the bureaucrat's payoff depends on whether effort is greater than or less than $\overline{e}_J$. If $e \geq \overline{e}_J$ then in a separating equilibrium the judge will allow policy a, absent new information, and so the bureaucrat has the same incentive compatibility constraints as when there is a favorable judge. As such we can use the previous analysis to get that an $\overline{e}_B'$ exists that solves (1) if $\theta_B^H \geq \theta_B^*$ and solves (2) if $\theta_B^H < \theta_B^*$. At $\theta_B^H = \theta_B^*$ we have $\overline{e}_B' = 0$, as the bureaucrat is indifferent at that point. Additionally, we have that $\overline{e}_B'$ is decreasing for $\theta_B^H < \theta_B^*$ and increasing for $\theta_B^H > \theta_B^*$. Furthermore, we see from (1) and (2) that if $\theta_B^H = 0$ then $\overline{e}_B' = 1$ and $\lim_{\theta_B^H \to \infty} \overline{e}_B' = 1$. Additionally, as the bureaucrat is indifferent at θ_B^* we have $\overline{e}' = 0$ at $\theta_B^H = \theta_B^*$. Therefore, there exists an interval of biases

[13] Note that off path beliefs are not an issue at $e = 0$ as the bureaucrat has no private information. Furthermore, for $e > 0$ as the judge is upholding $x = a$ when uninformed anyways and so deviating from $x = q$ to take advantage of favorable off path beliefs does not arise. Additionally, deviating from $x = a$ to $x = q$ yields a payoff of 0 regardless of the judge's beliefs. Thus, θ_B^* pins down a unique pooling equilibrium on $x = a$ for $\theta_B^H > \theta_B^*$ and a unique pooling equilibrium on $x = q$ for $\theta_B^H < \theta_B^*$.

around θ_B^* for which $\overline{e}'_B < \overline{e}_J$. To obtain the characterization given in the proposition define the lower endpoint of this interval as θ_B^- and the upper endpoint as θ_B^+ and define $\overline{e}_B = \overline{e}'_B$ for $\theta_B^* \notin [\theta_B^-, \theta_B^+]$ and $\overline{e}_B = \overline{e}_J$ for $\theta_B^H \in [\theta_B^-, \theta_B^+]$.

Now assume $e < \overline{e}_J$. In this case, absent outside information, the judge will overturn $x = a$ even if the bureaucrat separates. For the bureaucrat to separate requires her to still prefer choosing $x = a$ when $s_B = H$ and $x = q$ when $s_B = L$, which gives

$$
\begin{aligned}
0 &\leq \sigma(\mu_B^H(e)\theta_B^H - (1 - \mu_B^H(e))k) - (1 - \sigma)k, \\
0 &\geq \sigma(\mu_B^L(e)\theta_B^H - (1 - \mu_B^L(e))k) - (1 - \sigma)k.
\end{aligned}
$$

Rearranging yields

$$
\begin{aligned}
\frac{k}{\sigma(\theta_B^H + k)} &\geq \mu_B^L, \\
\frac{k}{\sigma(\theta_B^H + k)} &\leq \mu_B^H.
\end{aligned}
$$

Define $C_o = \frac{k}{\sigma(\theta_B^H + k)}$ and we get that the following equations must hold for the bureaucrat to separate:

$$
C_o \geq \mu_B^L, \tag{3}
$$

$$
C_o \leq \mu_B^H. \tag{4}
$$

If $\theta_B^H \geq k\Big(\frac{1}{\sigma m} - 1\Big)$ then constraint (3) is binding, otherwise equation (4) binds. Define $\theta_B^{**} = k\Big(\frac{1}{\sigma m} - 1\Big)$. For $\theta_B^H < \theta_B^{**}$ define $\underline{e}'_B$ as the unique solution to (3) and for $\theta_B^H \geq \theta_B^{**}$ let $\underline{e}'_B$ solve (4).[14]

[14]Note that again no complications arise due to off the path beliefs when the bureaucrat pools. As the judge observes e if $e \leq \overline{e}_J$ then deviating to the policy change cannot increase the judge's belief off the path enough so that he upholds the policy change and so the cut-point θ_B^{**} already takes into account the bureaucrat's choice. If $e \geq \overline{e}_J$ the conditions for the bureaucrat to separate together with θ_B^* already account for a possible deviation from pooling on q to choosing $x = a$ and having the judge uphold the policy when uninformed.

At $\theta_B^H = \theta_B^{**}$ we get that $\underline{e}_B' = 0$ because the bureaucrat is indifferent. Clearly C_o is decreasing as θ_B^H increases. Therefore, as μ_B^L is decreasing in e and μ_B^H is increasing in e, it must be that $\underline{e}_B'$ is decreasing in θ_B^H for $\theta_B^H < \theta_B^{**}$ and increasing in θ_B^H for $\theta_B^H > \theta_B^{**}$. Letting $\theta_B^H \to \infty$ we get that C_o goes to 0 and so $\underline{e}_B' \to 1$. Additionally, for $\theta_B^H = 0$ we have $C_o > 1$ and so (4) does not hold for any $e \leq 1$. This implies that there exists an interval $[\tilde{\theta}_B^-, \tilde{\theta}_B^+]$ containing θ_B^{**} for which $\underline{e}_B' \leq \bar{e}_J$. Taken all together we get the characterization given in proposition 3.

A.2 Effort

Ex ante the bureaucrat has no private information and, thus, no equilibrium exists in which the bureaucrat pools on the same policy but signals information to the judge through her effort choice. Therefore, any level of effort such that causes the bureaucrat chooses the same policy regardless of her signal has no impact on the judge's choice in equilibrium. This implies that the bureaucrat's expected utility, sans effort costs, is the same following any effort which causes the bureaucrat to pool. As effort is costly, it is optimal for the bureaucrat to expend no effort at the effort stage. Thus, if the bureaucrat expends positive effort in equilibrium it must be that the bureaucrat chooses effort such that she separates at the policymaking stage.

Proof of proposition 4. If the judge is favorable, the bureaucrat must either expend no effort and pool on $x = a$, expend no effort and choose $x = q$, or expend positive effort and separate. We can ignore the potential complication from the judge's constraint $\bar{e}_J$ as the judge upholds $x = a$ when uninformed either way and when $x = q$ the judge has no input. When the bureaucrat expends positive effort she chooses effort to solve

$$\max_{e \in [\hat{e}_B, 1]} \pi(e)[\sigma(\mu_B^H(e)\theta_B^H - (1 - \mu_B^H(e))k) + (1 - \sigma)(\mu_B^H(e)\theta_B^H + (1 - \mu_B^H(e))\theta_B^L)] - \gamma c(e).$$

As $p(e)$ is linear in effort, the second order condition is simply $-c''(e) < 0$. Thus, the bureaucrat has a unique optimal effort choice which we denote $\hat{e}^* = \max\{\hat{e}_B, \hat{e}'\}$ where $\hat{e}'$ is the unique solution to the first-order condition

$$\frac{m}{2}\theta_B^H - \frac{1-m}{2}((1-\sigma)\theta_B^L - \sigma k) = \gamma c'(e). \tag{5}$$

Define the utility to the bureaucrat for choosing $\hat{e}^*$ as

$$\hat{U}^* = \pi(\hat{e}^*)[\sigma(\mu_B^H(\hat{e}^*)\theta_B^H - (1-\mu_B^H(\hat{e}^*))k) + (1-\sigma)(\mu_B^H(\hat{e}^*)\theta_B^H + (1-\mu_B^H(\hat{e}^*))\theta_B^L)] - \gamma c(\hat{e}^*). \tag{6}$$

Therefore, the bureaucrat solves the following problem

$$\max\Big\{0,\ \sigma(m\theta_B^H - (1-m)k) + (1-\sigma)(m\theta_B^H + (1-m)\theta_B^L),\ \hat{U}^*\Big\}.$$

From proposition 2 we know that if $\theta_B^L \geq \theta'_B$ then the bureaucrat always pools on $x = a$ for any effort level. Thus, for any $\gamma \geq 0$ the bureaucrat always expends no effort and pool on $x = a$.

Now assume that $\theta_B^L < \theta'_B$. From equation (5) letting $\gamma \to 0$ we get $\hat{e}^* \to 1$. Therefore, $\lim_{\gamma\to 0}\hat{U}^* = m\theta_B^H > 0$. Additionally, we want that $m\theta_B^H > \sigma(m\theta_B^H - (1-m)k) + (1-\sigma)(m\theta_B^H + (1-m)\theta_B^L)$. Rearranging shows that this holds if $\theta_B^L < \frac{\sigma k}{1-\sigma} = \theta'_B$, which is true by assumption. Thus, by continuity of $\hat{U}^*$ in γ, for all $\theta_B^H > 0$ there exists $\hat{\gamma} > 0$ such that the bureaucrat prefers to expend effort and separate over pooling on $x = q$ or on $x = a$. On the other hand, letting $\gamma \to \infty$ the bureaucrat clearly never expends positive effort.

Finally, applying the envelope theorem we get

$$\frac{\partial \hat{U}^*}{\partial \gamma} = -c(\hat{e}^*) < 0. \tag{7}$$

Thus, increasing γ strictly decreases her utility for choosing $\hat{e}^*$. Taken all together, this implies that the bureaucrat expends effort $\hat{e}^*$ and separates if and only if $\gamma \in (0, \hat{\gamma}]$, for

$\theta_B^L < \theta_B'$. Otherwise, if $\gamma > \hat{\gamma}$ then the bureaucrat pools on a or q depending on if θ_B^H is greater or less than θ_B^*.

Now we show that $\hat{\gamma}$ is increasing in θ_B^H if $\theta_B^H < \theta_B^*$ and decreasing in θ_B^H if $\theta_B^H > \theta_B^*$. To begin, note that

$$\frac{\partial \hat{U}^*}{\partial \theta_B^H} = p(\hat{e}^*)m - \lambda^* \frac{\partial \hat{e}_B}{\partial \theta_B^H}. \tag{8}$$

Equation (8) follows from applying the envelope theorem to equation (6), where $\lambda^* \geq 0$ is the Lagrange multiplier at the optimum that is implied as we are maximizing subject to the constraint $e - \hat{e}_B \geq 0$.

If $\theta_B^H < \theta_B^*$ then $\hat{\gamma}$ solves $0 = \hat{U}^*$. Using the implicit function theorem we can write a change in $\hat{\gamma}$ as

$$\frac{\partial \hat{\gamma}}{\partial \theta_B^H} = -\frac{\partial \hat{U}^* / \partial \theta_B^H}{\partial \hat{U}^* / \partial \gamma}.$$

Using (7) and (8) we have

$$\frac{\partial \hat{\gamma}}{\partial \theta_B^H} = \frac{p(\hat{e}^*)m - \lambda^* \frac{\partial \hat{e}_B}{\partial \theta_B^H}}{c(\hat{e}^*)}.$$

As $\theta_B^H < \theta_B^*$ by proposition 2 we have $\frac{\partial \hat{e}_B}{\partial \theta_B^H} < 0$. Therefore, $\frac{\partial \hat{\gamma}}{\partial \theta_B^H} > 0$ as required.

Next, assume $\theta_B^H > \theta_B^*$. In this case, $\hat{\gamma}$ solves

$$\sigma(m\theta_B^H - (1-m)k) + (1-\sigma)(m\theta_B^H + (1-m)\theta_B^L) = \hat{U}^*.$$

By the implicit function theorem

$$\frac{\partial \hat{\gamma}}{\partial \theta_B^H} = -\frac{\frac{\partial \hat{U}^*}{\partial \theta_B^H} - \frac{\partial}{\partial \theta_B^H}[m\theta_B^H - (1-m)(\sigma k - (1-\sigma)\theta_B^L)]}{\frac{\partial \hat{U}^*}{\partial \gamma} - \frac{\partial}{\partial \gamma}[m\theta_B^H - (1-m)(\sigma k - (1-\sigma)\theta_B^L)]}.$$

Using equations (7) and (8) and differentiating yields

$$\frac{\partial \hat{\gamma}}{\partial \theta_B^H} = -\frac{m(1-p(\hat{e}^*)) + \lambda^* \frac{\partial \hat{e}_B}{\partial \theta_B^H}}{c(\hat{e}^*)}.$$

As $\theta_B^H > \theta_B^*$, by proposition 2 we have $\frac{\partial \hat{e}_B}{\partial \theta_B^H} > 0$, yielding $\frac{\partial \hat{\gamma}}{\partial \theta_B^H} < 0$ as required.

Proof of proposition 5. When the judge is opposed we begin by showing that for $\theta_B^H \notin [\tilde{\theta}_B^-, \tilde{\theta_B}^+]$ there exists $\underline{\gamma}$ such that if $\gamma < \underline{\gamma}$ then the bureaucrat chooses to expend effort greater than $\overline{e}_B$ and separate, and otherwise she expends no effort and pools.

If $\theta_B^H \notin [\tilde{\theta}_B^-, \tilde{\theta_B}^+]$ then $\underline{e}_B \geq \overline{e}_J$. Therefore, in this case, the bureaucrat never expends positive effort less than $\overline{e}_B$. If the bureaucrat does expend positive effort then she chooses e to solve

$$\max_{e \in [\overline{e}_B, 1]} \pi(e)[\sigma(\mu_B^H(e)\theta_B^H - (1-\mu_B^H(e))k) + (1-\sigma)(\mu_B^H \theta_B^H + (1-\mu_B^H)\theta_B^L] - \gamma c(e).$$

In this case, the bureaucrat faces a problem similar to that when the judge is friendly. As such, using similar arguments, there exists a unique effort level $\overline{e}^*$ that is the max of $\overline{e}_B$ and the solution to the first-order condition (5), $\overline{e}^* = \max\{\hat{e}', \overline{e}_B\}$. Define her utility for choosing $\overline{e}^*$ as

$$\overline{U}^* = \pi(\underline{e}^*)[\sigma(\mu_B^H(\underline{e}^*)\theta_B^H - (1-\mu_B^H(\underline{e}^*))k) + (1-\sigma)(\mu_B^H(\underline{e}^*)\theta_B^H + (1-\mu_B^H(\underline{e}^*))\theta_B^L] - \gamma c(\underline{e}^*).$$

Therefore, the bureaucrat solves the following problem

$$\max\left\{0,\ \sigma(m\theta_B^H - (1-m)k) - (1-\sigma)k,\ \overline{U}^*\right\}. \tag{9}$$

Now if the bureaucrat expends zero effort and pools on $x = a$ the judge reject the policy absent outside information. Note that using the same arguments as before (7) implies that $\overline{U}^*$ is strictly decreasing in γ. Furthermore, if $\gamma \to \infty$ then the bureaucrat never expends positive effort and if $\gamma \to 0$ then $e^* \to 1$ and $\overline{U}^* \to m\theta_B^H$. Comparing, we have that $m\theta_B^H > 0$ and $m\theta_B^H > \sigma m\theta_B^H - k(1-\sigma m)$. Thus, by continuity of $\overline{U}^*$ there exists $\underline{\gamma} > 0$ such that if $\gamma \leq \underline{\gamma}$ then bureaucrat prefers to expend $\underline{e}^* \geq \overline{e}_B$ over expending no effort and pooling.

Next, we show that $\underline{\gamma}$ is increasing in θ_B^H for $\theta_B^H < \tilde{\theta}_B^-$. If $\theta_B^H < \tilde{\theta}_B^-$ then $\underline{\gamma}$ solves $0 = \overline{U}^*$. Using the implicit function theorem we can write a change in $\underline{\gamma}$ as

$$\frac{\partial \underline{\gamma}}{\partial \theta_B^H} = -\frac{\partial \overline{U}^* / \partial \theta_B^H}{\partial \overline{U}^* / \partial \gamma}.$$

Using 7 and 8 we have

$$\frac{\partial \underline{\gamma}}{\partial \theta_B^H} = \frac{p(\underline{e}^*)m - \lambda^* \frac{\partial \overline{e}_B}{\partial \theta_B^H}}{c(\overline{e}^*)}.$$

As $\theta_B^H < \tilde{\theta}^- < \theta_B^{**}$, by proposition 3 we have $\frac{\partial \overline{e}_B}{\partial \theta_B^H} \leq 0$. Thus, $\frac{\partial \underline{\gamma}}{\partial \theta_B^H} > 0$, as required.

If $\theta_B^H > \tilde{\theta}_B^+$ then $\underline{\gamma}$ solves $\sigma(m\theta_B^H - (1-m)k) - (1-\sigma)k = \overline{U}^*$. By the implicit function theorem

$$\frac{\partial \underline{\gamma}}{\partial \theta_B^H} = -\frac{\frac{\partial \overline{U}^*}{\partial \theta_B^H} - \frac{\partial}{\partial \theta_B^H}[m\sigma\theta_B^H - (1-\sigma m)k]}{\frac{\partial \overline{U}^*}{\partial \gamma} - \frac{\partial}{\partial \gamma}[m\sigma\theta_B^H - (1-\sigma m)k]},$$

and using the envelope theorem we get

$$\frac{\partial \underline{\gamma}}{\partial \theta_B^H} = \frac{p(\overline{e}^*)m - \lambda^* \frac{\partial \overline{e}_B}{\partial \theta_B^H} - m\sigma}{c(\overline{e}^*)}.$$

We show there exists some $\overline{\theta}_B$ such that for any $\theta_B^H > \overline{\theta}_B$ we have $\frac{\partial \underline{\gamma}}{\partial \theta_B^H} > 0$. First, if $\theta_B^H \to \infty$ then the LHS of (5) goes to infinity. Thus, to maintain (5) the RHS, $c'(e)$, needs to go to infinity as well and so it must be that $\hat{e}' \to 1$. Therefore, $\lim_{\theta_B^H \to \infty} \overline{e}^* = 1$. Second, we show

$\lim_{\theta_B^H \to \infty} \lambda^* \frac{\partial \overline{e}_B}{\partial \theta_B^H} = 0$. Using equation (1) and the implicit function theorem we have

$$\frac{\partial \overline{e}_B}{\partial \theta_B^H} = \frac{\frac{\sigma k - (1-\sigma)\theta_B^L}{(\theta_B^H - \theta_B^L + \sigma(k + \theta_B^L))^2}}{\frac{2(1-m)m}{((2m-1)e-1)^2}}. \tag{10}$$

If $\theta_B^H \to \infty$ then the numerator of (10) goes to 0 while the denominator is always strictly greater than 0. Thus, combining these results we have $\lim_{\theta_B^H \to 1} m(p(\overline{e}^*) - \sigma) = m(1-\sigma) > 0$ and $\lim_{\theta_B^H \to \infty} \lambda^* \frac{\partial \overline{e}_B}{\partial \theta_B^H} = 0$, which yields $\lim_{\theta_B^H \to \infty} \frac{\partial \gamma}{\partial \theta_B^H} > 0$. By the implicit function theorem $\frac{\partial \gamma}{\partial \theta_B^H}$ is continuous in θ_B^H and hence $\overline{\theta}_B^H$ exists.

Now let $\theta_B^H \in [\tilde{\theta}_B^-, \tilde{\theta}_B^+]$ and so $\overline{e}_J \geq \underline{e}_B$. If the bureaucrat expends effort $e \in [\underline{e}_B, \overline{e}_J]$ she chooses effort optimally to solve

$$\max_{e \in [\underline{e}_B, \overline{e}_J]} \pi(e)[\sigma(\mu_B^H(e)\theta_B^H - (1-\mu_B^H(e))k) - (1-\sigma)k] - \gamma c(e). \tag{11}$$

This problem yields the first-order condition

$$\frac{\sigma m}{2}\theta_B^H + \frac{1 - m(2-\sigma)}{2}k = \gamma c'(e). \tag{12}$$

Let $\underline{e}'$ be the unique solution to (12) and define the solution to (11) as $\underline{e}^* = \min\{\max\{\underline{e}_B, \underline{e}'\}, \overline{e}_J\}$. We now define the bureaucrat's utility for choosing $\underline{e}^*$ as

$$\underline{U}^* = \pi(\underline{e}^*)[\sigma(\mu_B^H(\underline{e}^*)\theta_B^H - (1-\mu_B^H(\underline{e}^*))k) - (1-\sigma)k] - \gamma c(\underline{e}^*).$$

Because the bureaucrat only expends positive effort if it leads to her separating at the policymaking stage her effort choice solves

$$\max\left\{0,\ \sigma(m\theta_B^H - (1-m)k) - (1-\sigma)k,\ \underline{U}^*,\ \overline{U}^*\right\}.$$

Now we show that there are parameters for which there exists $\overline{\gamma}$ and $\underline{\gamma}$ with $\overline{\gamma} > \underline{\gamma} > 0$ such that: if $\gamma > \overline{\gamma}$ then the bureaucrat expends no effort; if $\gamma \in [\underline{\gamma}, \overline{\gamma}]$ then she chooses $\underline{e}^*$; and if $\gamma < \underline{\gamma}$ then she chooses $\overline{e}^*$.

We start by showing there exists $\underline{\gamma}$ such that if $\gamma > \underline{\gamma}$ then $\underline{U}^* > \overline{U}^*$, otherwise $\underline{U}^* \leq \overline{U}^*$. If $\gamma \to 0$ then $\underline{e}^* \to \overline{e}_J$, which results in $\underline{U}^* \to \sigma(p(\overline{e}_J)m\theta_B^H - (1-p(\overline{e}_J))(1-m)k) - (1-\sigma)\pi(\overline{e}_J)k$. However, $\sigma(p(\overline{e}_J)m\theta_B^H - (1-p(\overline{e}_J))(1-m)k) - (1-\sigma)\pi(\overline{e}_J)k < m\theta_B^H = \lim_{\gamma\to 0} \overline{U}^*$. Thus, for γ sufficiently small $\overline{U}^* > \underline{U}^*$. Next, using the envelope theorem we have $\frac{\partial \underline{U}^*}{\partial \gamma} = -c(\underline{e}^*) < 0$. Further, we have $\frac{\partial \overline{U}^*}{\partial \gamma} = -c(\overline{e}^*) < -c(\underline{e}^*)$, which follows from $\overline{e}^* > \underline{e}^*$ and $c' > 0$. Thus, $\underline{U}^*$ is decreasing slower in γ compared to $\overline{U}^*$. As such, the cut-point $\underline{\gamma}$ exists.

Next, we prove there exists $\overline{\gamma} > 0$ such that if $\gamma < \overline{\gamma}$ then the bureaucrat prefers $\underline{U}^*$ over exerting $e = 0$, and otherwise the bureaucrat prefers $e = 0$ over $\underline{U}^*$. First, if $\theta_B^H < \theta_B^{**}$ then we need $\overline{\gamma}$ to solve $\underline{U}^* = 0$. As $\underline{U}^*$ is strictly decreasing in γ and $0 > \lim_{\gamma\to\infty} \underline{U}^*$ it is sufficient to show that $0 < \lim_{\gamma\to 0} \underline{U}^*$. Letting $\gamma \to 0$, we need

$$0 < \sigma(p(\overline{e}_J)m\theta_B^H - (1-p(\overline{e}_J))(1-m)k) - (1-\sigma)\pi(\overline{e}_J)k, \tag{13}$$

$$p(\overline{e}_J)\Big(\sigma m\theta_B^H + (1-m(2-\sigma))k\Big) > (1-m)k, \tag{14}$$

where the second line follows from rearranging the first and substituting for π. We can rearrange (14) as

$$p(\overline{e}_J) > \frac{(1-m)k}{\sigma m\theta_B^H + (1-m(2-\sigma))k}. \tag{15}$$

From constraint (4) we have that $\underline{e}_B$ is greater than the RHS of (15). As in the case $\overline{e}_J > \underline{e}_B$ it must be that inequality (15) holds and so there exists $\overline{\gamma}$ such that if $\gamma < \overline{\gamma}$ then the bureaucrat prefers to expend effort $\underline{e}^*$ over expending no effort and pooling on $x = q$.

Now we prove that there exist parameters for which $\overline{\gamma} > \underline{\gamma}$. This inequality will hold if $\overline{U}^*$ intersects 0 before $\underline{U}^*$ intersects 0, as a function of γ. As $\overline{U}^*$ is decreasing faster in γ than $\underline{U}^*$ this will be true if $\underline{U}^*$ is sufficiently close to $\overline{U}^*$ when $\gamma \to 0$. We have $\lim_{\gamma\to 0} \overline{U}^* - \underline{U}^* = m\theta_B^H(1-\sigma p(\overline{e}_J)) + k(\sigma(1-p(\overline{e}_J))(1-m) + (1-\sigma)\pi(\overline{e}_J))$. This difference can be made arbitrarily small by letting $(\sigma, \overline{e}_J) \to (1,1)$. Thus, for sufficiently strong judicial preferences and a sufficiently high probability that the judge observes the state of the world we have $\overline{\gamma} > \underline{\gamma} > 0$.

Next, we show similar results for the case where $\theta_B^H \in (\theta_B^{**}, \tilde{\theta}^+)$. In this case, we want to find $\overline{\gamma} > 0$ that solves $\underline{U}^* = \sigma(m\theta_B^H - (1-m)k) - (1-\sigma)k$. Thus, we need that $\lim_{\gamma \to 0} \underline{U}^* > \sigma(m\theta_B^H - (1-m)k) - (1-\sigma)k$. We have $\lim_{\overline{e}_J \to 1} \left(\lim_{\gamma \to 0} \underline{U}^* \right) = \sigma m \theta_B^H - (1-\sigma)mk$. Thus, if judicial preferences are such that $\overline{e}_J$ is sufficiently high then for γ sufficiently low the bureaucrat prefers to expend effort $\underline{e}^*$ over expending no effort. Therefore, using the same argument as before, we get that for $(\overline{e}_J, \sigma)$ sufficiently close to $(1,1)$ we have $\overline{\gamma} > \underline{\gamma}$.

Finally, we demonstrate that $\overline{\gamma}$ is increasing in θ_B^H for $\theta_B^H \in [\tilde{\theta}^-, \theta_B^{**}]$ and decreasing in θ_B^H for $\theta_B^H \in (\theta_B^{**}, \tilde{\theta}^+]$. If $\theta_B^H < \theta_B^{**}$ then $\overline{\gamma}$ solves $\underline{U}^* = 0$ and

$$\begin{aligned}
\frac{\partial \overline{\gamma}}{\partial \theta_B^H} &= -\frac{\partial \underline{U}^* / \partial \theta_B^H}{\partial \underline{U}^* / \partial \gamma}, \\
\frac{\partial \overline{\gamma}}{\partial \theta_B^H} &= \frac{\sigma p(\underline{e}^*) m - \lambda^* \frac{\partial \underline{e}_B}{\partial \theta_B^H}}{c(\underline{e}^*)} > 0,
\end{aligned}$$

where the first line is derived via the implicit function theorem, the second by applying the envelope theorem to $\underline{U}^*$, and the derivative is signed using proposition 3.

If $\theta_B^H > \theta_B^{**}$ then $\overline{\gamma}$ solves $\underline{U}^* = \sigma(m\theta_B^H - (1-m)k) - (1-\sigma)k$ and

$$\begin{aligned}
\frac{\partial \overline{\gamma}}{\partial \theta_B^H} &= -\frac{\frac{\partial \underline{U}^*}{\partial \theta_B^H} - \frac{\partial}{\partial \theta_B^H} \left[\sigma m \theta_B^H - k(1 - \sigma m) \right]}{\partial \underline{U}^* / \partial \gamma}, \\
\frac{\partial \overline{\gamma}}{\partial \theta_B^H} &= -\frac{\sigma m (1 - p(\underline{e}^*)) + \lambda^* \frac{\partial \underline{e}_B}{\partial \theta_B^H}}{c(\underline{e}^*)} < 0,
\end{aligned}$$

where the first line is derived via the implicit function theorem, the second by applying the envelope theorem to $\underline{U}^*$, and the derivative is signed using proposition 3.

Fixing the other model parameters, if $\underline{U}^*$ is not preferred for any level γ then the bureaucrat's decision when $\theta_B^H \in [\tilde{\theta}_B^-, \tilde{\theta}_B^+]$ is also characterized using the same $\underline{\gamma}$ from the earlier analysis.

A.3 Comparative Statics

Effect of θ_B^H.

Favorable Judge: From our characterization we have that $\hat{\gamma}$ changes non-monotonically in θ_B^H. To finish our analysis of θ_B^H we examine how the level of bureaucratic effort changes for small changes in θ_B^H given that she expends positive effort. For $\gamma < \hat{\gamma}$ the bureaucrat's effort $\hat{e}^*$ is the max of $\hat{e}_B$ and the solution to the first-order condition (5). Assume $\hat{e}^* > \hat{e}_B$. Applying the implicit function theorem we get

$$\frac{\partial \hat{e}^*}{\partial \theta_B^H} = \frac{p'(\hat{e}^*)m}{\gamma c''(\hat{e}^*)} > 0.$$

If $\hat{e}^* = \hat{e}_B$ from our earlier analysis we have that if $\theta_B^H > \theta_B^*$ then $\frac{\partial \hat{e}_B}{\partial \theta_B^H} > 0$ and if $\theta < \theta_B^*$ then $\frac{\partial \hat{e}_B}{\partial \theta_B^H} < 0$.

Effect of γ. From the characterization of the bureaucrat's behavior we have that decreasing γ can move the bureaucrat from expending no effort to expending positive effort and separating. We will show that decreasing γ additionally increases the amount of effort expended by a bureaucrat, given that she is choosing positive effort.

Favorable Judge: Assume $\gamma < \hat{\gamma}$. If $\hat{e}^* > \hat{e}_B$ then from the implicit function theorem we get

$$\frac{\partial \hat{e}^*}{\partial \gamma} = \frac{-c'(e^*)}{\gamma c''(e^*)} < 0.$$

As $\hat{e}_B$ is not a function of γ we have $\hat{e}^*$ weakly decreasing in γ.

Opposed Judge: For $\gamma < \underline{\gamma}$ we have the same analysis as above. If $\gamma \in [\underline{\gamma}, \overline{\gamma}]$ then using the implicit function theorem and equation (12) we get

$$\frac{\partial \underline{e}'}{\partial \gamma} = -\frac{c'(\underline{e}')}{\gamma c''(\underline{e}')} < 0.$$

Again, because $\underline{e}_B$ is not a function of γ we have $\underline{e}^*$ is weakly decreasing in γ.

Effect of k. Letting $k \to \infty$ the bureaucrat will always choose no effort and $x = q$. On the other hand, when $k \to 0$ then $\theta_B' \to 0$. In this case, if $\theta_B^L \geq 0$, and so the bureaucrat's preferred policy is state-independent, then the bureaucrat pools on policy a and never expends effort.

Favorable Judge: If $\theta_B^H \leq \theta_B^*$ then

$$\frac{\partial \hat{\gamma}}{\partial k} = -\frac{(1-p(e^*))(1-m)\sigma - \lambda^* \frac{\partial \hat{e}_B}{\partial k}}{c(e^*)} < 0,$$

because $\frac{\partial C_f}{\partial k} = \frac{\sigma \theta_B^H}{\theta_B^H + \sigma k - (1-\sigma)\theta_B^L} > 0$ and μ_B^H increasing in e, thus, $\frac{\partial \hat{e}_B}{\partial k} > 0$ for $\theta_B^H < \theta_B^*$. When $\theta_B^H > \theta_B^*$ we have

$$\frac{\partial \hat{\gamma}}{\partial k} = \frac{p(e^*)(1-m)\sigma - \lambda^* \frac{\partial \hat{e}_B}{\partial k}}{c(e^*)} > 0,$$

Because $\frac{\partial C_f}{\partial k} > 0$ and μ_B^L is decreasing in e this yields $\frac{\partial \hat{e}_B}{\partial k} < 0$ for $\theta_B^H < \theta_B^*$. Next, using the implicit function theorem we find the effect of k on effort, given $\gamma < \hat{\gamma}$, to be

$$\frac{\partial \hat{e}'}{\partial k} = \frac{(1-m)k}{\gamma c''(\hat{e}^*)} > 0.$$

Thus $\hat{e}'$ is increasing in k. We can also describe how the bureaucrat's conditional effort changes when $\hat{e}^* = \hat{e}_B$. As C_f is increasing in k if $\theta_B^H < \theta_B^*$ we have $\frac{\partial \hat{e}_B}{\partial k} < 0$ and if $\theta_B^H > \theta_B^*$ then $\frac{\partial \hat{e}_B}{\partial k} > 0$.

Opposed Judge: First we consider how $\underline{\gamma}$ changes in k for $\theta_B^H \notin [\tilde{\theta}^-, \tilde{\theta}^+]$. For $\theta_B^H < \tilde{\theta}^-$ the cut-point $\underline{\gamma}$ solves $\overline{U}^* = 0$. Using the implicit function theorem we have

$$\frac{\partial \underline{\gamma}}{\partial k} = -\frac{\partial \overline{U}^*/\partial k}{\partial \overline{U}^*/\partial \gamma}.$$

Applying the envelope theorem we get

$$\frac{\partial \overline{U}^*}{\partial k} = -(1 - p(\overline{e}^*))(1 - m) - \lambda^* \frac{\partial \overline{e}_B}{\partial k} < 0.$$

Thus,

$$\frac{\partial \underline{\gamma}}{\partial k} = -\frac{(1 - p(\overline{e}^*))(1 - m) - \lambda^* \frac{\partial \overline{e}_B}{\partial k}}{c(\overline{e}^*)} < 0,$$

as $\frac{\partial \overline{e}_B}{\partial k} > 0$ for $\theta_B^H < \tilde{\theta}_B^-$.

For $\theta_B^H > \tilde{\theta}^+$ $\underline{\gamma}$ solves $\overline{U}^* = \sigma(m\theta_B^H - (1 - m)k) - (1 - \sigma)k$. We have

$$\frac{\partial \underline{\gamma}}{\partial k} = -\frac{\partial \overline{U}^*/\partial k - \frac{\partial}{\partial k}[\sigma m \theta_B^H + k(1 - \sigma m)]}{\partial \overline{U}^*/\partial \gamma},$$

and substituting we get

$$\frac{\partial \underline{\gamma}}{\partial k} = \frac{p(1 - m) + m(1 - \sigma) - \lambda^* \frac{\partial \overline{e}_B}{\partial k}}{c(\overline{e}^*)} > 0.$$

We have that $\overline{e}^*$ changes the same as $\hat{e}'$ in k.

Effect of σ.

Favorable Judge. To start, we have

$$\frac{\partial \hat{e}_B}{\partial \sigma} = \frac{\partial C_f/\partial \sigma}{\partial \mu_B/\partial e}.$$

Applying the envelope theorem we get

$$\frac{\partial C_f}{\partial \sigma} = \frac{\theta_B^H(\theta_B^L + k)}{(\theta_B^H + \sigma k - (1-\sigma)\theta_B^L)^2},$$

which is positive if $\theta_B^L > -k$ and negative otherwise. If $\theta_B^H < \theta_B^*$ then, by the implicit function theorem, we have

$$\frac{\partial \hat{\gamma}}{\partial \sigma} = \frac{-(1-p(e^*))(1-m)(\theta_B^L + k) - \lambda^* \frac{\partial \hat{e}_B}{\partial \sigma}}{c(\hat{e}^*)},$$

which is negative if $\theta_B^L > -k$ and positive if $\theta_B^L < -k$. On the other hand, if $\theta_B^H > \theta_B^*$ then

$$\frac{\partial \hat{\gamma}}{\partial \sigma} = \frac{p(e^*)(1-m)(\theta_B^L + k) + \lambda^* \frac{\partial \hat{e}_B}{\partial \sigma}}{c(\hat{e}^*)},$$

which is positive if $\theta_B^L > -k$ and negative if $\theta_B^L < -k$. Next, we consider how a change in σ effects the incentive of a bureaucrat to change her effort, given she is going to expend positive effort. Analyzing her first-order condition yields

$$\frac{\partial \hat{e}'}{\partial \sigma} = \frac{p'(e^*)(1-m)(\theta_B^L + k)}{\gamma c''(e^*)}.$$

If $\theta_B^L \geq -k$ then $\frac{\partial \hat{e}'}{\partial \sigma} > 0$ and so the bureaucrat expends more effort. On the other hand, if $\theta_B^L < -k$ then increasing σ decreases effort.

If $\hat{e}^* = \hat{e}_B$ then the effect of σ on the bureaucrat's optimal effort depends on the effect of σ on this constraint. Differentiating we get $\frac{\partial C_f}{\partial \sigma} = \frac{\theta_B^H(2\theta_B^L + k) - (\theta_B^L)^2}{(\theta_B^H(1+\sigma) + \sigma k - \theta_B^L)^2}$. This is always positive if $\theta_B^L \geq 0$. Thus, in this case, if $\theta_B^* < \theta_B^H$ then $\hat{e}_B$ is increasing in σ.

Opposed Judge.

For $\gamma < \underline{\gamma}$ changing σ has the same effect on $\overline{e}^*$ as it does on $\hat{e}^*$ under a favorable judge. Next, we want to find the effect of increasing σ on $\underline{\gamma}$. If $\theta_B^H < \tilde{\theta}_B^-$ then the analysis of changes to $\underline{\gamma}$ is analogous to the analysis of changes to $\hat{\gamma}$. If $\theta_B^H > \tilde{\theta}_B^+$ then by the implicit function theorem we get

$$\frac{\partial \underline{\gamma}}{\partial \sigma} = -\frac{\partial \overline{U}^*/\partial \sigma - \frac{\partial}{\partial \sigma}[\sigma m \theta_B^H - k(1-\sigma m)]}{\partial \overline{U}^*/\partial \gamma}$$
$$\frac{\partial \underline{\gamma}}{\partial \sigma} = \frac{-(1-p(\overline{e}^*))(1-m)(\theta_B^L + k) - \lambda^* \frac{\partial \overline{e}_B}{\partial \sigma} - m(\theta_B^H + k)}{c(\overline{e}^*)},$$

where the second line follows from the envelope theorem. Note, however, that the sign of this derivative is highly dependent on where we are in the parameter space and there are not clear conclusions to be drawn on when we should expect it to be positive or negative.

B Extensions

B.1 Public Signal

At the policymaking stage the bureaucrat has already expended effort e and both players have observed the public signal s_B. This generates an updated belief μ that policy a is high quality. We break down the bureaucrat's choice looking at how, for a fixed effort e, different signal realizations alter the bureaucrat's choice.

Favorable Judge. If $e \geq \overline{e}_J$, for the bureaucrat to choose $x = a$ when $s_B = H$ we need $0 \leq \sigma(\mu_B^H \theta_B^H - (1-\mu_B^H)k) + (1-\sigma)(\mu_B^H \theta_B^H + (1-\mu_B^H)\theta_B^L)$. Rearranging, we write this condition as

$$\frac{\sigma k - (1-\sigma)\theta_B^L}{\theta_B^H + \sigma k - (1-\sigma)\theta_B^L} \leq \mu_B^H.$$

For the bureaucrat to choose $x = q$ when $s_B = L$ requires that $0 \geq \sigma(\mu_B^L \theta_B^H - (1-\mu_B^L)k) - (1-\sigma)k$, which we rewrite as

$$\frac{k}{\sigma(\theta_B^H + k)} \geq \mu_B^L.$$

When $e < \overline{e}_J$ the bureaucrat's decision following $s_B = H$ is the same. If $s_B = L$, however, then for the bureaucrat to choose $x = q$ requires that $0 \geq \sigma(\mu_B^L \theta_B^H - (1-\mu_B^L)k) + (1-\sigma)(\mu_B^L \theta_B^H + (1-\mu_B^L)\theta_B^L)$. This holds if

$$\frac{\sigma k - (1-\sigma)\theta_B^L}{\theta_B^H + \sigma k - (1-\sigma)\theta_B^L} \geq \mu_B^L.$$

To show that $\hat{e}_P \leq \hat{e}_B$ note that there is only one case in which they may differ. As μ_B^L is decreasing in effort, for this inequality to sometimes hold strictly we need

$$\frac{k}{\sigma(\theta_B^H + k)} < \frac{\sigma k - (1-\sigma)\theta_B^L}{\theta_B^H + \sigma k - (1-\sigma)\theta_B^L} = C_f.$$

Rearranging yields

$$\theta_B^H \geq \frac{k(\theta_B^L(1-\sigma) - \sigma k)}{\sigma \theta_B^L + (1+\sigma)k},$$

which always holds because $\theta_B^L < \theta_B'$, a necessary condition for separation under private information, implies that the left hand side is negative. There are three relevant cases to consider when the judge is favorable. The first is that the bureaucrat chooses $e = 0$ and follows this up by choosing $x = q$. The second is that she chooses $e = 0$ and $x = a$. The third is that she optimally chooses effort $\hat{e}_P^* \geq \hat{e}_P$ and chooses $x = a$ if $s_B = H$ and $x = q$ if $s_B = L$. Let $\hat{U}_P^*$ be the bureaucrat's expected utility for choosing $\hat{e}_P^*$. Thus, the bureaucrat solves the following problem when choosing effort

$$\max\left\{0, \sigma(m\theta_B^H - (1-m)k) + (1-\sigma)(m\theta_B^H + (1-m)\theta_B^L), \hat{U}_P^*\right\}.$$

This yields a similar problem as under private information. Thus, if γ is sufficiently small then the bureaucrat expends positive effort and chooses the policy corresponding to her signal. Otherwise, she expends no effort and pools on $x = a$ or $x = q$ depending on the strength of θ_B^L.

Opposed Judge. If $e \geq \overline{e}_J$ then the bureaucrat's payoffs for choosing $x = a$ and $x = q$ are the same as under a favorable judge. If $e < \overline{e}_J$ then the bureaucrat's decision when $s = L$ is the same. However, if $s = H$ then she only chooses $x = a$ if $0 \leq \sigma(\mu_B^H \theta_B^H - (1 - \mu_B^H)k) - (1 - \sigma)k$ which we can rewrite as

$$\frac{k}{\sigma(\theta_B^H + k)} \leq \mu_B^H.$$

From earlier, we know that the left hand side of this equation is less than C_f. As μ_B^H is increasing in effort, we get that, in this case, $\hat{e}_P < \hat{e}_B$. Otherwise, $\hat{e}_P = \hat{e}_B$. Define the effort level above which the bureaucrat separates as $\overline{e}_P$.

When choosing effort the bureaucrat may want to expend no effort and choose $x = q$ or no effort and select $x = a$. The bureaucrat may also choose $e > \overline{e}_P$ and select $x = a$ if $s_B = H$ and $x = a$ if $s_B = L$. Finally, if $\overline{e}_J < \overline{e}_B$ the bureaucrat may want to choose e such that $\overline{e}_J \leq e \leq \overline{e}_B$. In this case she chooses $x = a$ regardless of her signal but the judge will uphold the policy change if $s_B = H$. Thus, for θ_B such that $\overline{e}_B < \overline{e}_J$ the bureaucrat's problem is to solve

$$\max \Big\{ 0, \sigma(m\theta_B^H - (1 - m)k) - (1 - \sigma)k, \max_{e \in [\overline{e}_B, \overline{e}_J]} \pi(e)[\sigma(\mu_B^H \theta_B^H - (1 - \mu_B^H k) - (1 - \sigma)k] - \gamma c(e),$$
$$\max_{e \in [\overline{e}_J, 1]} \pi(e)[\sigma(\mu_B^H \theta_B^H - (1 - \mu_B^H k) + (1 - \sigma)(\mu_B^H \theta_B^H + (1 - \mu_B^H)\theta_B^L)] - \gamma c(e) \Big\}.$$

Which has a similar structure as the bureaucrat's problem under private information. Thus, her effort choice can again be characterized in terms of γ.

On the other hand, if θ_B is such that $\overline{e}_B > \overline{e}_J$ her effort choices solves

$$
\begin{aligned}
&\max\Big\{0, \sigma(m\theta_B^H - (1-m)k) - (1-\sigma)k, \\
&\max_{e\in[\overline{e}_J,\overline{e}_B]} \pi(e)[\sigma(\mu_B^H\theta_B^H - (1-\mu_B^H k) + (1-\sigma)\theta_B] \\
&+ [1-\pi(e)][\sigma(\mu_B^L\theta_B^H - (1-\mu_B^L)k) - (1-\sigma)k] - \gamma c(e), \\
&\max_{e\in[\overline{e}_B,1]} \pi(e)[\sigma(\mu_B^H\theta_B^H - (1-\mu_B^H)k) + (1-\sigma)(\mu_B^H\theta_B^H + (1-\mu_B^H)\theta_B^L)] - \gamma c(e)\Big\}.
\end{aligned}
$$

To distinguish the public information setting from the private information setting we want to show there exists parameters such that the bureaucrat chooses $e \in [\overline{e}_J, \overline{e}_B]$.

We start by showing that if γ is sufficiently small there exist parameters such that the bureaucrat prefers expending effort in $[\overline{e}_J, \overline{e}_B]$ over expending effort greater than $\overline{e}_B$. Letting $\gamma \to 0$ these optimal efforts go to $\overline{e}_P$ and 1, respectively. Comparing the bureaucrat's utility for each of these choices, for her to choose $\overline{e}_P$ requires

$$
\begin{aligned}
&\pi(\overline{e}_J)[\sigma(\mu_B^H(\overline{e}_J)\theta_B^H - (1-\mu_B^H(\overline{e}_J))k) + (1-\sigma)\theta_B] \\
&\qquad + [1-\pi(\overline{e}_J)][\sigma(\mu_B^L(\overline{e}_J)\theta_B^H - (1-\mu_B^L(\overline{e}_J))k) - (1-\sigma)k] \geq m\theta_B^H.
\end{aligned}
$$

We can write this inequality as

$$
m\theta_B^H(\sigma + (1-\sigma)p(\overline{e}_J)) + (1-m)\theta_B^L(1-\sigma)(1-p(\overline{e}_J)) - k((1-m)\sigma + (1-\pi(\overline{e}_J))(1-\sigma)) \geq m\theta_B^H,
$$

and rearranging again we get the condition

$$
(1-\sigma)(1-p(\overline{e}_J))((1-m)\theta_B^L - m\theta_B^H) - k(\sigma(1-m) + (1-\pi(\overline{e}_J))(1-\sigma)) \geq 0.
$$

If $\theta_B^L > \frac{m\theta_B^H}{1-m}$ and k is sufficiently small then this inequality holds. Thus, for γ sufficiently small we are able to find a set of parameters such that the bureaucrat prefers to choose $e \in [\overline{e}_J, \overline{e}_p]$ over choosing $e \geq \overline{e}_P$.

Finally, using our earlier proofs we have that if γ is sufficiently small choosing effort $e \geq \bar{e}_P$ is preferred to pooling on $x = a$ or $x = q$. Thus, taking γ sufficiently small there exist parameters such that the bureaucrat optimally chooses effort in $[\bar{e}_J, \bar{e}_B]$.

Proof of Corollary 2. First, assume the signal is private information. As $\sigma \to 0$ we have $\theta'_B \to 0$. Thus, if $\theta_B^L \geq 0$ then $\theta_B^L > \theta'_B$ and so the bureaucrat never separates. Now assume that the signal is private.

Favorable Judge. If $e = 0$ then choosing $x = a$ at the policy stage, following any signal, yields a payoff of $m\theta_B^H + (1-m)\theta_B^L$. Thus, at the effort stage choosing $e = 0$ yields a final payoff of $m\theta_B^H + (1-m)\theta_B^L$. As this is the bureaucrat's highest ex ante expected utility when $\theta_B^L \geq 0$ the bureaucrat never expends effort.

Opposed Judge. For $e < \bar{e}_J$ the judge always overturns $x = a$, thus, bureaucrat always chooses $x = q$ at the policymaking stage avoiding incurring the cost k. For $e > \bar{e}_J$, however, the bureaucrat chooses $x = a$ if $s_B = H$ as the judge sees the signal this is always be upheld and $x = q$ otherwise. Thus, the bureaucrat solves

$$\max\{0, \max_{e \geq \bar{e}_J} \pi(e)(\mu_B^H \theta_B^H + (1 - mu_B^H)\theta_B^L) - \gamma c(e)\}.$$

From our earlier analysis it is clear that for γ sufficiently small the bureaucrat chooses effort greater than $\bar{e}_J$. Thus, under public information there exists parameters for which the bureaucrat separates even as $\sigma \to 0$.

B.2 Judicial Authority

First, consider $e \geq \bar{e}_J$ and so the judge will uphold either policy when uninformed. For the bureaucrat to separate requires the following to hold

$$\sigma(\mu_B^H \theta_B^H - (1 - \mu_B^H)k) + (1 - \sigma)(\mu_B^H \theta_B^H + (1 - \mu_B^H)\theta_B^L) \geq \sigma \mu_B^H(\theta_B^H - k),$$

$$\sigma(\mu_B^L \theta_B - (1 - \mu_B^L)k) + (1 - \sigma)(\mu_B^L \theta_B^H + (1 - \mu_B^L)\theta_B^L) \leq \sigma \mu_B^L(\theta_B^H - k).$$

These constraints reduce to

$$\mu_B^H \geq \frac{\sigma k - (1-\sigma)\theta_B^L}{2\sigma k + (1-\sigma)(\theta_B^H - \theta_B^L)}, \tag{16}$$

$$\mu_B^L \leq \frac{\sigma k - (1-\sigma)\theta_B^L}{2\sigma k + (1-\sigma)(\theta_B^H - \theta_B^L)}. \tag{17}$$

Again, if $\theta_B^L > \theta_B'$ then no separating equilibrium exists. Assume $\theta_B^L \leq \theta_B'$. Define $\theta_B^{***} = \frac{\sigma k(1-2m)-(1-\sigma)(1-m)\theta_B^L}{m(1-\sigma)}$. If $\theta_B^H \geq \theta_B^{***}$ then constraint (17) is binding, otherwise (16) is binding. Define $\overline{e}^A$ as the unique solution to (16) when $\theta_B^H > \theta_B^{***}$ and define it as the unique solution to (17) when $\theta_B^H < \theta_B^{***}$.

First, looking at constraint (17), the left hand side is decreasing as e increases and the right hand side is decreasing in θ_B^H. Thus, it must be that $\overline{e}^A$ is increasing in θ_B^H when $\theta_B^H \geq \theta_B^{***}$. On the other hand, when equation (16) is binding the LHS is increasing in e. Thus, in this case e^A is decreasing in θ_B^H. Therefore, if $e \geq \max\{e^A, \overline{e}_J\}$ then the bureaucrat separates.

Next, consider a favorable judge and $e \leq \overline{e}_J$. In this case, for the bureaucrat to separate requires

$$\sigma(\mu_B^H\theta_B^H - (1-\mu_B^H)k) + (1-\sigma)(\mu_B^H\theta_B^H + (1-\mu_B^H)\theta_B^L) \geq \sigma\mu_B^H(\theta_B^H - k) + (1-\sigma)(\mu_B^H\theta_B^H + (1-\mu_B^H\theta_B^L - k),$$

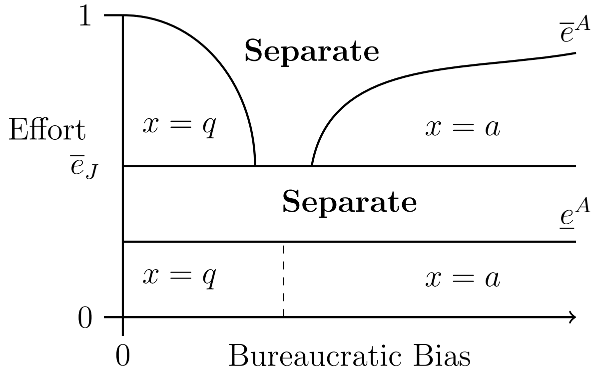
$$\sigma(\mu_B^L\theta_B^H - (1-\mu_B^L)k) + (1-\sigma)(\mu_B^L\theta_B^H + (1-\mu_B^L)\theta_B^L) \leq \sigma\mu_B^L(\theta_B^H - k) + (1-\sigma)(\mu_B^L\theta_B^H + (1-\mu_B^L\theta_B^L - k).$$

Rearranging we can write these as

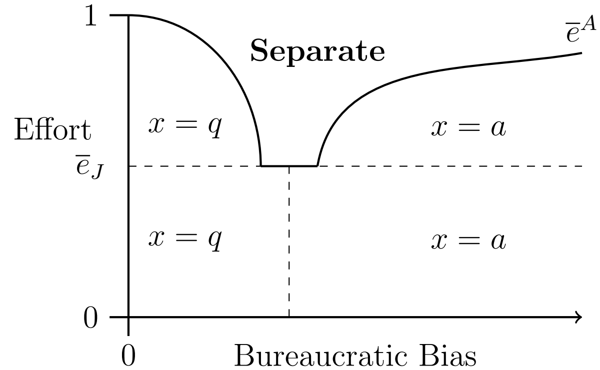
$$\mu_B^H \geq 1 - \frac{1}{2\sigma}, \tag{18}$$

$$\mu_B^L \leq 1 - \frac{1}{2\sigma}. \tag{19}$$

If $m \geq 1 - \frac{1}{2\sigma}$ then (19) is the binding constraint; otherwise, if $m < 1 - \frac{1}{2\sigma}$ then (18) is the binding constraint. Note that in this case the constraint does not depend on the bureaucrat's policy preference. Let $\underline{e}^A$ solve the relevant constraint. If $\underline{e}^A > \overline{e}_J$ then the bureaucrat's decision is fully characterized by $\overline{e}^A$. If $\underline{e}^A < \overline{e}_J$ then the bureaucrat separates for $e > \overline{e}^A$, pools for $e \in [\overline{e}_J, \overline{e}^A]$, separates for $e \in [\underline{e}^A, \overline{e}_J]$, and pools for $e < \underline{e}^A$.



(a) $\overline{e}_J > \underline{e}^A$



(b) $\overline{e}_J \leq \underline{e}^A$

Figure 6: The bureaucrat's policy choice based on her bias and effort under judicial authority.

If $\overline{e}_J \leq \underline{e}^A$ then the bureaucrat's expected utility for effort, given she is expending positive effort, is

$$\max_{e \geq \overline{e}^A} \pi(e)(\sigma(\mu_B^H(e)\theta_B^H - (1-\mu_B^H(e))k) + (1-\sigma)(\mu_B^H\theta_B^H + (1-\mu_B^H)\theta_B^L) + (1-\pi(e))\sigma\mu_B^L(\theta_B^H - k) - \gamma c(e).$$

This yields first-order condition

$$\frac{1-\sigma}{2}\left(m\theta_B^H - (1-m)\theta_B^L\right) + \frac{k\sigma}{2} = \gamma c'(e). \tag{20}$$

Denote the unique solution to (20) as $\overline{e}'_A$. Thus, the bureaucrat's optimal effort is $\overline{e}^*_A = \max\{\overline{e}^A, \overline{e}'_A\}$. Let the bureaucrat's expected utility for choosing $\overline{e}^*_A$ be

$$\overline{U}^*_A = m\theta_B^H(p(\overline{e}^*_A) + (1-p(\overline{e}^*_A))\sigma) - k\sigma(1-p(\overline{e}^*_A)) + (1-\sigma)(1-p(\overline{e}^*_A))(1-m)\theta_B^L - \gamma c(\overline{e}^*_A).$$

The bureaucrat chooses effort that solves the following maximization

$$\max\{\sigma(m\theta_B^H-(1-m)k)+(1-\sigma)(m\theta_B^H+(1-m)\theta_B^L),\ \sigma m(\theta_B^H-k)-(1-\sigma)k,\ \overline{U}_A^*\}.$$

Using the envelope theorem we get $\frac{\partial\overline{U}_A^*}{\partial\gamma}=-\gamma c(\overline{e}_A^*)<0$. Additionally, $\lim_{\gamma\to 0}\overline{e}_A^*=1$ and, thus, $\lim_{\gamma\to 0}\overline{U}_A^*=m\theta_B^H$.

If the judge is favorable and constraint (18) is binding then $\overline{\gamma}_A$ solves $\overline{U}_A^*=\sigma m(\theta_B^H-k)-(1-\sigma)k$. Clearly, $\lim_{\gamma\to 0}\overline{U}_A^*>\sigma m(\theta_B^H-k)-(1-\sigma)k$, thus $\overline{\gamma}_A>0$. If the judge is favorable and constraint (19) is binding then $\overline{\gamma}_A$ solves $\overline{U}_A^*=\sigma(m\theta_B^H-(1-m)k)+(1-\sigma)(m\theta_B^H+(1-m)\theta_B^L)$. By $\theta_B^L<\theta_B'$ we have $\lim_{\gamma\to 0}\overline{U}_A^*>\sigma(m\theta_B^H-(1-m)k)+(1-\sigma)(m\theta_B^H+(1-m)\theta_B^L)$ and so $\overline{\gamma}_A>0$. Plugging in $\theta_B^H=0$ we see that these inequalities still hold strictly and thus $\overline{\gamma}_A>0$ even for $\theta_B^H=0$.

Next, let $\overline{e}_J>\underline{e}_A$. In this case let $\underline{e}_A^*$ solve

$$\max_{e\in[\underline{e}_A,\overline{e}_J]}\pi(e)\Big(\sigma(\mu_B^H(e)\theta_B^H-(1-\mu_B^H(e))k)+(1-\sigma)(\mu_B^H\theta_B^H+(1-\mu_B^H)\theta_B^L)\Big)$$
$$+(1-\pi(e))\Big(\sigma\mu_B^L(\theta_B^H-k)+(1-\sigma)(\mu_B^L\theta_B^H+(1-\mu_B^L)\theta_B^L-k)\Big)-\gamma c(e).$$

Let $\underline{e}_A'$ solve the first-order condition

$$\frac{k}{2}\Big(1-2m(1-\sigma)\Big)=\gamma c'(e).$$

Therefore, $\underline{e}_A^*=\min\{\overline{e}_J,\max\{\underline{e}_A,\underline{e}_A'\}\}$. Define $\underline{U}_A^*$ as the bureaucrat's utility for choosing $\underline{e}_A^*$. The bureaucrat chooses effort e to solve

$$\max\{\sigma(m\theta_B^H-(1-m)k)+(1-\sigma)(m\theta_B^H+(1-m)\theta_B^L),\ \sigma m(\theta_B^H-k)-(1-\sigma)k,\ \underline{U}_A^*,\ \overline{U}_A^*\}.$$

Still, for γ sufficiently low the bureaucrat expends enough effort to separate and have the judge uphold the policy choice. Furthermore, the cutoff is strictly greater than 0 for θ_B^H.

This is because $\lim_{\gamma\to 0}\overline{U}^*_A = 0 > \max\{-\sigma(1-m)k, -\sigma mk\}$. Thus, in any case, for $\theta^H_B = 0$ we have $\overline{\gamma}_A > 0 = \hat{\gamma}$. By continuity of the bureaucrat's payoffs, for any θ^H_B sufficiently small we have $\overline{\gamma}_A > \hat{\gamma}$.

Finally, we consider an opposed judge. First, let $\overline{e}_J \le \underline{e}_A$. This yields the following constraints for the bureaucrat to separate

$$\sigma(\mu^H_B\theta^H_B - (1-\mu^H_B)k) - (1-\sigma)k \ge \sigma\mu^H_B(\theta^H_B - k),$$
$$\sigma(\mu^L_B\theta^H_B - (1-\mu^L_B)k) - (1-\sigma)k \le \sigma\mu^L_B(\theta^H_B - k).$$

We can rewrite these constraints as

$$\mu^H_B \ge \frac{1}{2\sigma}, \tag{21}$$
$$\mu^L_B \le \frac{1}{2\sigma}. \tag{22}$$

If $m \ge \frac{1}{2\sigma}$ then (21) is the binding constraint and, otherwise, if $m < \frac{1}{2\sigma}$ then (22) is the binding constraint. Note, that in this case the constraint does not depend on the bureaucrat's policy preferences. Let $\underline{e}^A$ solve the relevant constraint. If $\underline{e}^A > \overline{e}_J$ then the bureaucrat's decision is fully characterized by $\overline{e}^A$. If $\underline{e}^A < \overline{e}_J$ then the bureaucrat separates for $e > \overline{e}^A$, pools for $e \in [\overline{e}_J, \overline{e}^A]$, separates for $e \in [\underline{e}^A, \overline{e}_J]$, and pools for $e < \underline{e}^A$.

If the judge is opposed and $m < \frac{1}{2\sigma}$ then $\overline{\gamma}_A$ solves $\overline{U}^*_A = \sigma(m\theta^H_B - (1-m)k) - (1-\sigma)k$. If $m > \frac{1}{2\sigma}$ then $\overline{\gamma}_A$ solves $\overline{U}^*_A = \sigma m(\theta^H_B - k)$. We have $\lim_{\gamma\to 0}\overline{U}^*_A = m\theta^H_B > \max\{\sigma m\theta^H_B - \sigma(1-m)k - (1-\sigma)k, \sigma m\theta^H_B - \sigma mk\}$. In either case the RHS is not a function of γ and from our previous results we have $\overline{U}^*_A$ strictly decreasing in γ, thus, $\overline{\gamma}_A$ exists and $\overline{\gamma}_A > 0$, even for $\theta^H_B = 0$. As $\overline{\gamma} = 0$ for $\theta^H_B = 0$, by continuity for θ^H_B sufficiently small the bureaucrat is less likely to shirk under expanded judicial authority.

B.3 Judiciary with Extreme Policy Bias

If the judge prefers the same policy regardless of the state of the world then an opposed judge always rejects the policy change and a favorable judge always accepts the policy change. Thus, if the judge is opposed the bureaucrat's utility for proposing $x = a$, regardless of her signal or effort, is $-k < 0$ and so the bureaucrat always keeps the status quo.

When the judge is favorable we have two cases. First, if $\theta_B^L \geq 0$ then the bureaucrat always proposes $x = a$ as this yields expected utility $\mu\theta_B^H + (1-\mu)\theta_B^L \geq 0$. Thus, the bureaucrat chooses $x = a$ for any effort level and so shirks as well and chooses $e = 0$. Second, if the bureaucrat prefers $x = q$ when the policy change is low quality then her optimal effort is chosen to solve

$$\max\{0, m\theta_B^H + (1-m)\theta_B^L, \max_{e \geq \hat{e}_B} \pi(e)[\mu_B^H\theta_B^H + (1-\mu_B^H)\theta_B^L] - \gamma c(e)\}.$$

Using the same analysis as before, we get that if $\hat{\gamma} > 0$ and so for γ sufficiently small the bureaucrat is still willing to expend effort and separate.

References

Aghion, Philippe and Jean Tirole, "Formal and real authority in organizations," *Journal of Political Economy*, 1997, *105* (1), 1–29.

Argenziano, Rossella, Sergei Severinov, and Francesco Squintani, "Strategic information acquisition and transmission," *American Economic Journal: Microeconomics*, 2016, *8* (3), 119–155.

Bailey, M, "Measuring ideology on the courts," *Working Paper*, 2016.

Bertelli, Anthony M, Dyana P Mason, Jennifer M Connolly, and David A Gastwirth, "Measuring agency attributes with attitudes across time: A method and examples using large-scale federal surveys," *Journal of Public Administration Research and Theory*, 2015, *25* (2), 513–544.

Besley, Timothy and Maitreesh Ghatak, "Competition and incentives with motivated agents," *The American Economic Review*, 2005, *95* (3), 616–636.

Bonica, Adam, Jowei Chen, and Tim Johnson, "Automated methods for estimating the political ideology of individual public bureaucrats across time and in a common ideological space," *Unpublished Manuscript, New York University*, 2012.

Cameron, Charles M and Lewis A Kornhauser, "Decision rules in a judicial hierarchy," *Journal of Institutional and Theoretical Economics*, 2005, *161* (2), 264–292.

Chade, Hector and Natalia Kovrijnykh, "Delegated information acquisition with moral hazard," *Journal of Economic Theory*, 2016, *162*, 55–92.

Chen, Jowei and Tim Johnson, "Federal employee unionization and presidential control of the bureaucracy: Estimating and explaining ideological change in executive agencies," *Journal of Theoretical Politics*, 2015, *27* (1), 151–174.

Clinton, Joshua D, Anthony Bertelli, Christian R Grose, David E Lewis, and David C Nixon, "Separated powers in the United States: The ideology of agencies, presidents, and congress," *American Journal of Political Science*, 2012, *56* (2), 341–354.

Crewson, Philip E, "Public-service motivation: Building empirical evidence of incidence and effect," *Journal of Public Administration Research and Theory*, 1997, *7* (4), 499–518.

Dessein, Wouter, "Authority and communication in organizations," *The Review of Economic Studies*, 2002, *69* (4), 811–838.

Dragu, Tiberiu and Oliver Board, "On judicial review in a separation of powers system," *Political Science Research and Methods*, 2015, *3* (3), 473–492.

Epstein, Lee, Andrew D Martin, Jeffrey A Segal, and Chad Westerland, "The judicial common space," *Journal of Law, Economics, and Organization*, 2007, *23* (2), 303–325.

Eskridge, William Jr. and Lauren E Baer, "The continuum of deference: Supreme Court treatment of agency statutory interpretations from *Chevron* to *Hamdan*," *Georgetown Law Journal*, 2007, *96*, 1083.

Gailmard, Sean and John Patty, "Participation, process, & policy: the informational value of politicized judicial review," *Washington University in St. Louis Working Paper*, 2013.

_ **and John W Patty**, "Slackers and zealots: Civil service, policy discretion, and bureaucratic expertise," *American Journal of Political Science*, 2007, *51* (4), 873–889.

Garvie, Devon A and Barton L Lipman, "Regulatory rule-making with legal challenges," *Journal of Environmental Economics and Management*, 2000, *40* (2), 87–110.

Gilligan, Thomas W and Keith Krehbiel, "Collective decisionmaking and standing committees: An informational rationale for restrictive amendment procedures," *Journal of Law, Economics, & Organization*, 1987, *3* (2), 287–335.

Hübert, Ryan, "The downsides of dispassionate judges: A theory of costly law enforcement in district courts," *Working Paper*, 2015.

Johnson, Ronald N and Gary D Libecap, *The federal civil service system and the problem of bureaucracy: The economics and politics of institutional change*, University of Chicago Press, 1994.

Lax, Jeffrey R, "The new judicial politics of legal doctrine," *Annual Review of Political Science*, 2011, *14*, 131–157.

Martin, Andrew D and Kevin M Quinn, "Dynamic ideal point estimation via Markov chain Monte Carlo for the US Supreme Court, 1953–1999," *Political Analysis*, 2002, *10* (2), 134–153.

Meier, Kenneth John and Lloyd G Nigro, "Representative bureaucracy and policy preferences: A study in the attitudes of federal executives," *Public Administration Review*, 1976, *36* (4), 458–469.

Miles, Thomas J and Cass R Sunstein, "The real world of arbitrariness review," *The University of Chicago Law Review*, 2008, *75* (2), 761–814.

Morgenstern, Richard D and Paul R Portney, *New approaches on energy and the environment: Policy advice for the president*, Resources for the Future, 2004.

Prendergast, Canice, "The limits of bureaucratic efficiency," *Journal of Political Economy*, 2003, *111* (5), 929–958.

_ , "The motivation and bias of bureaucrats," *The American Economic Review*, 2007, pp. 180–196.

_ , “Work incentives, motivation, and identity-intrinsic motivation and incentives,” *American Economic Review*, 2008, *98* (2), 201.

Revesz, Richard L, “Environmental regulation, ideology, and the DC Circuit,” *Virginia Law Review*, 1997, *83* (8), 1717–1772.

Rogers, James R, “Information and judicial review: A signaling game of legislative-judicial interaction,” *American Journal of Political Science*, 2001, *45* (1), 84–99.

Shipan, Charles R, “The legislative design of judicial review: A formal analysis,” *Journal of Theoretical Politics*, 2000, *12* (3), 269–304.

Stephenson, Matthew, “A costly signaling theory of hard look review,” *Harvard Law and Economics Discussion Paper*, 2006, (539).

Stephenson, Matthew C, “Bureaucratic decision costs and endogenous agency expertise,” *Journal of Law, Economics, and Organization*, 2007, *23* (2), 469–498.

Sunstein, Cass R, David Schkade, and Lisa Michelle Ellman, “Ideological voting on federal courts of appeals: A preliminary investigation,” *Virginia Law Review*, 2004, *90* (1), 301–354.

Turner, Ian R, “Working smart and hard? Agency effort, judicial review, and policy precision,” *Working Paper*, 2015.

Zermeno, Luis, “A principal-expert model and the value of menus,” *Working Paper*, 2011.