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The Role of Information and Inequality on Political Institutions

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Doctor of Philosophy

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An abstract of
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2025

Abstract

Institutions shape political and economic outcomes, but they do so within an environment of unequal access to information and asymmetric power dynamics. My dissertation examines how these asymmetries influence decision-making in broadly three institutional settings—regulatory policymaking, coalition bargaining, and bureaucratic coordination—focusing on the ways in which information access, bargaining power, and coordination constraints shape decision-making.

In *Strategic Experiments Under Regulatory Uncertainty*, I present a model of policymaking in complex domains. I apply the model to a hypothetical situation in which a firm has developed a new product but is uncertain about its quality. The firm can acquire more information about the quality of the product, but knows that this information will be "public" in the sense that it will also be observed by the regulator. The firm's choice about information is represented as a Blackwell experiment. After the firm designs its experiment and the result of the experiment is realized, the firm and regulator can each take unilateral costly action to discover the truth. Thus, the firm wants to learn enough to make the optimal choice regarding revealing the true state but also wants to prevent the regulator from knowing too much. In equilibrium, the firm chooses to reveal partial information with a binary experiment. In particular, the firm's optimal experiment is informative only about whether the firm or the regulator has an incentive to invest in discovering the product's true quality.

In *Bargaining for Longevity*, I propose a theoretical framework of government coalitions in which a proposer with complete discretion over resource allocation between her and a partner faces a trade-off between immediate gains and long-term stability. I particularly focus on the role of dynamic outside options in driving this trade-off and show that the real benefit of being a proposer may not be in the share she appropriates within a coalition but rather in her choice of coalition longevity. The proposer sometimes concedes to her partner and buys his long-term support just so that she can be the one to time the dissolution of the coalition. This mechanism lends additional support to the lack of proposer advantage in portfolio allocation as well as the relative strength of weak parties discussed in the empirical literature. I further identify conditions under which parties may agree on their choice to use commitment devices.

Lastly, I show in a co-authored work, *Coordination in Bureaucratic Policy-Making*, how agencies with overlapping policy responsibilities coordinate their decisions. We consider a model of coordination in which a political executive can provide subsidized coordination between two agencies and consider how this possibility affects both the agencies' incentives and, ultimately, social welfare. Our model of subsidizing coordination is very simple: an executive can invest her own resources in a *coordination protocol* that the agencies can (but need not) use to align their decisions. We consider the impact of scarce attention at the agency level and demonstrate that, while coordination between the agencies is maximized by the agencies having aligned policy preferences, the fact that the executive can invest in the coordination protocol undermines these incentives.

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Chapter 1

Strategic Experiments Under Regulatory Uncertainty

1.1 Introduction

Emerging technologies continuously reshape markets, often adding new regulatory concerns to an industry. In response, regulatory agencies are tasked with evaluating these new developments with regard to the existing regulatory practices and determining potential violations. Yet the significant complexity of many industries, coupled with the inadvertent co-production of latent hazards by independent firms, leaves both firms and agencies uncertain about the new product's expected safety or, more broadly, its impact on society's welfare [52, 46, 139, 146, 169].

For instance, part of the reason behind the grounding of the Boeing 787 Dreamliner fleet was the fact that defects that could emerge in battery manufacturing were not caught by inspection [150]; the regulation of a decongestant drug pseudoephedrine highlights how a product can become a critical component in harmful activities, such as the production of meth, illustrating how regulatory concerns can emerge in unforeseen ways. In other cases, a lot is still unknown about whether the facial recognition technology (FRT)'s benefits will outweigh the potential problems regarding misidentification, underscoring the challenges agencies face in anticipating and addressing latent risks within existing regulatory frameworks. With the U.S. Supreme Court's recent ruling in *Loper Bright Enterprises v. Raimondo* endowing the courts with the power to rely on their own interpretation of ambiguous laws, the legal landscape has recently become far more uncertain for both firms and the agencies that regulate them.

I consider the firm's optimal information acquisition in this context. In the theoretical framework, both the firm and the regulator are uncertain about the true social impact of the firm's product. Uncertainty over the outcome can be fully resolved through players' decision to take the issue to court, but prior to the decision, the firm conducts a one-time observable Blackwell experiment that is informative about the truth. After the firm and regulator observe the experiment's outcome, each chooses whether to accept the status quo level of regulation or pay a cost to go to court and enforce a new regulatory standard that reflects the "true" social impact of the product.

It is straightforward to see that players will go to court only if they expect to gain by doing so. The firm thus wants to learn more about the product, as this helps the firm make an informed decision about whether or not to risk going to court. Importantly, however, the firm's choice of an experiment is *public* in my model. For example, in the real world, how tech companies such as Apple, Google, Meta, and X/Twitter deploy new features using AI shapes not only their own beliefs about the products' social, economic, and political impacts - it also shapes the beliefs held by outsiders, such as regulators and politicians; oil companies shape their own and the public's beliefs through their choice of which experts to hire to evaluate new oil spill prevention technologies; pharmaceutical companies choose which research design to use when seeking approval of their drugs, and so forth. In the context of the model, this implies that both the firm and the regulator update their beliefs about the product's social impact via the experiment. In other words, the regulator—whose preferences are not fully aligned with the firm—may also benefit from the firm's information acquisition. This paper focuses on how such "learning in front of an audience" shapes the firm's incentives to provide information and fully characterizes the firm's optimal signal structure.

I show that the firm's optimal experimental design in this framework manipulates the observability of the underlying state to the firm's advantage. Despite having complete flexibility in designing its information acquisition process, the firm's optimal choice is a simple binary experiment: the outcome of the experiment effectively signals only whether the regulator or the firm may have an incentive to go to court. More formally, there are essentially two classes of binary experiments that can be optimal for the firm that reveal whether the product quality is *above* or *below* some threshold.

Specifically, I characterize the optimal experiment by examining three different sub-cases. When the quality of the product is likely to be high, i.e., the firm's risk of going to court is low, the firm can perfectly exploit its information-designing power by revealing all the good information about the product and concealing the rest. This is equivalent to commissioning a study that reveals only whether the product is "extremely safe" or "not extremely safe." Here the prior belief about the product is favorable enough that the firm can perfectly separate out the states under which it would challenge the status quo ("extremely safe"); and the key is that even when the study finds that the product is "not extremely safe," the regulator still believes that the product must be safe *enough* and refrains from going to court.

With moderate risk, the firm-optimal still involves only revealing good information about the product, but now the firm is unable to reveal all of them as in the low-risk case. This is because the regulator's prior belief about the product is moderate that if the study reveals that the product is not "extremely safe," the regulator is now convinced that it must be unsafe and goes to court. For the firm to deter the regulator from going to court after a bad signal, it optimally has to pool some of the good information with the bad information. By doing so, the firm induces the regulator's posterior belief after the "not extremely safe" outcome to be just high enough that he is persuaded not to take the issue to court.

When the risk of going to court is high, the firm optimally reveals whether the product is extremely harmful to the society, i.e., commissions a study that reveals whether the product is "extremely *un*safe" or "not extremely *un*safe." Here the regulator is very strongly incentivized to go to court in the first place. In order for the firm to dissuade the regulator from going to court, the firm has to commit to disclosing some of its worst states ("extremely unsafe"), after which the regulator goes to court and tightens the regulation. The firm ex-ante gains by doing so because this way, the regulator's posterior belief conditional on the product being "not extremely unsafe" is just high enough to deter him from going to court. This last result can in particular be helpful in explaining why we often see firms voluntarily disclosing damaging information about its own product. For example, Nike has implemented a Responsible Disclosure Program that encourages external researchers to report security vulnerabilities in its products; Meta has hired independent audit boards that are tasked with revealing controversial practices related to misinformation, harmful content, and privacy issues. We expect to observe these behaviors when the firm is *least* confident about the potential social impact of the product.

The model further shows that both players sometimes have shared preferences for silence. In equilibrium, the firm strategically manipulates information to maximize the regulator's silence; in other words, by fully exploiting its informational advantage, the regulator is persuaded not to pursue court action even when it could ex-post successfully challenge the status quo. As a result, the regulator often ends up worse off due to the firm's information generation. I find that the regulator sometimes prefers to let this happen. The idea is that as the firm gains more information about the product, it becomes better at identifying *when* it is strategically advantageous to go to court and in turn goes to court less often compared to when it lacks information. The regulator, in turn, may benefit from the firm's increased reluctance to go to court and willingly forgoes its own opportunities to pursue legal action in favor of maintaining silence.

This framework is related to an extensive and growing literature on regulation in incomplete information settings. Previous works consider an optimal stopping problem in the context of pre-market approval where an agency learns about the policy environment through the firm's experimentation [e.g., 50, 52, 46, 47, 100, 140] or their efforts at self-regulation [139]. Other works examine how market competition interacts with politics in innovative markets [41, 42], or emphasize the bureaucratic problems inherent to delegation when new regulatory concerns emerge [31, 82, 146].

Much of the work to date has understandably considered settings in which players' payoffs are conditional on each other's action: the firm decides how much experimentation to perform on a product; after observing the outcome, the firm decides whether to submit the product for review. The regulator observes the information, updates his beliefs, and then decides whether or not to approve the product [50, 52, 47]. In this setting, the firm must apply for the product in order for the regulator to review it. This means that information can never backfire for firm. If the firm's experiment returns a bad outcome, and if the firm decides not to submit the product, the regulator is unable to reject something that has not been submitted. The firm's primary incentive here is thus to use information to persuade the regulator to approve the product whenever the firm submits it for review.

The key difference of my model is the firm and the regulator's ability to act *independently* after acquiring information. We often observe examples of this within the context of post-market complexities associated with a firm's product. In these scenarios, the regulator can take unilateral measures that tighten the preexisting regulation, which implies that now information can *backfire*. If the outcome of the experiment is damaging for firm, the regulator can use that information to shift the regulatory landscape without having to condition its action on firm's submission. Now the firm needs to consider how much to learn about the product in light of the fact that the regulator also observes the information and can use it against the firm.[1]

More broadly, my model contributes to the large body of research that highlights how strategic information provision is affected by the preferences of the decision-maker [e.g. 38, 37, 85, 26, 128, 166] and, concomitantly, how decisions are informed and chosen when faced with strategically information provision [7, 164, 40, 39, 173, 174, 175, 176, 9, 69, 157, 59, 158]. For instance, [157] find that the employer might optimally withhold sensitive information that can be used for discrimination. In [158], the designer might want to incorporate noise into his decision in order to manipulate behavior. These results resonate with the firm in my model committing to receiving a noisy signal.

1.2 Benchmark Model

Consider two players, Firm (she) and Regulator (he). Firm wants to expand her marketing claims for a product. The product is currently subject to a certain level of regulation, with Firm and Regulator's utility from the regulation reflected in the status quo division $(x, 1-x)$ where $x \in [0,1]$.

There is currently only preliminary evidence about the product's expected social impact, ω. This underlying state conveys the extent to which Regulator can impose

[1] Note that this model can still account for the process of product review or bargaining. So long as both players retain the option to independently challenge the status quo regulation later down the road, the qualitative results of my model remain consistent.

rules or restrictions on the product within legal confines. To keep the model as transparent and simple to present as possible, I only focus on the interval over which Firm and Regulator have misaligned interests and assume that Firm always prefers a more lenient regulation than Regulator does. Both players can decide to pay some cost to go to court and have an (unmodeled) court reveal ω and enforce a new regulation based on the underlying state.

Prior to this decision, Firm chooses a publicly observable experiment that generates some information about state ω. This outcome becomes the data for both players' decisions that follow. We could expect two counteracting incentives to prevail: one where Firm wants to learn more about the product so that she could make an informed decision about whether or not to challenge the status quo, and another where she wants Regulator to be sufficiently unaware that he is persuaded not to go court even when the current level of regulation is too lenient relative to the "true" social impact of the product. Generating less information can thus be strategically optimal for Firm. Each stage of the game is detailed below.

Initial Stage. Nature first draws ω from distribution F with expectation $\mathbb{E}[\omega]$. I assume that F has continuous and strictly positive density f on $[0,1]$. State ω is not directly observed by any player. Players then observe the status quo division $(x, 1-x)$ and the cost of going to court $c \in [0,1]$, which is common knowledge to both players.

Signal Stage. Firm engages in a publicly observable Blackwell experiment that informs both players about the outcome. The experiment gathers more information about ω. Firm can choose how *much* to learn about it, and any information that Firm learns is accessible to Regulator. Players condition their strategy in the conflict stage on such endogenously acquired public information. Formally, Firm can choose any ordered set S and joint distribution v over $[0,1]\times S$. Players observe the realization $s \in S$ and Bayesian updates their beliefs. Let F_s denote the distribution that represents the posterior belief following the realization $s \in S$.

Conflict Stage. Players simultaneously decide whether or not to go to court and enforce a new regulation based on the public signal they have received in the signal stage.[2] In this stage, they choose either to go to court (C) or not (N). If both players choose not to go to court and stay silent, they receive the initial status quo payoffs. If either of the players chooses to go to court, the true state is realized and players' realized payoffs are $(\omega, 1-\omega)$. Intuitively, Regulator goes to court if the outlook of going to court post-signal is advantageous enough for himself; Firm may also do so if she is fairly confident about the outcome and believes that she will be able to challenge the status quo. Further, a player choosing to go to court pays a net cost c, which measures the general effort needed for the true state to be realized. The cost implies that players won't be willing to overturn the initial status quo division unless the additional benefit they expect to gain by going to court exceeds its cost. The sequence of the game is as follows:

1. Nature draws a true state $\omega \in [0,1]$ from distribution F.

2. Players observe the cost of going to court c and the initial division of dollar $(x, 1-x)$.

3. Firm chooses a publicly observable experiment defined by set S and distribution v.

4. Players observe the realized signal $s \in S$.

[2] Note that the results of the model are identical even if we assume that the players move in sequential order. This is because players never go to court at the same time in equilibrium. In such a setup, one of the players moves first and decides whether to go to court or stay silent; the other player then also chooses between the same actions. I assume throughout for simplicity that players act simultaneously.

5. Players play a simultaneous game.

		Regulator: N	Regulator: C
Firm	N	$(x, 1-x)$	$(\omega, 1-\omega-c)$
Firm	C	$(\omega-c, 1-\omega)$	$(\omega-c, 1-\omega-c)$

Table 1.1: Payoff Structure

Below I offer a few comments on this model's assumptions. First, in the model, the incentives of Firm are misaligned with those of Regulator. In particular, I assume that Firm does not suffer the full social damage even when the product is revealed to be socially harmful and does not necessarily recoup the full social benefits [101]. Firm thus simply wants to push the regulatory boundaries and promote her new product under fewer regulations ($\omega = 1$). Regulator, on the other hand, believes that there are potential risks that have not been fully explored and wants to impose stricter standards ($\omega = 0$). Alternatively, he is cautious about setting a strong precedent that may limit his future ability to regulate Firm, or he prioritizes guarding his reputation for protecting consumer safety [e.g. 52].

Note that Regulator need not have direct preferences against the product, i.e., we should not think of $\omega = 0$ as the state where the product is harmful. Instead, he has preferences for some level of regulation on the product with uncertain risks. In this sense, we may also assume Regulator who simply prefers to impose fewer regulations when the product has high quality and strict regulations otherwise. The model could then be interpreted as a subgame of this game where the quality of the product is "low," and Firm and Regulator are in conflict over the level of regulation. Firm still wants the product to be subject to lenient regulations while Regulator prioritizes safety over profitability and prefers it to be regulated. In Section A.5.2, I directly explore this with a different payoff matrix that reflects Regulator's preference for accurately matching the regulation with underlying state ω.[3]

Second, both players are symmetrically uninformed about the true social impact of the product. This value is initially unknown to both players and remains so unless either of the players pays some cost and goes to court, reflecting the notion that firms may be uncertain as to the quality and safety of their products [47]. This may especially be the case given that players in my model act anticipating the future realization of truth via legal proceedings, which are influenced by various external factors such as changes in the political climate or public perception. Such inherent unpredictability makes it challenging for both Firm and Regulator to forecast the results of a potential dispute. I relax this in Section 1.6.2 and discuss how the results change when we assume privately informed Firm.

Third, I interpret the cost of going to court c as the "enforcement cost" required to contest the existing regulation and establish a new standard. For simplicity c is assumed to be common for all players; however, note that this enforcement cost may have to be interpreted differently for Firm and Regulator, especially since Firm is likely to have the technology to fully reveal the state and communicate it to others with no costs. We could then alternatively think of heterogeneous costs for Firm and Regulator where $c_R = c_F + \gamma$, and γ is regulator's cost to *learning* the state and c is administrative costs, i.e., Firm has no costs of learning. I characterize this in Appendix A.6 and find that the results are qualitatively similar.

Lastly, the current setup of the model allows going to court as the only action available to the players after the experiment and the detailed process of the legal

[3] I consider a binary example where $\omega \in \{0, 1\}$ and find that Firm optimally provides no information more often than in the benchmark model. This is coming from the fact that Firm may now *want* Regulator to go to court so that she can free-ride on the cost while changing the status quo to her favor. Otherwise the key qualitative outcomes remain unchanged.

action is modeled in a "black-box" fashion. While this modeling choice was made for simplicity, the model can easily account for other processes of post-experiment bargaining or product review without changing the core results of the model. In particular, Firm's optimal choice of experiment will be identical so long as the conflict stage exists; this is because Firm's incentive to learn more/less depends primarily on the fact that both Firm and Regulator can unilaterally pay some cost to reveal the underlying state and enforce a new regulation.

1.3 Equilibrium Analysis

This section provides a full characterization of the model. I first solve the last stage of the game where both Firm and Regulator, with some belief about ω, decide whether or not to pay some cost to go to court and enforce the underlying state. Then, I analyze Firm's optimal learning problem by varying the ex-ante level of product risk.

1.3.1 Decision in the Conflict Stage

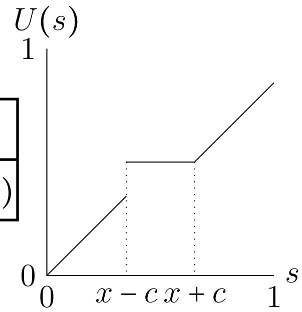
Note that in the conflict stage, players are still uncertain about the true value of ω. Their decision in this stage depends on their belief about ω given realization s from the experiment, which means that we can rewrite the game in this stage as in Figure 1.1a.

Solving for the Nash equilibrium for the conflict stage,

- Firm remains silent and Regulator goes to court if $\mathbb{E}[\omega|s] < x - c$,
- Firm goes to court and Regulator remains silent if $\mathbb{E}[\omega|s] > x + c$,
- Both remain silent if $x - c \leq \mathbb{E}[\omega|s] \leq x + c$.

		Regulator: N	Regulator: I
Firm	N	$(x, 1-x)$	$(\mathbb{E}[\omega\|s], 1-\mathbb{E}[\omega\|s]-c)$
	I	$(\mathbb{E}[\omega\|s]-c, 1-\mathbb{E}[\omega\|s])$	$(\mathbb{E}[\omega\|s]-c, 1-\mathbb{E}[\omega\|s]-c)$

(a) Payoff Structure



(b) Firm's Indirect Utility

Figure 1.1: This figure illustrates the payoff structure (left panel) and Firm's indirect utility (right panel) in the conflict stage.

The corresponding indirect utility of Firm is

$$U(s) = \begin{cases} \mathbb{E}[\omega|s] & \text{if } \mathbb{E}[\omega|s] < x - c \\ x & \text{if } \mathbb{E}[\omega|s] \in [x-c, x+c] \\ \mathbb{E}[\omega|s] - c & \text{if } \mathbb{E}[\omega|s] > x + c. \end{cases}$$

A visual representation of Firm's indirect utility is in Figure 1.1b. Note that this utility depends only on posterior mean $\mathbb{E}[\omega|s]$, not on other aspects of posterior F_s. This implies that the analysis can focus on the distribution over posterior means instead of the distribution of posterior distributions. Without loss of generality, let s denote the mean of posterior distribution following realization s. Given prior F, there exists an experiment that produces a distribution G of posterior means if and only if F is a mean-preserving spread of G [29, 89, 119]. I can thus rewrite Firm's optimal learning problem as

$$\max_{G \in \text{MPC}(F)} \int U(s) dG(s), \tag{1.1}$$

where $\text{MPC}(F)$ denotes the set of all mean-preserving contractions of F.

Below I restrict our attention to the case where Firm's status quo payoff is moderate $x \in (c, 1-c)$ and solve for Firm's optimal experiment. Cases where this condition fails to hold is trivial. For sufficiently small x, Regulator never goes to court and thus Firm perfectly learns ω and goes to court whenever ω is good enough. When both x and the prior mean of ω are sufficiently large, Firm conversely learns nothing and both players stay silent in equilibrium. A complete characterization of the equilibrium is in Appendix A.2.

1.3.2 Low-risk Case

I first consider Firm's ideal scenario. Intuitively, Firm would want to go to court when the underlying state is favorable and otherwise induce mutual silence.[4] To achieve this, Firm prefers to learn perfectly when the underlying state is good and not learn anything else—commission a study that reveals only whether ω is very high—as information generated about the bad states may encourage Regulator to go to court. Importantly, however, the absence of information would then imply that ω is *not* very high. For Firm to achieve her best outcome, she needs Regulator to still believe that ω is high *enough* even after knowing that ω is not very high in order to induce his silence; otherwise, Regulator updates his belief that ω is low and goes to court.

This can be achieved in the low-risk case where $\mathbb{E}[\omega \mid \omega < x + c] > x - c$. Here the

[4] Note that the absolute first-best scenario for Firm would be to "trick" Regulator into believing that ω is low when in fact it is not, thereby persuading him to go to court. Firm essentially passes on the cost to Regulator while still revealing the underlying state. This, however, is never an optimal strategy for Firm within the framework of this model. For Firm to achieve this outcome, she would need to sufficiently pool the good states with the bad states to convince Regulator that ω is low. However, this is too costly for the bad states, as Regulator in equilibrium goes to court after the signal; Firm never prefers this from an ex-ante perspective. In Section 1.6.2, I discuss how this can be optimal for privately informed Firm.

prior belief of both players about ω is sufficiently high; even when ω is expected to not be very high ($\omega \leq x + c$), they believe that it is more likely to be moderate than high. Firm in this case designs an experiment that perfectly separates all the good states ($\omega > x + c$) and pools the rest, which induces her ideal outcome. When the resulting signal from the experiment is a perfectly revealed $\omega > x+c$, Firm successfully goes to court in equilibrium and achieves a payoff higher than her initial status quo payoff. When players receive no information, both players know that $\omega \leq x + c$, but the conditional posterior belief is still high enough that Regulator refrains from going to court and both players remain silent in equilibrium.

How do we verify that this is indeed the Firm-optimal experiment? Since ω is continuous, standard concavification method [112] may have limitations when solving (1.1). I apply a novel technique recently developed by [67] to verify whether a candidate solution G is optimal. By this approach, I consider the smallest convex function ϕ that uniformly stays above U and identify the set of values such that $\phi(s) = U(s)$. Then, I see whether there is a distribution G such that $\text{supp}(G) \subseteq \{s : \phi(s) = U(s)\}$ and $\int \phi(s)dF(s) = \int \phi(s)dG(s)$. This allows for a simple graphical analysis to characterize Firm's optimal learning choice.

Figure 1.2 illustrates Firm's indirect utility function $U(s)$ (black solid line) and the smallest feasible convex function $\phi(s)$ (red translucent line) above $U(s)$. For the low-risk case, the smallest convex function is a piece-wise linear function that bends at $x + c$. The ideal experiment described above is feasible and, therefore, optimal because its support $\{\mathbb{E}[\omega|\omega < x + c]\} \cup [x + c, 1]$ is a subset of [x-c,1]—the region on which $\phi = U$.[5]

[5] In equilibrium, Firm goes to court when the underlying state is perfectly revealed via the experiment. In other words, we expect to observe Firm's action only when there is a "smoking gun." However, notice that there is a multiplicity of equilibria, where one of them involves only learning whether ω is below or above some threshold. Therefore,

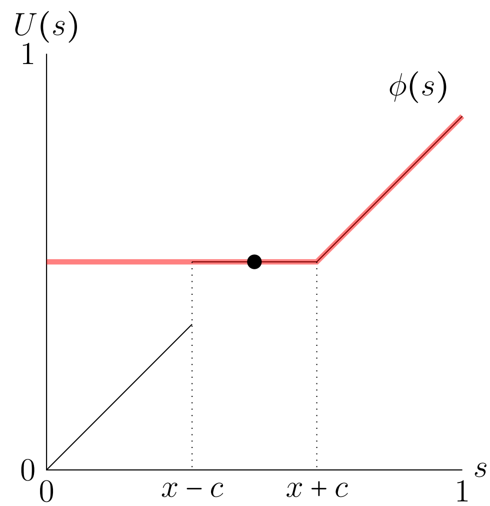


Figure 1.2: This figure plots Firm's indirect utility function $U(s)$ (black solid) and the smallest feasible convex function $\phi(s)$ (red translucent) above $U(s)$, given $c < x < 1 - c$. This can be used to apply the results by [67] for the low-risk case where $\mathbb{E}[\omega \mid \omega \leq x + c] > x - c$.

Proposition 1 *If $\mathbb{E}[\omega \mid \omega \leq x + c] > x - c$, then it is optimal for Firm to fully learn $\omega > x + c$ and no other information.*

Proposition 1 summarizes the low-risk equilibrium. Firm here does not have to forego any loss of information while being able to perfectly deter Regulator from going to court and potentially revealing states that are detrimental to her.

1.3.3 Medium-risk Case

Now suppose that the previous case fails, and the product's risk is neither sufficiently low or sufficiently high; precisely, $\mathbb{E}[\omega|\omega \leq x+c] \leq x-c \leq \mathbb{E}[\omega]$. The product is expected to mandate only modest regulatory involvement, but the risk of court action is higher because conditional on the underlying state not being very high ($\omega \leq x+c$), it is likely

once we incorporate the costs of informative experiments where a more informative experiment is more costly, e.g., [136] and [163], with sufficiently high cost we would expect Firm to commission such a study instead of the one provided in the main analysis.

to be extremely low. This is likely to be common in industries with polarized risk outcomes, where Firm's experiment may reveal that minimal regulation is sufficient due to significant societal benefits, or it might show the need for extremely stringent regulation because of the high risk of fatal accidents.

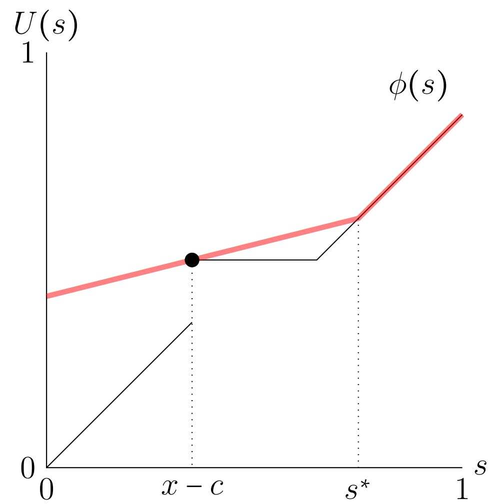


Figure 1.3: This figure represents the medium-risk case where $\mathbb{E}[\omega \mid \omega \leq x+c] \leq x-c \leq \mathbb{E}[\omega]$.

In such case, Firm-optimal still involves learning the best states, but now Firm is discouraged from learning all the good states under which it wants to go to court because with such design, Regulator goes to court whenever he learns that ω is not very high. To overcome this problem, Firm optimally pools some of the good states with the bad ones and only learns states larger than some cutoff $s^* > x+c$. This enables Firm to induce a conditional posterior mean $\mathbb{E}[\omega|\omega \leq s^*]$ exactly at $x-c$, which is the minimum value that induces Regulator's silence. By only partially revealing high ω, Regulator believes that conditional on $\omega < s^*$—i.e., knowing that ω is not very high—there is still possibility that $\omega \in [x+c, s^*]$, and this shifts the posterior up to $x-c$ and deters him from going to court. This is illustrated in Figure 1.3. The smallest convex function is a piece-wise linear function that connects $(x-c)$ and (s^*, s^*). Cutoff s^* satisfies $\mathbb{E}[\omega|\omega \leq s^*] = x-c$. The optimal experiment G under moderate risk then has a support $\{\mathbb{E}[\omega|\omega \leq s^*]\} \cup (s^*, 1]$, where it coincides with prior distribution F for $\omega > s^*$, and the remaining probability mass is concentrated at $\omega = \mathbb{E}[\omega|\omega \leq s^*]$ as an atom.

Proposition 2 *If $\mathbb{E}[\omega|\omega \leq x + c] \leq x - c \leq \mathbb{E}[\omega]$, then it is optimal for Firm to fully learn $\omega > s^*$ and no other information, where s^* is the value such that $\mathbb{E}[\omega|\omega \leq s] = x - c$.*

Proposition 2 states the condition for the above equilibrium where Firm only partially learns the good states. Firm goes to court if $\omega > s^*$ and both players stay silent otherwise. Compared with Figure 1.2, $(x+c, s^*]$ represents the interval of information that the Firm has to "give up" in order to deter Regulator from going to court. Firm seeks to deter Regulator while minimizing the amount of information she forgoes by choosing s^* that satisfies $\mathbb{E}[\omega|\omega \leq s^*] = x-c$, which is the smallest value that convinces Regulator that going to court is not worth the risk.

1.3.4 High-risk Case

The last case involves both players believing that the product is likely to be harmful and require a high degree of regulatory control ($\mathbb{E}[\omega] < x - c$). A sufficiently small $\mathbb{E}[\omega]$ implies that the above strategy of pooling some good states with the bad states now cannot be optimal, as Regulator goes to court even if Firm gives up all the good states ($s^* = 1$). Now, in order to minimize Regulator's probability of going to court, Firm instead has to design an experiment that reveals whether the product is very *harmful*. By partially separating out the bad states, Firm maintains the conditional posterior of the less-bad states just high enough that deters Regulator from going to court.

This can be verified with the visual tool in Figure 1.4. If $\mathbb{E}[\omega] < x - c$, by Bayes plausibility, the smallest convex function must pass through point $(x-c, x)$, i.e., some

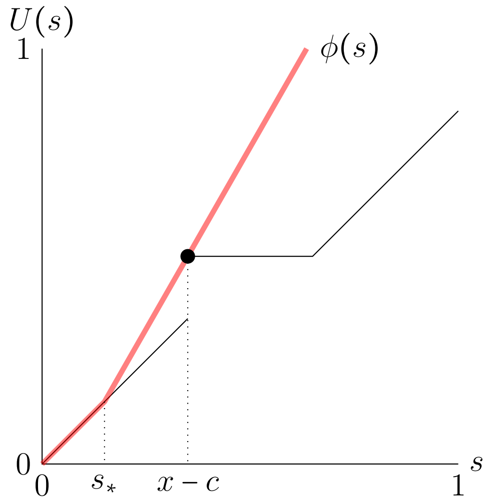


Figure 1.4: This figure represents the high-risk case where $\mathbb{E}[\omega] < x - c$.

states below $x - c$ must be pooled with those above. Then, $\phi(s)$ is a piece-wise linear function that connects (s_*, s_*) and $(x - c, x)$ where $E[\omega|\omega \geq s_*] = x - c$. The support of Firm's optimal choice of G is $\{\mathbb{E}[\omega|\omega \geq s_*]\} \cup [0, s_*)$, where it coincides with the prior distribution F for $\omega < s_*$, with the remaining probability mass concentrated at the point $\omega = \mathbb{E}[\omega|\omega \geq s_*]$ as an atom. This can be interpreted as a signal that fully reveals ω below s_* but provides no other information. Since $\mathbb{E}[\omega|\omega \geq s]$ increases in s, it follows that s_* that satisfies $E[\omega|\omega \geq s_*] = x - c$ is the smallest s that induces a posterior mean large enough to persuade Regulator. Firm's optimal choice then is to minimize this probability by revealing small enough ω below s_* and induce mutual silence otherwise.

Proposition 3 *If $\mathbb{E}[\omega] < x - c$, then it is optimal for Firm to fully learn $\omega < s_*$ and no other information, where s_* is the value such that $\mathbb{E}[\omega|\omega \geq s] = x - c$.*

Proposition 3 states the condition under which Firm fully learns small $\omega < s_*$ and lets Regulator go to court. Notably, if prior mean $\mathbb{E}[\omega]$ is sufficiently small, Firm *voluntarily* learns when the product is extremely harmful in order to successfully persuade Regulator not to go to court when the experiment returns a less-bad outcome. This suggests that empirically, we would expect to see firms disclosing damaging information, e.g., by commissioning a study or hiring an independent board of experts, specifically when the product faces a significant controversy.

1.4 Comparative Statics

In this section, I detail the implications of prior distribution F, Firm's status quo payoff x, and cost c on Firm's optimal choice of signal and her equilibrium utility.

Proposition 4 *Both s_* and s^* decrease as F increases in the sense of first-order stochastic dominance. Equivalently, the equilibrium informativeness of the experiment is non-monotonic with respect to her prior belief about the product.*

Proposition 4 establishes that the cutoffs used in the medium- and high-risk equilibrium both decrease as F increases in the sense of first-order stochastic dominance. Under medium-risk, Firm in equilibrium learns all states *above* s^* and no other information. A decrease in s^* then means that Firm's choice of experiment reveals more information in equilibrium. The idea is that as Firm's prior belief about ω increases, it takes a lower s^* to persuade Regulator not to go to court; Firm is thus able to learn more about the good states and exploit information while at the same time keeping Regulator silent. In the high-risk equilibrium, Firm uses cutoff s_* and learns states *below* it. A decrease in s_* implies that Firm learns less information. This is coming from a similar mechanism where it takes a lower s_* to induce Regulator's silence, and so Firm can disclose less negative information about its product and still achieve deterrence. Note however that the prior belief about ω is still low that it is suboptimal for her to learn any good states. Firm therefore selects a strictly *less* informative experiment in this region.

Proposition 5 *Firm's equilibrium payoff is non-monotonic with respect to her status quo payoff x. In particular, Firm prefers lower x if $\mathbb{E}[\omega] < x - c$.*

Next, I examine Firm's utility with respect to two main parameters in the model, x and c. A notable finding from Proposition 5 is that Firm's equilibrium utility may decrease in her status quo payoff x. We observe this in the high-risk equilibrium, where the direct effect of an increase in x is outweighed by the indirect effect of an increase in Regulator's probability of going to court. Importantly, this implies that Firm in this region would prefer to *concede* some of her status quo payoff to Regulator. I discuss the implication of this result further in Section 1.6.1 by allowing players to bargain over their status quo division prior to playing the game and show that Pareto optimal divisions exist.

Similarly, the effect of cost c on Firm's utility is also not straightforward. Specifically, her utility decreases in c under low-risk and increases in c under high-risk; its effect under medium-risk is countervailing and will depend on the shape of prior F. Note that the non-monotonicity is mainly driven by the fact that c is a shared parameter for both players in the model. While an increase in c helps lower the probability of Regulator going to court, it simultaneously increases the cost of Firm challenging the status quo as well - the effect of c is therefore convoluted. In Appendix A.6 I consider heterogeneous costs for players, and as expected, Firm's utility monotonically increases with the cost borne solely by Regulator.

1.5 Preference for Silence

So far, I have characterized information structures that maximize Firm's utility. Firm in equilibrium optimally manipulates the observability of the experiment in a way that induces Regulator's silence. By selectively revealing information about the product, the resulting posterior beliefs in medium- and high-risk equilibria are just high enough that dissuades Regulator from going to court. In other words, Regulator in these cases remains silent in equilibrium when he could have received a higher payoff by going to court.

In this section, I further elaborate on this point and examine how bad Firm's control over information is for Regulator. If Regulator is potentially deterred from receiving a higher payoff with Firm's provision of information, would it be better for Regulator to shut down Firm's information generation in the first place? This would be equivalent to the case where no additional information is generated about the product, i.e., both players make their decision based on their prior belief about ω. While this is sometimes the case, I show that Regulator sometimes prefers to let Firm design the experiment. Notably, Regulator benefits from Firm's choice of information not because more information informs Regulator about when he can navigate the regulatory landscape in his favor; rather, he benefits because information leads to more *silence*.

Proposition 6 *Consider a low-risk case. Regulator prefers Firm's choice of information over no information if* $\mathbb{E}[\omega] > x + c$ *and* $\mathbb{E}[\omega | \omega < x + c] > x$.

Proposition 6 tells us that Regulator in the low-risk case has mixed preferences toward Firm's choice of experiment. In particular, he benefits from the information that Firm designs if $\mathbb{E}[\omega | \omega < x + c] > x$. First consider types $\omega \in [0, x)$. These types are always better off with no information; with no information, Regulator goes to court and successfully challenges the status quo, while with Firm's endogenous information Regulator is deterred from going to court and receives his status quo payoff which is always smaller than ω.

Types $\omega \in [x, x + c)$, however, are worse off with no information. To see why, note that we are considering a low-risk case; Firm thus goes to court in this region in the absence of any experiment, and Regulator's payoff is then always worse than his status quo payoff ($\omega < 1 - x$). However, with Firm's endogenous choice of information, Firm only learns whether $\omega > x + c$ and stays silent otherwise. This means that Regulator gets to keep his status quo payoff $1-x$, and he strictly prefers this over the equilibrium outcome given no information. Lastly, types $\omega \in [x+c, 1]$ are indifferent between the two options. From an ex-ante perspective, the costs of types $\omega \in [x, x+c)$ always outweigh the benefits of $\omega \in [0, x)$, and Regulator thus prefers to let Firm choose information in this region. Note that by definition Firm is always weakly better off choosing its own optimal experiment, and thus it is sometimes *mutually beneficial* to let Firm choose her preferred level of information.

This result in particular speaks to the existing literature that has emphasized how firms tend to control how and what information is revealed to regulatory agencies. This can easily produce information asymmetries that limit the regulator's ability to implement socially efficient regulatory policies (much like the seminal oversight points raised by [11]). Furthermore, these asymmetries can generate equilibrium behaviors that have the appearance of agency capture, such as regulatory systematically favoring regulated firms [153, 178, 44, 23], or more specifically information capture, where the industry tries to manipulate the information on the basis of which the decision is made [193, 2].

This model finds that Regulator may optimally let this happen. He prefers Firm's choice of information despite the fact that it allows Firm to perfectly exploit information and go to court whenever she can successfully overturn the status quo, while at the same time deterring Regulator from doing so. As detailed above, this is largely driven by Regulator's incentive to avoid failed legal action and maintain the status quo.

1.6 Some Extensions

This section discusses three extensions to the model that incorporate additional aspects of the regulatory environment. The analysis so far has imposed no particular assumption on prior distribution F. For the extensions, I consider a simple example to illustrate the model in a more tractable setting. Specifically, I examine the case where the state of the world ω is a binary value of either 0 or 1, where $\omega = 1$ with probability $\pi \in (0,1)$. Bernoulli distribution is a limit case of f in which the distribution variance reaches the supremum of the set of feasible values of variance given the bounds of support and mean; random variable ω only takes extreme values 0 and 1 with atoms of size $1 - \pi$ and π, respectively. Substantively, this may capture the binary nature of a formal action where only one player "wins" the fight. The qualitative results of the model are similar with the baseline results in Section 1.3; the main difference is that Firm-optimal now involves partially learning either $\omega = 0$ or 1.[6] A complete analysis of the baseline model with this setup is in Appendix A.5.

1.6.1 Pre-game Settlement

First, I consider an extension of the model where Firm may offer to transfer resources to Regulator after observing cost c and status quo division $(x, 1 - x)$ (initial stage) but prior to Firm's experimentation (signal stage). Specifically, Firm decides whether to keep the current status quo division $(x, 1 - x)$ or propose a new division of dollar $(x', 1 - x')$.[7] If Firm keeps the current division, players move on to play the benchmark game. If Firm proposes a new division, Regulator decides whether or not to accept the proposal. If Regulator accepts, players move on to play the game with the new division; if he rejects, they play the game with the initial division.

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[6] Low-risk case does not exist in a binary setting. This is because if Firm perfectly learns all of its good state $\omega = 1$, in a binary setting it also perfectly reveals $\omega = 0$.

[7] Equivalently, Firm may offer Regulator payment $k \in [x - 1, x]$, which would result in a new status quo division $(x - k, 1 - x + k)$. When $k = 0$, Firm does not make an offer; when $k > 0$, she concedes some of her pie to Regulator; when $k < 0$, Regulator concedes some of his pie to Firm.

The settlement may be in the form of a side payment that shapes players' utilities from the status quo, or they could take a more legal form such as a certain solution (e.g., consent decrees involving additional warnings) proposed by Firm that Regulator may decide whether or not to agree on [138]. Note that I also allow Firm to demand compromise from Regulator ($x' > x$), which can be interpreted as Firm demanding a more lenient regulation from Regulator. I look for Firm's optimal offer $(x', 1 - x')$ given status quo division $(x, 1 - x)$, cost c, and probability π. As baked into the structure, if the new division is chosen in equilibrium, it will always Pareto dominate the status quo division. Otherwise, Firm will rather keep the current status quo division or Regulator will reject the offer.

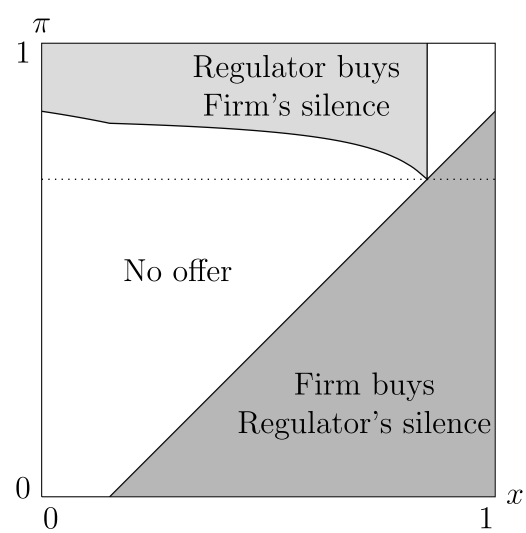


Figure 1.5: This figure illustrates the conditions under which a player is willing to compromise x to induce more silence from the other player. In the light-shaded region, Regulator buys Firm's silence; in the dark-shaded region, Firm buys Regulator's silence. I fix c at 0.15.

Figure 1.5 visualizes the conditions under which a player is willing to compromise his or her status quo division prior to playing the game. More formally, each shaded region represents values of x and π where Pareto improving division $(x', 1-x')$ exists. Most notable in this figure is that both Firm and Regulator sometimes prefer to compromise some of the initial share. Firm proposes to either take more ($x' > x$) or less ($x' < x$) share of the pie and Regulator accepts the offer. With a new division, both players become sufficiently satisfied that they are less incentivized to go to court, essentially "buying each other's silence." For Regulator, a settlement provides a reduced chance to end up in court and lose the case; for Firm, a settlement may help limit negative publicity, also avoiding the possibility of the penalty that would result if it loses [121].

The light-shaded region represents the case where Regulator buys Firm's silence. In equilibrium, Firm proposes to take more share of the pie ($x' > x$) and Regulator accepts the offer. Firm learns nothing afterwards, and both players simply decide to avoid pushing the issue to the forefront. By "offering" some portion of his initial share to Firm, Regulator gains an additional payoff by eliminating Firm's incentives to go to court. The dark-shaded region delineates the area where Firm conversely offers her share of the pie to Regulator. In the region above the dotted line in Figure 1.5, Firm's compromise leads to mutual silence where no legal action occurs in equilibrium; in other cases, Firm buys Regulator's silence by conceding x but now goes to court after signal 1 with the new division. Further note that when both players stay silent in equilibrium with the initial division, Firm never proposes a new division, i.e. there is no offer that Pareto dominates the original division. This means that bargaining over the status quo division strictly increases silence. The pre-game bargaining, in this sense, further allows players to keep the issue in the dark.

Proposition 7 *Suppose players can bargain over their initial status quo division.*

1. *Firm always prefers to give up her pie and buy Regulator's silence. The new division results in collusion if the prior probability is high ($\pi > 1 - 2c$) and Firm goes to court otherwise.*

2. *Regulator prefers to give up the pie in exchange for Firm's silence only with sufficiently high prior ($\pi > 1 - 2c$).*

Proposition 7 delineates conditions under which each player prefers to buy the other player's silence. Note that whenever Regulator goes to court with the initial division (dark-shaded region), Firm is willing to concede some of her status quo division to minimize this probability. Firm proposes a new division such that makes Regulator indifferent between accepting and rejecting the offer, and Regulator accepts in equilibrium.

With sufficiently high π, Regulator is willing to compromise his status quo division and offer a larger x' to discourage Firm from going to court (light-shaded region). Firm also prefers larger x in this range—she prefers to take a larger division and not go to court rather than to take the risk of a failed court action ($\omega = 0$) with a smaller division—and accepts the offer. Again, we observe that any successful bargain strictly results in increased silence, further emphasizing the point in Section 1.5 regarding players' preference for silence.

1.6.2 Privately Informed Firm

Consider an alternative setting where Firm chooses an experiment *after* observing ω. This is now an *informed information design* problem in the sense of [118]. A central issue in this class of problems lies in examining the designer's interim incentives after learning additional information. My analysis in the benchmark model looked for Firm's ex-ante optimal signal. I check whether a privately informed Firm has the incentive to deviate from the proposed choice of signal and reveal her knowledge to Regulator. Firm's signal from the benchmark model is robust to private information in the low-risk equilibrium; in the medium- and high-risk equilibria, Firm's ex-ante optimal strategy unravels.

First, in the low-risk equilibrium, recall that Firm learns all the good states ($\omega > x + c$) and no other information. This means that Firm in equilibrium goes to court whenever it is ex-post optimal for her; privately observing ω thus does not change any of her strategy. Specifically, if Firm learns $\omega \geq x - c$, her payoff from the ex-ante optimal strategy is identical to the payoff she receives from disclosing her type. If $\omega < x - c$, Firm does better by not disclosing her type. Disclosing her type leads to Regulator taking action in equilibrium and leaves Firm with payoff ω, but Firm can do better by following the ex-ante optimal strategy and receiving x. Thus, Firm can never do better by deviating and disclosing her type.

Next, consider the medium-risk equilibrium where Firm only partially learns the good states ($\omega > s^*$) and pools the rest and suppose that Firm privately learns state ω. If $\omega < x - c$, Firm again does better with the ex-ante optimal strategy than disclosing her type, as she can induce Regulator's silence despite the product being socially harmful. If $\omega \in [x - c, x + c]$ or $\omega > s^*$, her payoff is identical with and without disclosure. However, if Firm learns that $\omega \in (x + c, s^*]$, she can receive payoff $\omega - c$ (that is larger than her payoff from the ex-ante optimal strategy, x) by disclosing information. It follows that these types will separate themselves, resulting in unraveling over the interval. Notice that this is the exact interval that Firm was willing to "give up" ex-ante in order to deter Regulator from going to court.

With high risk, the ex-ante optimal signal for Firm is to learn $\omega < s_*$ and let Regulator go to court for these cases; she induces mutual silence otherwise and yields a payoff of x. By pooling states $\omega > s_*$, Firm is essentially giving up her own opportunity to go to court ($\omega > x + c$) so that she can deter Regulator from going to court given $\omega \in [s_*, x - c)$. Similar to the logic above, if Firm learns that $\omega \in (x + c, 1]$, she can receive payoff $\omega - c$ larger than x by disclosing that information. Firm cannot credibly commit to making this sacrifice if she learns that her type is $\omega > x + c$, and so the unraveling logic also applies here.

This analysis clearly demonstrates Firm's trade-off when deterring Regulator from going to court. Whenever Firm ex-ante foregoes some opportunity to induce Regulator's silence, if she realizes that the state is favorable enough and that she can gain more by going to court, Firm's strategy in the benchmark model unravels. On the other hand, Firm's interim incentive constraints are satisfied when Firm is ex-ante already enjoying informational advantage at its full potential.

Interim optimal design. Then, what is the alternative strategy that is interim optimal for Firm when the ex-ante optimal strategy unravels with Firm's private information? In Appendix A.5.1, I fully characterize the interim optimal design for binary state ω. With private information, we now see an incentive of Firm to *persuade* Regulator to go to court. Suppose $\omega = 1$ and Firm learns this privately. Firm wants to go to court, but in an ideal scenario, Regulator would be the one who goes to court because Firm can then overturn the status quo without incurring the cost of action c. Accordingly, when the prior belief about ω is sufficiently low—and Regulator goes to court without additional information—it is interim optimal for Firm to provide no information.

1.6.3 "Getting It Right"

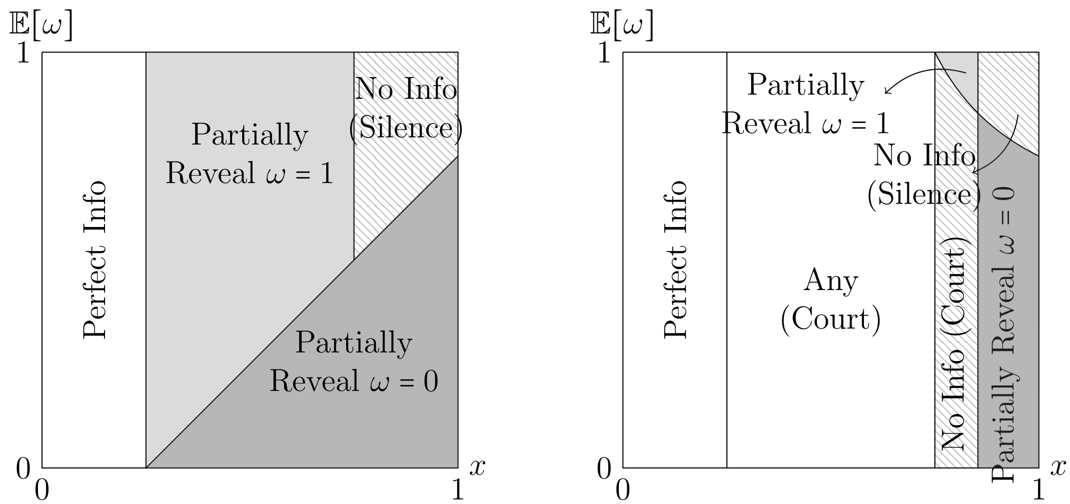
So far I have focused on a particular regulatory context where Firm and Regulator have misaligned preferences regarding the right level of regulation for the product. Realistically, however, there can be intervals where Firm and Regulator are aligned in their preferences, also preferring a more lenient regulation when he believes that the benefit of the product clearly outweighs the potential risks. Here I consider a different payoff matrix that reflects Regulator's preferences to "get it right" and show how the results of the benchmark model effectively captures all the key qualitative outcome, even without the added complexity of the extended version. The new payoff matrix is as follows:

Note that Regulator is now much more likely to go to court than in the benchmark model, as he simply benefits from *revealing* the underlying state and matching the

		Regulator N	Regulator C
Firm	N	$(x, -\|x-\omega\|)$	$(\omega, -c)$
	C	$(\omega - c, 0)$	$(\omega - c, -c)$

Table 1.2: New Payoff Structure

regulatory standard to that state (unless the cost of doing so is too large).



(a) Benchmark (b) Extension

Figure 1.6: These figures plot how Firm's optimal choice of signal depends on status quo x and prior mean $\mathbb{E}[\omega]$ given $c = 0.25$. The left panel represents the benchmark model, and the right panel represents the extended model.

Figure 1.6 represents a visual comparison of the results from the benchmark and the extended model. Note that Figure 1.6a represents the results of the benchmark model with a binary setup. In Figure 1.6b, the same set of strategies as the benchmark model is optimal for Firm, but notice that any and no information is more frequently an optimal signal strategy for Firm. When x is moderate, Firm is indifferent to any choice of experiment because the underlying state $\omega \in \{0, 1\}$ is sufficiently distant from the status quo that Regulator is willing to pay the cost and reveal ω regardless of the signal he received via Firm's experiment; thus, persuasion becomes irrelevant. With higher x and relatively lower $\mathbb{E}[\omega]$, Regulator goes to court without any information, and interestingly, Firm intentionally encourages Regulator do so by providing no information - Firm takes some risk of ω turning out to be 0 but in return is able to reveal $\omega = 1$ without having to pay cost c.

1.7 Conclusion

To what degree would a firm seek to acquire information about an outcome when it intends to leverage that information for future action but what it learns is also available to a regulator with misaligned interest? I develop a model that examines this informational problem in the context of regulatory uncertainty and show that the firm-optimal can be achieved by designing a binary experiment. The experiment is informative only about whether the firm or the regulator has an incentive to invest in challenging the current level of regulation. Specifically, the firm may choose two very different forms of experiment: when it believes that the product requires only minimal regulation, the firm optimally commissions a study that only reveals whether the product is sufficiently beneficial. The firm in equilibrium goes to court and challenges the status quo whenever the experiment reveals good information. Even when the experiment informs players that the product is not beneficial, the resulting belief is still high enough that the regulator believes going to court is not worth the risk and stays silent. Conversely, when it believes the product demands extensive regulatory scrutiny, the firm designs an experiment that only reveals whether the product is sufficiently harmful. The firm intentionally commits to a design of experiment that reveals whenever a product necessitates extensive oversight. By doing so, the firm persuades the regulator to stay silent when the experiment informs players otherwise.

One avenue for future research is to understand how this dynamic applies to different institutional contexts that may potentially limit the firm's ability to persuade. While the regulator may be dependent on the firm for information, he (or a policymaker) can choose whether to grant discretion to an agent [146] or institute requirements for information provision that may constrain the firm's ability to manipulate information [65]. Examining the firm's strategic incentives in these contexts could be useful.

Chapter 2

Bargaining for Longevity

2.1 Introduction

Parties with varying preferences need to act collectively repeatedly within a given term in office, for example, to pass legislation, maintain a government or foster administrative cooperation. Repeated interaction among parties induces them to be farsighted, taking into account not only the immediate gains at hand but also how this affects their future payoffs [e.g., 16, 36, 25].

In this paper, I consider a two-party strategic interaction that involves one party with unilateral control over resource allocation, while both parties retain the ability to abandon the relationship in favor of outside opportunities. The continued participation of both parties then depends on the initial terms of the agreement, which creates a trade-off between the terms and length of the relationship - the idea being that the proposer must weigh the benefits of maximizing short-term advantage against the need to secure the partner's collaboration in the future [e.g., 109, 161, 19].

Such dynamics are not unique to any specific institutional setting. For example, in the US, the Speaker of the House exercises significant control over committee assignments. When making the decision the Speaker has to consider what strikes an optimal balance between maintaining the Speaker's own hold on power and conceding enough to satisfy the members of the other faction. This problem can also be found in other instances of partnerships with unequal bargaining powers, including organizational hiring or personal relationships. As a leading example, I consider two parties bargaining to form a coalition government. Forming a coalition requires a compromise between two or more separate political parties. The duration of such coalitions depends crucially on the compromise that the coalition initially strikes, implying that parties inherently face a similar trade-off between terms and length [e.g., 64, 108].

A distinctive feature of this process in my model is that I allow the attractiveness of outside opportunities to vary over time. In the model, a proposer in my model has complete discretion over how much share to offer her partner. In the next stage, the proposed amount is pitted against a random draw in each period. Both players then decide in each period whether to continue the partnership and receive the initial allocation or whether to end the game by choosing the draw. I examine what the optimal allocation of resources is for the proposer, who needs to take account of both her immediate gains at hand as well as the effect of her choice on the probability that her partner terminates the relationship for potentially better future opportunities. How much will the proposer optimally value the future over the present?

Naturally, if the proposer exploits her proposal power too aggressively, it could result in the partner leaving for an alternative partnership; this provides her with the incentive to concede some of the share. However, because the outside opportunities of parties are stochastically drawn, the *timing* of defection now becomes important for both parties. For example, if the proposer plans to break away from the partnership for a better outside option, she would want to do so when her outside option is the highest. For her to defect at the optimal time, she has to make sure that her partner doesn't leave the partnership first. This creates an incentive for the proposer to overcompensate to her partner just so that she can be the one to time the exit.

This paper's main contribution is to show that the benefit of being a proposer may not be in the share she appropriates within the relationship but rather in her ability to determine its longevity. Consistent with the findings of the existing studies, the proposer in my model sometimes compromises more to bargain for longevity. However, she may also compromise more only because she expects the coalition to terminate *early*. In this case, the proposer strategically concedes to her partner and buys his long-term support but leaves the partnership as soon as she draws her favorable outside option.

Consider Israel in 2020. After the election in March, Netanyahu's Likud and Gantz's Blue and White agreed to form a coalition government. Despite the large disparity in Knesset members between the two blocs—the Likud bloc with 54 members and Blue and White with 20 members—the coalition agreed to have an equal number of cabinet ministers aligned with each bloc. Parties also agreed to a rotation government where Gantz succeeds Netanyahu as the Prime Minister of Israel for at least 18 months from November 2021.[1]

Such generous terms of the agreement largely stemmed from Netanyahu's intention to determine the timing of a new election. Netanyahu was facing three criminal charges against him at the time of the election, and there was uncertainty about how the legal proceedings would unfold. Netanyahu made sure that he could stay in power for long enough, which would give him a platform to postpone his trial and also bolster his status as the representative who embodies the injustice of the courts and the legal system [177]. He was also aware that Blue and White did not have many options at hand. Prior to the election, Gantz vowed to form a government that would not include Netanyahu. By reversing his stance and forming a coalition with Netanyahu, the party lost a sizable share of the alliance as well as voters. The

[1] The terms of the agreement also provided that Gantz serves as defense minister when the new government is sworn in with Netanyahu as the Prime Minister.

poll rate in December 2020 indicated that Gantz's electoral prospects were bleak, expecting to win just five seats in the next election compared to 28 seats expected for Likud [183]. With such considerations of future electoral prospects, Netanyahu, while keeping Blue and White in the coalition by offering generous concessions, strategically "retained the option to topple the government whenever he sees fit [110, p.14]." In December 2020, Netanyahu ultimately dissolved the government just nine months into the coalition.

For the remainder of the introduction, I first discuss previous empirical and formal works on related areas of study and identify the gap in the literature that I aim to address with my model. I then move on to introduce a brief overview of the model and its main findings which may rationalize Netanyahu's move in 2020.

2.1.1 Outside Options in Coalition Bargaining

Past studies have considered coalition bargaining in the context of "outside options," or walk-away values. These values are what a negotiator secures by walking away from the bargaining table [131, 171]. This concept has been used to encompass the notion of seat shares while at the same time incorporating other aspects of bargaining power, representing benefits from new elections that lead to a new regime and yield utilities or the willingness of other parties to start coalition negotiations with a party. It also means that the concept captures the dynamic aspects of future bargaining power rather than a static view of the future that models bargaining power simply as a function of legislative seat shares. This problem has become more important given the trend of growing party system instability in the past several decades.[2] This,

[2] Studies have consistently identified increasing and persistently high electoral volatility in many established and new democracies; established parties in older European democracies are becoming less popular with the voters [160, 66, 56], and volatility in post-communist countries have opened doors to non-traditional parties and candi-

coupled with the growing importance of media on public opinion [e.g., 123], implies that political events such as scandals or economic shocks are more likely to reshape the political landscape now than ever.

While both formal and empirical works have considered the effect of such changes in outside options on government termination and policy changes, these works mostly posit that parties strategically react to shocks *after* they occur; they do not examine how parties bargain *in expectation of* such potential changes in outside options. Some of the models most closely related to this work present a one-period [130] or an infinitely repeated [13] bargaining model where a public opinion shock provides parties with information about their future electoral prospects, and parties respond accordingly. They find that such shocks may result in dissolution when parties expect large benefits from an election and derive little value from the seats they currently control. [61] further this intuition by showing that minimal-winning coalitions may form if it is too expensive for the formateur to maintain surplus or minority coalitions over time. More recently, [20] highlight the effect of outside options with respect to the dissolution power and find that prime ministers with the power should have incentives to exploit public support for policy gains.

Other works take this perspective in empirical studies. [135] investigates the impact of public opinion shocks on government termination and observes that an expected increase in seats for coalition members leads to a noticeable impact on government termination only when the government gets closer to the end of its term in office. [194] empirically investigate two different mechanisms that link popular support and government stability; high popular support leads to a greater likelihood of opportunistic elections, while low support leads to higher frequencies of a non-electoral replacement. [114] and [115] develop a novel measure of party leverage—coalition-inclusion probabilities—and find that shifts in these probabilities of green

dates [28, 180, 185, 186, 165].

parties strongly predict environmental policy change, while seat shares and political polls do not.

These studies altogether highlight the notion that the ability of a government to remain in power depends upon its vulnerability to unexpected shocks in the political environment. However, they focus primarily on how parties respond after these shocks occur and not on how they act in anticipation of them. I argue that parties respond to exogenous events not only at the time of their occurrence but also *preemptively* during the initial portfolio allocation process and propose a theoretical framework that addresses this gap. A farsighted proposer in my model takes into account such potential changes when making the initial offer to her partner, which influences her expectations about the duration of the government and ultimately the portfolio allocation.

The framework, in this regard, also complements existing works that focus on the parties' trade-off between the terms and length of the agreement. A number of studies find that farsighted actors and their desire for stability can induce moderation in their division of resources in the short run. These works recognize that entering office does not result in an immediate one-time payoff; instead, it results in a stream of benefits that continues as long as the government stays in power [92]. Parties therefore may be willing to make concessions over the current benefit in exchange for the long-run stability value. In [161]'s model, a policy that is chosen in a round becomes the reversion point of the next round of bargaining and remains in effect until it is replaced by a new alternative. This consideration leads to the recognition that policies that fairly divide benefits between members of a winning coalition leave individual players best off in the long run. [108] proposes a two-period model of legislative bargaining and shows that the formateur will prefer to compromise and form a coalition that will stay in place in the second period when he values the future enough.

A distinctive aspect of my model compared to these works is its incorporation of how parties' future incentives to defect vary dynamically over the life of a government. By examining the effect of changing outside options on the portfolio allocation process, we can understand how they affect the proposer's strategic considerations when deciding how much to value the future over the present. I show that incorporating this dynamic aspect of shocks lends additional support to several empirical results discussed in the literature, including the lack of proposer advantage in portfolio allocation and weak-party bias.

2.1.2 Overview of Results

The baseline model in this paper consists of two stages. In the first stage, the proposer unilaterally decides on an allocation of resources between her and her partner. In the next stage, the proposed amount will be pitted against a random draw in each period. Both parties then decide in each period whether to continue the partnership and receive the initial allocation or whether to end the game by choosing the draw. Each party leaves the relationship when he or she is unwilling to trade the present benefits of leaving against the expected value of remaining in the partnership. Following this strategy, the proposer must make strategic calculations about the allocation that will influence the future duration of the government. Note that this is a stylized version of coalition bargaining. As will be detailed later in the article, the process of proto-coalition formation or formateur selection is outside the model. The proposer and the partner are assumed to have already been selected prior to the game, and they simply bargain over the allocation of cabinet portfolios. However, this parsimonious framework is useful in clearly delineating how parties may bargain in consideration of future fluctuations in outside options and its implications on resource allocation and government duration.

Some key findings of this article are as follows. First, I identify an additional equilibrium class—**buyout equilibrium**—under which the proposer's advantage in terms of the portfolio share she appropriates may not be obvious. Existing formal models that emphasize future considerations find that proposer advantage may disappear when the proposer often foregoes her short-term interests to secure long-term cooperation [e.g., 147, 108]. While the above mechanism is also present in my model, I further show that the proposer may optimally concede more of her share even when she has no interest in a stable relationship. The proposer in this case has a high outside option and is thus strongly motivated to leave after a favorable draw of her outside option. However, she wants to make sure that her partner won't leave first; she therefore buys the long-term support of the partner just so that she can be the one to time the dissolution of the coalition and ultimately a new election. This mechanism is present even after considering the presence of renegotiation or audience costs (see Section 2.5 and Appendix B.5, B.7 for more details). Formal models that fail to take this equilibrium into account may lead to an overstatement of proposer advantage in the portfolio allocation we observe; the result, in this sense, further helps explain empirical results [34, 35, 125, 196, 197] and lab experiments [62, 73] that observe no significant premia in portfolio allocation for proposer parties.[3] More importantly, this also implies that the lack of proposer advantage in terms of portfolio allocation should not be thought of as evidence of a lack of proposer advantage in general; the proposer may be conceding to the partner in return for the power to defect at an opportune time.

A second implication of my model relates to the finding that a partner may be worse off with a higher outside option. A partner with a moderately higher outside option may, in equilibrium, receive a smaller offer and be worse off than one with a lower option, which speaks to the existing literature that has consistently identi-

[3] See [147, 55, 15, 18] for other formal models that suggest different mechanisms behind the lack of first mover advantage.

fied a tendency for large parties to be under-compensated and for small parties to be overcompensated in the allocation of government portfolios [34, 35, 197, 108].[4] Specifically, my model describes two mechanisms where such weak party bias would occur. First is the effect of the partner's outside option becoming too expensive to buy [8, 12, 61, 181]. Under this mechanism, the proposer wants the partnership to last and therefore is willing to buy her partner's support. When the partner's outside option is sufficiently low, it can work as leverage for more compromise, inducing a larger offer and thus a higher payoff for the partner. However, if it is too high, the proposer may simply give up on persuading the partner, offer nothing in equilibrium, and let the partnership terminate. A partner with a lower outside option may thus be better off in equilibrium.

Additionally, we observe a qualitatively different weak party bias when the buy-out equilibrium prevails. Now, the proposer overcompensates even when she has no incentives for stability. She is willing to concede to her partner insofar as the partner's outside option is low enough, as this allows her to keep the partner satisfied until the right time for dissolution arrives. Consistent with the above mechanism, the partner may be worse off as his outside option increases because he has now become too expensive to persuade (hence the weak party bias), but the strategic incentive behind the proposer's overcompensation is fundamentally different. This mechanism captures the logic that the proposer is willing to overcompensate small parties to retain their support throughout the government [92, 108] while further uncovering a novel strategic consideration of the proposer regarding coalition termination.

[4] Note that the literature on weak-party bias uses legislative seat shares as a measure of "relatively weak" parties, while my model defines them as parties with lower outside options. Empirical implications may thus not follow through directly, but the results are consistent in that more inequality in bargaining strength can sometimes lead to less *ex-post* inequality observed as bargaining terms.

Third, the model uncovers non-monotonic relationships among outside options, proposer compromise, and government duration that, if unaccounted for, will lead to an underestimation of their effect on one another. Studies have suggested that a larger compromise leads to a longer duration of the government [130, 107, 135, 98, 64]. My model shows that a reverse relationship can be possible: more compromise may lead to a *shorter* duration of government when the proposer's outside option is sufficiently high relative to her partner's. Such a non-straightforward relationship is driven by the ambiguous effect of an increase in the proposer's outside option on her optimal compromise. The buyout equilibrium predicts that the proposer sometimes compromises more as her outside option increases because she concedes in anticipation of her own defection in the future. These points altogether suggest that government duration needs to be considered in conjunction both with the degree of compromise as well as parties' outside options, and failing to consider the heterogeneous effects of outside options will underestimate the effect size of the proposer's compromise on government duration.

2.2 The Baseline Model

There are two players in the model, Party 1 (she) and Party 2 (he). Below I describe the two stages of the game: contracting stage and maintenance stage.

Contracting Stage. Party 1 chooses a division of dollar $(1-x, x)$ where $x \in [0,1]$. The key issue of the bargaining process that parties face when forming a coalition government is the allocation of government resources, e.g., cabinet portfolios. The term x in my model represents Party 1's offer on the allocation of these resources, normalized to a value between 0 and 1; larger x means more compromise.[5] Note that

[5] We need not assume the dollar to represent the entire government resources or portfolio allocation. Rather, it more closely depicts the resources or portfolios subject

this is a type of "dictator game" in that Party 1 provides a one-time offer to Party 2, after which the game moves on to the next stage and Party 2 is unable to veto the offer right away. [6]

Maintenance Stage. In each period $t \in \{0, 1, 2, \ldots\}$ of the maintenance stage, both parties receive an outside option ω_i^t independently drawn from a Bernoulli distribution defined by $\omega_i > 0$ and $p \in (0, 1)$. That is, Party i's outside option in period t is $\omega_i^t = 0$ with probability $1 - p$ and $\omega_i^t = \omega_i$ with probability p.[7] After each party privately observes ω_i^t, parties simultaneously choose $a_i^t \in \{0, 1\}$. The game continues as long as both parties choose to stay in each period ($a_i^t = 0$ for all i at time t). If either of the two parties chooses to leave, the party who leaves receives his or her lottery payoff, and the game ends. If a party stays while the other chooses to leave, he or she gets a

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to distributive conflicts, such as the distribution of "bonus ministries above parties' proportional shares," which builds on the framework of [34], and [14, 20] more broadly.

[6] My model can be generalized to cases where there is no designated formateur. Similar to the approach of [103], one can also envision that at some time in the future, the second party becomes the formateur, and so forth in alteration for future periods. The one-shot asymmetric game equilibrium described here remains an outcome of this more complex repeated interaction. Introducing a probabilistic formateur selection rule will also not change the core results of the model.

[7] In Appendix B.8, I also consider the case where ω_i is continuous and drawn from a Normal(μ, σ) distribution. Markov perfect strategy that is stationary to a continuous and unbounded state shock always has a positive probability of bargaining termination; there thus is no equilibrium where parties never leave in this setup (instead, the probability that parties leave tends to 0). Otherwise, the core dynamics of the game remain unchanged.

0.[8] The payoff structure is summarized in the table below. Each party's total utility is the discounted sum of his or her per-period payoffs, discounted by an exogenous and commonly known discount factor $\delta \in (0, 1)$.

		Party 2	
		$a_2^t = 0$	$a_2^t = 1$
Party 1	$a_1^t = 0$	$(1 - x, x)$	$(0, \omega_2^t)$
	$a_1^t = 1$	$(\omega_1^t, 0)$	(ω_1^t, ω_2^t)

Table 2.1: Payoff Structure in the Extension

A non-zero outside option ω_i and the probability of drawing it p can be interpreted in largely two ways. First is to think of ω_i as the value of a potential partnership with an outside party. Outside option ω_i in this sense will be the continuation value that takes into account the future value of a new partnership. We can rewrite this as $\omega_i = \kappa/(1 - \delta)$, where κ represents a new offer from an alternative party. Then, the probability of drawing a favorable outside option p represents the volatility in the political environment. What will the party's coalition inclusion probability be in a given period [114, 115]? How likely will a new party emerge during the government that might change the political landscape?

Relatedly, outside option ω_i may also represent the benefit a party gains from defecting at an opportune time. For instance, a party at the time of the bargaining might be faced with a scandal. The party's high outside option would be its expected popularity after the party comes out ahead of the scandal. Alternatively, an immigration crisis might be on the horizon; the outside option in this case represents the party's payoff from refusing to compromise with his partner who prefers a more lenient policy toward the absorption of asylum seekers and maintaining a firm stance on the issue. Probability p in this regard will be the prospect of the party's scandal,

[8] In Appendix B.4, I assume that a party can still draw ω_i even when the other party has defected in the given period. All qualitative results remain consistent.

or how likely a particular issue will be salient at a given time.

Finally, the discount factor δ can be interpreted in two different ways. First, it could reflect the political impatience of parties to enjoy the fruits of agreement. This impatience may result from electoral considerations or from the personal preferences of parties. When parties are patient, the political discount factor is high, resulting in a higher value of the future. This means that parties would value a longer length of agreement. When parties are impatient, they value future less. Another way is to interpret δ as the probability of the game being continued by external factors. In other words, even if parties choose to stay, the duration of the coalition may be subjected to a fixed probability of exogenous breakdown, caused by natural catastrophes, an institution of new laws or regulations, abrupt changes in the political structure, introduction of new technology, and so on [200]. Specifically for this model, it could represent an exogenous probability of random replacement of political appointees or parties.

2.3 Interpreting the Assumptions

Prior to analyzing the model, I offer a few comments on this model's assumptions.

No renegotiation. In the model, once Party 1 makes an initial offer of x in the contracting stage, she cannot change her offer later on in the maintenance stage; more specifically, she is unable to offer more after her partner draws a high outside option. The main purpose of this assumption is to direct the focus of this paper to examine the dynamic aspect of the model where Party 1 proposes an offer in anticipation of Party 2's behavior in the subsequent stage, which is conditional on both the size of the outside option as well as the probability that it is drawn. In Appendix B.7, I incorporate the possibility of renegotiation and find that the equilibrium outcomes are qualitatively similar. Alternatively, however, it is possible to think of the outside option in my model as potentially being the benefit that each party receives from the reshuffled cabinet.

Proto-coalition. I assume that Party 2 has already been invited to join the coalition and parties are bargaining on terms. While this formulation is restrictive in terms of the general question of how parties choose their negotiating partners [91], note that my model also incorporates the possibility of a negotiation failure, as highlighted in the literature [68]. In the maintenance stage, Party 2 is able to leave in the very first period, which effectively means that the offer is rejected and the duration of the coalition is 0, i.e., coalition broke down immediately.

Ideological preferences. I omit explicit considerations of ideological differences between parties, although they are implicit in my model in two ways. First, Party 1's offer x can be understood as an ideological compromise normalized to a value between 0 and 1. If the parties have absolute loss preferences, then any policy in their Pareto set in a unidimensional model is equivalent to a divide-the-dollar game. Later I also include an extension in Appendix B.2, where I explore the case where Party 1 can offer a negative x, extracting policy compromise from Party 2.[9]

Second, I look at an extension where the probabilities of parties drawing a positive outside option are correlated. In this extension, I use parameter r to represent the conditional probability; when $r > p$ the two probabilities are positively correlated, and when $r < p$ they are negatively correlated. High r substantively means that an exogenous shock is more likely to affect the parties jointly. This could be interpreted as the parties sharing similar ideological stances and thus being subject to the same shocks

[9] Results show that even when Party 1 *extracts* $|x|$ from Party 2, the partnership can still last for a positive amount. This is because Party 2 is willing to pay the cost to wait for a potential draw of a high outside option, ω_2.

in the political environment. A complete analysis of this extension is in Appendix B.3.

2.4 Equilibrium Analysis

I now proceed to characterize and describe the equilibrium behaviors of Party 1 and Party 2. I analyze this game by backward induction.

Optimal strategy of parties given x. The solution concept I employ is stationary Markov perfect equilibrium (MPE). I restrict attention to pure strategies for simplicity. Since the stability of the agreement is maintained only if both parties prefer to sustain it, the expectation of what outside options parties would draw and how they would behave in response to the draws are crucial to understanding how Party 1 will allocate the resources in the contracting stage. It is easy to see that leaving is weakly dominated when outside option $\omega_i^t = 0$; in other words, parties will never leave ($a_i^t = 0$) when $\omega_i^t = 0$. Each party's strategy therefore hinges on what to choose when he or she draws a high outside option ($\omega_i^t = \omega_i$). There are four possible strategy profiles: 1) *both never leave*, 2) *Party 1 will leave* when $\omega_1^t = \omega_1$ and Party 2 never leaves, 3) Party 1 never leaves and *Party 2 will leave* when $\omega_2^t = \omega_2$, and 4) *both will leave* when $\omega_i^t = \omega_i$.[10] It follows that

- *Both never leave* when $(1-\delta)\omega_2 < x < 1-(1-\delta)\omega_1$,
- *Party 1 will leave* when $x > \max\left\{1-(1-\delta)\omega_1, \frac{(1-\delta(1-p))\omega_2}{1-p}\right\}$,
- *Party 2 will leave* when $x < \min\left\{1-\frac{(1-\delta(1-p))\omega_1}{1-p}, (1-\delta)\omega_2\right\}$,

[10] It is always a Nash equilibrium for both parties to simultaneously choose to leave for all parameters and realizations of ω_i^t. However, as dynamic considerations do not come into play in this equilibrium, I do not consider it in the analysis.

- *Both will leave* when $1 - \frac{(1-\delta(1-p))\omega_1}{1-p} < x < \frac{(1-\delta(1-p))\omega_2}{1-p}$.

These four cases together are exhaustive but not mutually exclusive. More specifically, the first (*both never leave*) and the fourth (*both will leave*) cases may overlap - the same offer x can lead to multiple equilibria. I assume that *both never leave* in such a case. Generally, we observe that parties leave when their continuation value is greater than the payoff from taking the outside option and stay otherwise.

Party 1's optimal choice of x. Given exogenous parameters ω_i, p, and δ, Party 1's choice of x in the contracting stage determines parties' choices of action and hence the equilibrium outcomes in the maintenance stage.

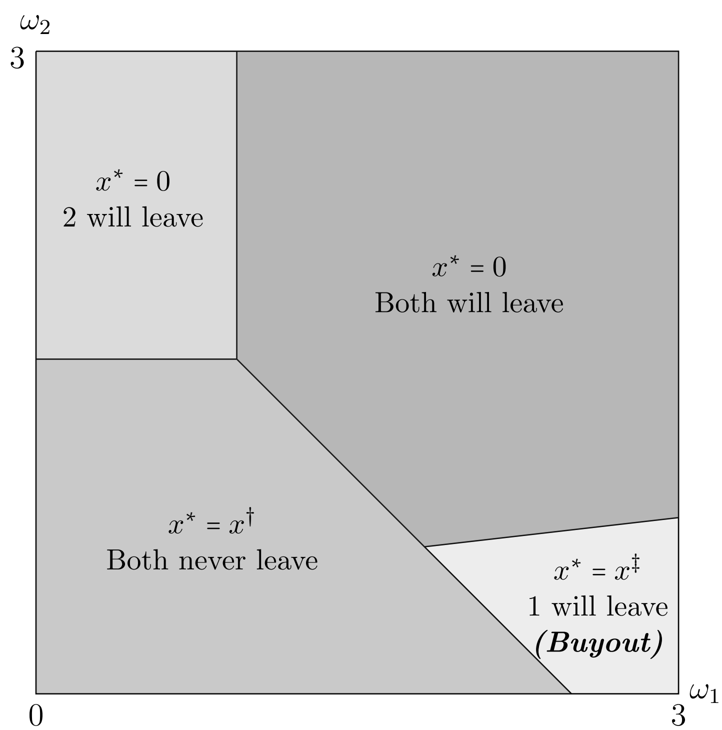


Figure 2.1: Equilibrium Outcomes
$\delta = 0.6, p = 0.4$

Figure 2.1 illustrates how Party 1's optimal choice of x and its corresponding equilibrium outcome depend on ω_1 and ω_2. The four equilibrium outcomes discussed above are represented in different shades. I formally state the equilibrium conditions below.

Proposition 8 *Let* $A = (1-p)/(1-\delta(1-p))$ *and* $B = 1/(1-\delta)$. *In equilibrium,*

- *Party 1 offers* $x^{\dagger} \equiv \omega_2(1-\delta)$ *and both parties never leave in equilibrium if*

$$\omega_2 < B - A \quad \textit{and} \quad \omega_1 + \omega_2 < B.$$

- *Party 1 offers* $x^{\ddagger} \equiv (1-\delta(1-p))\omega_2/1-p$ *and Party 1 will leave in equilibrium if*

$$\omega_2 < \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad \textit{and} \quad \omega_1 + \omega_2 > B.$$

- *Party 1 offers* 0 *and Party 2 will leave in equilibrium if*

$$\omega_1 < A \quad \textit{and} \quad \omega_2 > B - A.$$

- *Party 1 offers* 0 *and both parties will leave in equilibrium if*

$$\omega_1 > A \quad \textit{and} \quad \omega_2 > \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad \textit{and} \quad \omega_1 + \omega_2 > B.$$

First consider low ω_2 (the lower half of Figure 2.1), i.e., when Party 2's "good" outside option is still not high enough. Then, depending on the value of ω_1, there are two equilibria: one where Party 1 concedes to *stay* and the other where she concedes to *leave*.

Conceding to stay. When ω_1 is sufficiently low, Party 1 in equilibrium offers $x^{\dagger} > 0$ and both parties never leave the agreement. This is a standard notion of the term-length trade-off where Party 1 concedes her immediate terms of the agreement for a lengthy cooperation in the future. Party 1's walk-away value is not high enough that she prefers to stay in the agreement; she thus chooses a good enough offer that induces Party 2 to stay, securing her stream of payoffs. Note that the exit threat of Party 2 is not too high that Party 1 can pay to keep him in the partnership.

Conceding to leave. However, as ω_1 increases, we see an equilibrium where Party 1 offers $x^{\ddagger}$ that induces Party 2 to always stay while she leaves immediately after drawing ω_1. I denote this region as the **buyout equilibrium** and explain its implications below.

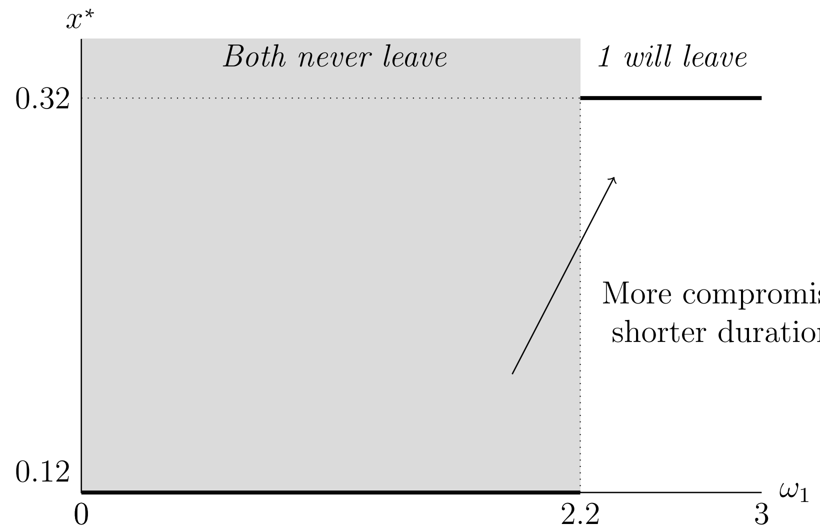


Figure 2.2: Optimal Compromise x^* with respect to ω_1
$\delta = 0.6, p = 0.4, \omega_2 = 0.3$

Figure 2.2 depicts the effect of an increase in Party 1's outside option on her optimal choice of x and its implications on the duration of partnership between the two parties. Equivalently, it is a horizontal slice of Figure 2.1 at $\omega_2 = 0.3$. Note that as ω_1 increases, her optimal level of compromise also increases. This is somewhat counter-intuitive since we would normally expect an increase in Party 1's outside option ω_1 to lead to a decrease in the amount Party 1 concedes to Party 2, yet we observe a larger level of compromise. The underlying mechanism behind the buyout equilibrium (the region where $\omega_1 > 2.2$ in Figure 2.2) is quite straightforward. Now that Party 1 has a higher outside option she wants to leave, but she wants to do it *with certainty*. This means that she is willing to pay Party 2 more in order to keep him in the relationship, just so that she can leave on her own terms. Just like in the above equilibrium, Party 1 gives up her present per-period benefit and buy the long-term support of Party 2, but this is not because she wants government stability; it is rather to capitalize on her outside option with certainty in the future.[11]

Importantly, this implies that the relationship between the proposer's compromise and the duration of government may be negative. Below I show that Party 1's optimal offer in the buyout equilibrium ($x^{\ddagger}$), if exists, is always larger than her offer in the equilibrium where both parties never leave ($x^{\dagger}$).

Proposition 9 *Let x^* be Party 1's optimal offer in equilibrium as a function of exogenous outside option ω_1. Conditional on a sufficiently low outside option of Party 2, $\omega_2 < (1-p)/(1-\delta(1-p))$, there always exists some $\hat{\omega}_1$ such that*

$$\lim_{\omega_1 \to \hat{\omega}_1^-} x^*(\omega_1) < \lim_{\omega_1 \to \hat{\omega}_1^+} x^*(\omega_1).$$

Proposition 9 states that if ω_2 is sufficiently low (or when p is moderate), there always exists a discontinuous jump where Party 1 compromises more with higher ω_1, i.e., $x^{\ddagger} > x^{\dagger}$. Further, by definition, we know that the duration of cooperation must be shorter when Party 1 unilaterally leaves (buyout equilibrium) than when both parties never leave. This implies that in this region, more compromise leads to a shorter duration of government.

Corollary 10 *Party 1's optimal offer x^* in equilibrium is larger than half when*

1. *Party 1 concedes to stay and $\omega_2 > 1/(2-2\delta)$.*

2. *Party 1 concedes to leave and $\omega_2 > (1-p)/(2(1-\delta(1-p)))$.*

[11] A simple but important point is worth noting here. Comparing the model's results to a version where outside options are drawn with probability 1 ($p = 1$), I find two crucial differences: (1) the buyout equilibrium does not exist and (2) parties never defect unilaterally. A formal model that assumes the outside options to be static thus fails to explain these empirical patterns.

Corollary 25 further tells us that there exists a region where Party 1 concedes more than half, and characterizes the conditions under which we don't observe a proposer advantage even when the model confers the strongest possible power to Party 1 in the sense that she has complete discretion over the terms of bargaining. Note that we observe this in both equilibria. When Party 1 concedes to *stay*, she offers more than half to Party 2 when she has preferences for stability; when she concedes to *leave*, however, Party 1 willingly gives up more than half to time her exit.

Now suppose that ω_2 is high (the upper half of Figure 2.1); Party 2's potential outside option is attractive, and his probability of leaving the partnership is now higher. We observe two additional equilibria.

Unable to buy longevity. When ω_1 is low, i.e., Party 1's outside opportunities are bleak, Party 1 wants the partnership to last. However, with sufficiently high ω_2, Party 1 is unable to buy the other party's support.

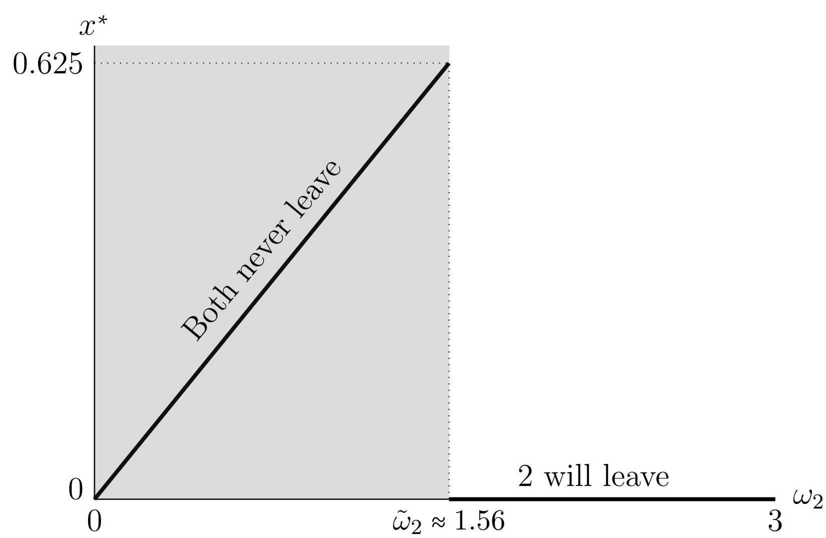


Figure 2.3: Optimal Compromise x^* with respect to ω_2
$\delta = 0.6, p = 0.4, \omega_1 = 0.5$

In Figure 2.3, I display Party 1's optimal choice x^* as a function of Party 2's outside option ω_2 given $\delta = 0.6$, $p = 0.4$, and $\omega_1 = 0.5$. Equivalently, it is a vertical slice of

Figure 2.1 at $\omega_1 = 0.5$. We observe that optimal compromise x^* is not monotonically increasing in ω_2. When ω_2 is sufficiently low, Party 1 is willing to make a compromise ($x^* = x^\dagger$) to sustain the partnership. This equilibrium holds until the outside option reaches $\tilde{\omega}_2 = B - A$. Afterward, however, Party 1 has to compromise too much to incentivize Party 2 to stay in the partnership. Therefore, she chooses $x^* = 0$ and lets the agreement break down as soon as Party 2 draws a high outside option, which is the discontinuous drop in Figure 2.3.

Unwilling to buy longevity. Suppose that ω_1 is high. Party 1's potential outside opportunities are now favorable enough that she is also willing to leave the partnership upon receiving a favorable draw. Similar to the equilibrium above, Party 1 offers nothing to Party 2 ($x^* = 0$), but *both* parties eventually leave after a good outside option. Offering 0 means that the duration of the agreement is finite. In this equilibrium, this is a conscious choice of Party 1 choosing terms over length - she prefers to play a short-lived game with Party 2 and refuses to compromise, knowing that the relationship will end soon.

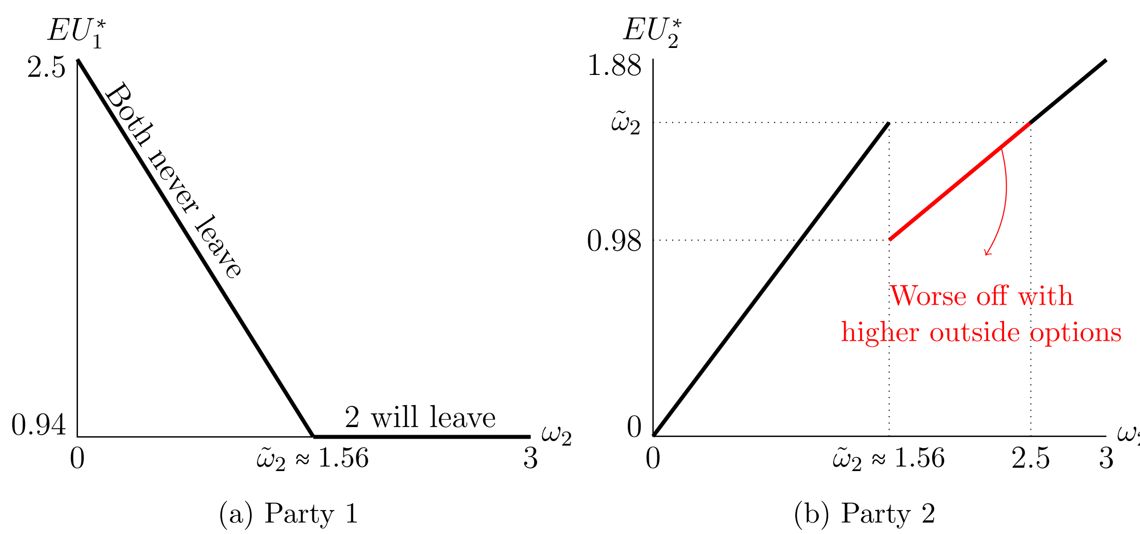


Figure 2.4: Equilibrium Expected Payoffs
$\delta = 0.6, p = 0.4, \omega_1 = 1$

With the equilibrium conditions in hand, I move on to discuss each party's equilibrium payoff as a function of ω_2. In Figure 2.4a, Party 1's utility decreases in ω_2 when ω_2 is sufficiently low ($\omega_2 < \tilde{\omega}_2$) because optimal compromise $x^* = x^\dagger$ increases in ω_2; intuitively, it takes more to persuade Party 2 when he has higher outside option. When his outside option is high ($\omega_2 > \tilde{\omega}_2$), Party 1 offers no compromise. Her utility in this region with respect to ω_2 is now constant, as it only depends on the expected timing of Party 2's defection.

In Figure 2.4b, we observe that Party 2's utility increases with respect to ω_2 in both equilibrium regions, but with a discontinuous drop. With low ω_2, an increase in ω_2 leads to a larger compromise from Party 1 since ω_2 is still not too high that it is optimal for Party 1 to compromise more and keep Party 2 in the agreement. However, when ω_2 goes above a threshold, an increase in ω_2 now means that persuading Party 2 is too expensive. We thus observe a discontinuous drop between the two regions, as Party 1 switches from offering $x^* = x^\dagger$ to offering $x^* = 0$. Party 2's payoff in the second region increases only as a function of an increase in his outside option. It follows that Party 2 is worse off with a moderately high outside option than with a lower outside option, which can be seen from the red line segment in Figure 2.4b.

Proposition 11 *Let EU_2^* be Party 2's expected utility in equilibrium as a function of exogenous outside option ω_2. Then, there always exists $\hat{\omega}_2$ that satisfies*

$$\lim_{\omega_2 \to \hat{\omega}_2^-} EU_2^*(\omega_2) > \lim_{\omega_2 \to \hat{\omega}_2^+} EU_2^*(\omega_2).$$

Proposition 26 shows that we always observe the aforementioned discontinuous drop. This result identifies the perverse consequences of a high outside option, as a partner with a lower outside option may be overcompensated and be better off because he is "easier to persuade." In this regard, more inequality in bargaining strength can sometimes lead to less *ex-post* inequality observed as bargaining terms.

2.5 Additional Extensions

In this section, I briefly introduce three extensions of the model that incorporate some additional features of coalition bargaining with the aim of providing a more nuanced analysis. I show that while there are minor shifts in equilibrium outcomes, the qualitative results from the models analyzed above continue to hold in these settings.

Renegotiation. The main models focus on how parties are forward-looking when negotiating the initial coalition terms with their partners. However, parties may be able to change their terms of agreement throughout their partnership. Coalition agreements may turn out to be suboptimal later, giving parties incentives to revisit the original deal via changes in portfolio design [179, 144] or policy compromises [20, 63, 114]. Allowing for shifts in the allocation of initial resources would, in this regard, speak to the theoretical ideas of coalition renegotiation as a response to outside options. To incorporate the possibility of renegotiation, I endow Party 1 with a chance to make a second offer to Party 2 with some probability when he announces that he will (unilaterally) leave. Now reshuffles may be strategically used by both parties. Party 1 can use it to protect herself from Party 2's unilateral defection; Party 2 utilizes it to extract more concessions from Party 1. I incorporate parameter σ that represents the exogenous probability that renegotiation may succeed. The baseline model is identical to this model with $\sigma = 0$. [12]

[12] Note that renegotiation with a perfect success rate essentially only works as a "second chance" for Party 1. Party 1, in most cases, can simply offer nothing to Party 2 until he announces to leave, after which Party 1 can propose some degree of compromise to Party 2 to persuade him to stay. We would thus expect all equilibrium outcomes in the baseline model to be present but *after* renegotiation. I thus incorporate parameter σ that represents the exogenous probability that renegotiation may succeed.

The equilibrium regions are qualitatively the same as in the baseline model, although Party 1 offers $x^* = 0$ more often with renegotiation now that she can change her offer later down the road. Successful renegotiation occurs when Party 2's outside option is moderate (see Appendix B.7 for formal results). As expected, the renegotiated offer is always larger than the initial offer. There are largely two different patterns of successful renegotiation. First, we see Party 1's desire to avoid coalition termination when her outside option is low. Party 1 offers more to Party 2 during renegotiation and persuades him to stay in the partnership. Alternatively—and similar to the logic of the buyout equilibrium—Party 1 in equilibrium may offer more to Party 2 during renegotiation and convince him to stay, but after renegotiation, Party 1 leaves in equilibrium. This is when Party 1 has a high outside option. The effect of an increase in Party 2's outside option on the amount of renegotiation offer can thus be positive or negative depending on the size of Party 1's outside option.

Audience costs. In the baseline model, parties do not face any negative repercussions from defecting. Extensive works on coalition breakdown, however, find that terminations can be electorally costly for the parties [143, 148, 162, 182], and voters especially punish parties that choose to leave the government [195]. In this extension, I add a parameter $c \in (0, \omega)$ that captures the audience cost that the defector incurs from abandoning the partnership. The results show that the presence of audience costs leads to an increase in the equilibrium region where Party 1 offers Party 2 nothing and Party 2 unilaterally defects from the coalition. This is because the presence of audience costs already deters Party 2 from defecting, and thus Party 1 is less incentivized to offer him a compromise. The dynamic is otherwise consistent with the baseline model.

Will parties ever *want* high audience costs? In another extension, I compare the baseline model to a scenario in which Party 1 faces a sufficiently high audience cost, discouraging her from leaving the partnership. I find that when outside options of both parties lie in an intermediate range, Party 1 prefers to tie her hands and "commit" to the partnership rather than to have the option to leave. Commitment forces her to concede more to Party 2 in equilibrium, but she prefers this over being able to leave, as this leads to a longer duration of partnership. Equilibrium analysis is described in detail in Appendix B.6.

Correlated outside options. Additionally, I consider an extension where the parties' outside options are correlated. If we interpret the outside options as prospects of a new election or coalition, it is natural to assume that various exogenous factors could result in their utilities from leaving to be either positively or negatively correlated. For instance, when a certain issue is more salient than others or when certain groups of voters are more active in a given period, one party having received a high draw could mean that the other party is also more or less likely to receive a high draw of outside options.

Intuitively, a positive correlation between the parties seems like a good deal for both parties. Both parties being likely to receive the higher outside option in the same period could mean that when parties leave, they are more likely to leave together, and when they stay, they are also more likely to do so together. Therefore, we might expect unilateral leaving to occur less often and the duration of the partnership to be longer. However, I find that this is only true under some conditions; for moderate values of outside options, a higher level of positive correlation can lead to less stable partnerships. In this region, a positive correlation could lead to government termination when a negative or no correlation between the outside options under the same parameters would have resulted in the parties staying in the coalition. Formal results and further discussion are in Appendix B.3.

2.6 Discussion and Empirical Implications

Lastly, I review several key contributions of my model and discuss their empirical implications.

Buyout equilibrium. One of the main contributions of the model is the finding that an increase in proposer compromise should not be taken as evidence of a lack of "proposer advantage." The buyout equilibrium finds that the proposer may be willing to concede precisely because she is highly incentivized to leave. She wants to call an opportunistic election when her prospect is favorable, but in order to sustain the coalition until the best timing for a new election, she keeps him in the relationship by offering more share of the pie. In this sense, the benefit of being a formateur does not come from the share she appropriates in the initial bargaining process but rather from the ability to time her defection. This also implies that the partner under this equilibrium will be "overcompensated" in terms of the share he is offered by the proposer, but unlike previous works that find such weak-party bias to occur when the proposer has preferences for a stable coalition [108], the partner is offered more when the proposer ironically has no incentives for stability. Here, the proposer uses the partner's unwillingness to leave as a chance for her to leave at an opportune time. This result builds on other formal works that uncover possible mechanisms for why we observe a lack of formateur advantage [55, 15, 18] and weak party bias [147], and further helps bridge the gap between the empirical evidence and standard models of legislative bargaining.

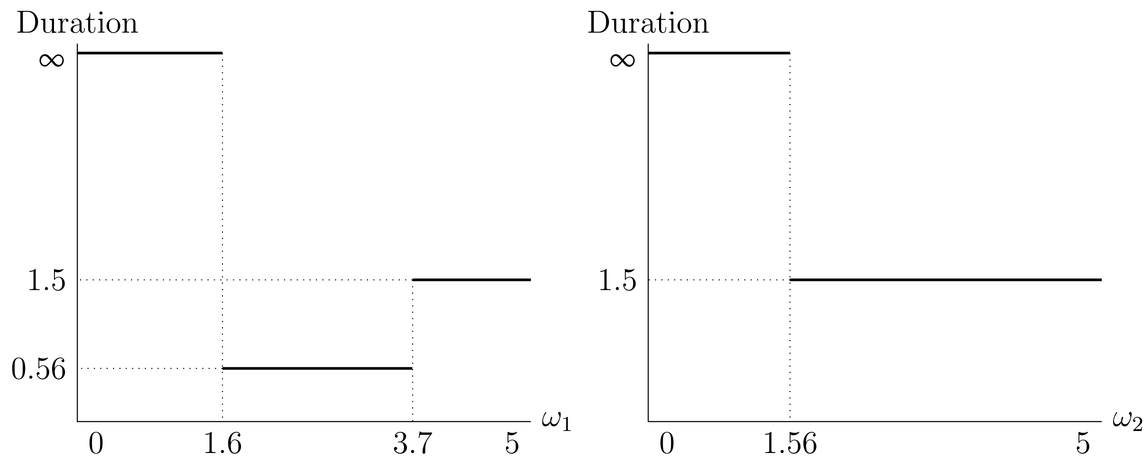
Proposer advantage. From an inferential standpoint, if the above equilibrium dynamic exists in data but is not controlled for, then the observed portfolio allocation will not be a reliable measure of the proposer advantage in question; the proposer with a higher outside option may compromise more in equilibrium. Note that we observe the buyout equilibrium when the relative difference in outside options between the parties is large in favor of the proposer party. This implies that empirical studies need to consider the *dyadic* aspect of outside options when examining the relationship between the proposer's outside option and her optimal level of compromise. Conditional on the partner's outside option being sufficiently high, an increase in the proposer's outside option leads to a decrease in her optimal level of compromise. However, when the partner's outside option is low, the association is positive; an increase in the proposer's outside option may *increase* the amount of compromise.[13]

The advantages of the proposer may instead be found in the rate in which we observe a strategic dissolution by the proposer party. Empirically, we expect to see higher frequencies of defection *by the proposer* when her outside option is sufficiently higher than that of the other party or when the probability of drawing a favorable outside option is moderate (i.e., higher variance of the distribution). This is largely related to the literature on opportunistic election [e.g., 96, 172, 194], and it resonates with [116]'s model of election timing, which examines the government's ability to time elections ("surf") and manipulate their economies ("manipulate") for political advantage and finds that, among others, the frequency of opportunistic elections is positively associated with the variance of economic performance.

Outside option, compromise, and government duration. The theoretical framework also tells us that the relationship between parties' optimal compromise and the overall government duration may not be straightforward. More compromise may lead to *a shorter duration of government*. This happens under the buyout equilibrium when the proposer bargains in expectation of future government termination.

Notably, such dynamic also implies an ambiguous relationship between the parties'

[13] An increase in the partner's outside option always leads to more compromise unless his outside option is too high.



(a) Party 1 (b) Party 2

Figure 2.5: Equilibrium Duration of Partnership
$\delta = 0.6, p = 0.4, \omega_2 = 0.9$

outside options and the duration of government. As illustrated in Figure 2.5, my model predicts that an increase in the partner's outside option always leads to a decrease in government duration (Figure 2.5b), while an increase in the proposer's outside option may have a non-monotonic effect (Figure 2.5a). This is consistent with [135], which fails to find a significant relationship between the electoral prospects of the prime minister and government termination and only finds an effect for other coalition members.

2.7 Conclusion

The present value of any coalition is valued over time. While any coalition struck today might be the best available option for all of the coalition members, ruling out the possibility of this alignment of preferences *changing* is at odds with the non-trivial rate of coalitions ultimately collapsing. I have presented a simple model of bargaining with proposer advantage with the aim of considering the impact of dynamic outside options on both the contracting and maintaining phase in coalition bargaining. This paper provides a game-theoretic explanation of how cooperation might or might not last among actors who in the short term are inclined to take more for themselves. In particular, I return to the example introduced at the beginning of the paper and review the key contributions of the model.

The coalition between Netanyahu's Likud and Gantz's Blue and White in 2020 is an example of the buyout equilibrium in several aspects. Netanyahu's true advantage over Gantz didn't come from securing more resources from the coalition but rather from the ability to offer more to Gantz and ultimately time the election. Despite the numerical asymmetry between the two parties, Netanyahu made significant concessions to Gantz during the initial coalition bargaining, which kept Gantz in the coalition. Instead, Netanyahu expected his future outside option to be high and waited for the right time to end the partnership. He refused to pass the two-year budget and retained the ability to dissolve the coalition, yet when his outside option wasn't high in August with the second wave of COVID-19, he agreed to continue the coalition and postpone the election [110]; he ultimately called a new election exploiting the same budget crisis in December 2020.

As in this case, the theory presented in this paper also indicates why more compromise does not necessarily lead to a longer duration of government. A simple present-future trade-off fails to explain Netanyahu's strategic calculation in conceding more to Gantz. He was willing to give up some of the present benefits not to enjoy coalition stability but to disincentivize Blue and White from defecting first. We observe this dynamic: while the Gantz camp constantly pushed through a coalition-compliant budget that would keep the coalition going through 2021 and expressed its willingness to maintain the coalition, Netanyahu unilaterally chose to dissolve the coalition [199]. This further highlights the model's insight on when we might observe a weak party bias. Gantz's Blue and White was offered a sizable concession despite the fact that Netanyahu was expecting his potential future prospects to be favorable and thus had no interest in maintaining the coalition. This resonates with the model's finding that a party with a low outside option may be overcompensated even when the proposer has no preferences for stability.

Overall, the model yields several conclusions. First, the buyout equilibrium tells us that the true proposer advantage may not be in taking more share of the portfolios but rather in the proposer's choice of coalition longevity. When the relative difference in outside options between the parties is large in favor of the proposer, the proposer may optimally make concessions at the bargaining table today in order to cash in on stochastically occurring outside options in the future. This dynamic further provides a novel account of why the proposer may optimally overcompensate a partner with a sufficiently low outside option and why we would expect to observe weak party bias even when the proposer has no preferences for stability. Such overcompensation of portfolio allocation also means that higher outside options should not simply be thought of as increasing a party's bargaining leverage. Lastly, more compromise by the proposer may lead to a shorter duration of government, as she sometimes offers more in anticipation of her own defection in the future.

The concept behind this paper can be applied to other instances of transactional partnerships with unequal bargaining powers. While I have analyzed one particular setting where two parties engage in a one-time bargaining over government resources, future research could take this insight in various other settings to examine how multiple agents may bargain in light of their outside options. Alternatively, we could endogenize the selection of the proposer in the model and study agents' preferences over having one agent as the proposer to another.

Chapter 3

Coordination in Bureaucratic Policy-Making

> The Interior Department is in charge of salmon while they're in freshwater, but the Commerce Department handles them when they're in saltwater. I hear it gets even more complicated once they're smoked.
>
> — Former President Barack Obama, *2011 State of the Union address*

> The Federal government's need for a uniform set of principles on the question of the use of tests and other selection procedures has long been recognized. The Equal Employment Opportunity Commission, the Civil Service Commission, the Department of Labor, and the Department of Justice jointly have adopted these uniform guidelines to meet that need, and to apply the same principles to the Federal Government as are applied to other employers.
>
> — *Uniform Guidelines On Employee Selection Procedures*[1]

[1] August 25, 1978, 43 FR 38297. The *Uniform Guidelines* were precipitated, in part, by the passage of Title VII of the Civil Rights Act of 1964 (Public Law 88–352,

3.1 Coordination in Bureaucratic Policy-Making

In terms of how the state affects the daily lives of its citizens, most policy-making is bureaucratic policy-making. Bureaucratic policy-making both reflects, and is often justified by, *expertise* (*e.g.*, [81]). One important potential downside of relying on experts is that few, if any, people or agencies are "general experts." Rather, both individual expertise and most agencies' statutory authorities are domain-specific.

Meanwhile, many modern policy questions do not fit neatly into exactly one agency's jurisdiction ([102]). Examples of such questions range from the relatively mundane (*e.g.*, regulations governing the operation of garbage trucks) to the quite serious (*e.g.*, Hurricane Katrina in 2005, the 2010 Deepwater Horizon disaster, the 2014 Flint, Michigan water crisis, and the 2023 Norfolk Southern derailment in East Palestine, Ohio). The emergence of such issues on the national level has even prompted both overhauls of existing agencies (*e.g.*, the dismantling of the Mineral Management Service (MMS) following the Deepwater Horizon disaster), creation of new ones (*e.g.*, the Consumer Financial Protection Bureau (CFPB) after the financial crisis of 2007-08), and combinations of the two (*e.g.*, the Department of Homeland Security (DHS) following the September 11th, 2001 terrorist attacks).

Indeed, even implementing any given statute frequently requires coordination between multiple agencies. For example, at least five agencies were involved in drafting hiring guidelines to implement the Departments of Justice and Labor, the Equal Employment Opportunity Commission, the Civil Service Commission (which has been succeeded in relevant part by the Office of Personnel Management), and the Office of Revenue Sharing, Treasury Department

Such major realignments of the administrative state are relatively rare. But the

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enacted July 2, 1964) and the amendments therein enacted in the Equal Employment Opportunity Act of 1972 (Public Law 92-261, enacted March 24, 1972).

general issue at play in them — the need for coordination between agencies — is omnipresent. This has been recognized for many years, of course. In the United States, this is seen as early as the early New Deal (1933-1935). For example, prior to passage of the Federal Register Act in 1935,[2] the US Federal Government did not even have a central repository for its agencies' regulations. As the federal administrative state grew in size and complexity (largely mirroring the dynamics of society and the economy as a whole), legal and policy scholars observed that agencies had little incentive to coordinate their more quotidian policy choices, in spite of growing evidence that coordination failures could eventually produce *policy failures*.

This fact arguably led to the creation of agencies explicitly charged with coordinating other agencies' activities. Examples include the Environmental Protection Agency (EPA), the Federal Emergency Management Agency (FEMA), and the Department of Homeland Security (DHS). At the same time, some coordination problems are arguably "baked into" the structure of the executive branch of the Federal Government. For example, the National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) have split, but overlapping, authority for air travel safety in the United States, the EPA and the Army Corps of Engineers have similarly complicated overlapping authority with respect to water pollution, and the list of agencies with overlapping authority in law enforcement is very long: legal scholars have identified multiple clear statutory sources of administrative overlap (*e.g.*, [133]) and some have argued that such overlap can, in theory, allow agencies to police and/or lobby one another,[3] while others have argued that delegating shared authority to multiple agencies might serve Congressional interests in the separation of powers system embodied in the Constitution.[4] However, the broad consensus appears to be

[2] 49 Stat. 500, enacted July 26, 1935.

[3] See, for example, [60] and [24].

[4] See, for example, [145] and [127].

that coordinating policy decisions is generally costly to agencies, detracting from both their performance and accountability.[5]

3.1.1 Agency Coordination in Practice

The problem of agency coordination in the US Federal Government (and elsewhere) has been recognized by for over a century, but has only recently attracted sustained scholarly attention.[6] This is not surprising in some ways, given the unique nature of the bureaucracy in the constitutional structure of the United States Federal Government. However, as governance has become more complicated and both the US Code (USC) and the Code of Federal Regulations (CFR) have each become larger and more complex, the relevance of the problem of inter-agency coordination has become more acture and apparent. Indeed, as this article was being written, the United States Supreme Court (SCOTUS) further muddied the relevant waters in *Loper Bright Enterprises v. Raimondo*[7], overruling the notion of "*Chevron* deference" established in *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.* (1984).[8] While our theory sets aside the question of judicial review,[9] the insights from our theory can be applied to considering the potential impacts of the *Loper* decision.

Agency Efforts. In his seminal study of bureaucracy, Wilson argued that formalization and centralization are common agency-level responses when facing uncertainty and/or external pressure ([198]). Along these lines, [76] explored the determinants

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[5] For example, see [75].

[6] Early works in this vein include [60], [90], [151], [113], [32], [**?**], [75], and [134].

[7] 603 U.S. __ (2024).

[8] 467 U.S. 837 (1984).

[9] For theories of judicial review of agency policy-making in the post-*Chevron*/pre-*Loper* regime, see [84] and [27].

of government agencies' internal management processes. Considering three measures of management — centralization of decision-making, formal record keeping, and departmentalization of responsibilities — Frumkin & Galaskiewicz find that government agencies tend to be more bureaucratized than non-governmental organizations[10] and that this tendency was stronger in agencies where individuals reported that the organization tends to pay attention to how other similar organizations operate ("mimetic isomorphism"). At the same time, Frumkin & Galaskiewicz also find that "there was no clear norm ... different institutional pressures were having different effects."[11] This heterogeneity is not surprising, given the wide array of problems that government agencies are tasked with (*e.g.*, [154]). Finally, Frumkin & Galaskiewicz also find that agencies in which individuals reported that the agency was subject to external oversight (such as licensing, accreditation, *etc.*) were more likely to use formalized and centralized procedures. Along the same lines, [120] consider federal agencies' efforts to enforce equal employment opportunity (EEO) policy, a process that legally requires coordination between the agency in question and the Equal Employment Opportunity Commission (EEOC). Their empirical analysis supports the notion that formal coordination mechanisms ("coordinated reporting organizational arrangements") promote both efficient dispute resolution and perceptions of fairness within the agency.

Executive Efforts. To the degree that coordination is required for policy success and/or reelection, the president has an incentive to promote coordination among agencies must also be considered in conjunction with the agencies' own coordination efforts. The executive can influence agency choices through various channels, in-

[10] Specifically, they found that government agencies' processes tended to be more centralized, formally documented, and departmentalized than in firms and non-profit organizations.

[11] [76], p. 303.

cluding unilateral appointments ([105]), consultation provisions ([142]), inter-agency agreements ([70]), negotiated rule-making ([58]), or centralized White House reviews ([111]). Historically, Congress has frequently acknowledged the President's unique role in coordination through the passage of various reorganization acts ([5, 4], [104]).[12] Several presidents have appointed policy "czars" over the past century, beginning with President Woodrrow Wilson's appointment of Bernard Baruch to head the War Industries Board in 1916. In line with the arguments we present below, the War Industries Board was created by Congress at President Wilson's urging to begin coordinating public and private efforts for a national mobilization as World War I raged in Europe. Baruch was referred to in the press as the "industry czar," and the term was also used informally to describe several officials in President Franklin D. Roosevelt's cabinet during the New Deal and World War II. [13]

These efforts only accelerated after World War II. For example, President Richard M. Nixon appointed Jerry Jaffe as the Special Consultant to the President for Narcotics and Dangerous Drugs in 1971. This position was eventually codified by the bipartisan Anti-Drug Abuse Act of 1988,[14] which created the Office of National Drug Control Policy within the Executive Office of the President. The position exists to this day and is responsible for advising the president on, and coordinating agencies' organizational, budgetary, and personnel policies related to anti-drug policy efforts. Then, in July of 1973, President Nixon appointed John Love the Director of the

[12] Of course, Congress also plays a role in coordinating and designing agencies ([33]. The judiciary also clearly plays a role. [132] provides an excellent overview of this, though the recent *Loper Bright* decision mentioned above obviously makes these waters a good bit murkier now.

[13] See Randy James, September 23, 2009, "A Brief History of White House Czars" *Time*.

[14] Public Law 100–690, enacted November 18, 1988.

Energy Policy Office, who was quickly referred to the nation's "energy czar." The 1973 oil embargo began shortly thereafter, at which point President Nixon appointed William Simon to replace Love as the Director of the newly created Federal Energy Office. In announcing the appointment and the creation of the new executive level agency, Nixon described Love's role as

> ". . . develop[ing] the necessary policies to meet what was then essentially a long-term problem which had important short-term consequences."[15]

While Love served only 5 months and Simon served only 6 months, the office and role was reified in statute by Congress with the creation of the Federal Energy Administration in 1974,[16] As the energy crisis lingered throughout the 1970s, Congress went farther, creating the cabinet level agency, the Department of Energy, in 1977, consolidating several energy related agencies, such as the Federal Energy Administration, the Energy Research and Development Administration, and the Federal Power Commission.[17]

President Clinton created the Domestic Policy Council (DPC) in 1993, which still exists as of the time of this article's writing. Formally chaired by the president, the DPC's principal functions are described as follows:

1. to coordinate the domestic policy-making process;
2. to coordinate domestic policy advice to the President;
3. to ensure that domestic policy decisions and programs are consistent with the President's stated goals, and to ensure that those goals are being effectively pursued; and

---

[15] President Richard M. Nixon, December 4, 1973.

[16] Federal Energy Administration Act of 1974 (Public Law 93-275, enacted May 7, 1974).

[17] The Department of Energy Organization Act of 1977 (Public Law 95-91, enacted August 4, 1977).

4. to monitor implementation of the President's domestic policy agenda.

Furthermore, Clinton's Executive Order directed all agencies to "coordinate domestic policy through the Council."[18] The DPC consists of the heads of over a dozen Cabinet-level agencies and departments in the Federal Government.

Coordination Between Agencies. Presidential efforts to coordinate agency activities extend beyond the creation of "czars." Most such efforts have been focused on more specific policy decisions, as opposed to broad swaths of policy-making and policy outcomes. One example of such a coordination effort is the national program for greenhouse gas emissions and fuel economy standards for light-duty vehicles, which was jointly issued by the Environmental Protection Agency (EPA) and the Department of Transportation (DOT) in 2010. The Obama administration explicitly directed the two agencies to work together to establish a coherent regulatory standard, which led to the creation of a joint rule that significantly reduced the transaction and compliance costs for both the auto industry and the agencies themselves. More broadly, President Obama also created the Interagency Climate Change Adaptation Task Force and required agencies to actively participate in it.[19]

Coordination Within Agencies. While our analysis is framed as considering coordination between two unitary, no agencies are actually monolithic unitary actors. Along these lines, [24] considers the challenges faced by agencies with multiple goals and [149] provides an excellent discussion of the understudied topic of *intra*-agency coordination. We do not delve too deeply into this fascinating topic in this article but, as we mention in the conclusion, we believe that the framework we develop could be leveraged to provide more insights into the role of agency structure and procedures

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[18] Executive Order 12859, August 16, 1993.

[19] Executive Order No. 13,514 (Oct. 8, 2009).

in shaping both the substance and success of bureaucratic policy-making. With the substantive application of our theoretical framework described, we now turn to a quick overview of our theoretical findings.

3.1.2 An Overview of Our Theoretical Findings

Intuition might suggest that, to the degree that inter-agency coordination mutually benefits the agencies and the president *and* the president's cost of facilitating such coordination is not too large, the agencies would always prefer to have aligned policy preferences and the president will, to the degree required, help coordinate the agencies on the policy that both agencies prefer. One contribution of this paper is to show that, even if the president and agencies have common preferences over policy, this will generally *not* be the case. In particular, the possibility of presidential subsidy provides the agencies with a second-order incentive to prefer some *mis*alignment of their policy preferences. Moderate amounts of such misalignment of agency preferences essentially passes on the responsibility of coordination to the executive in equilibrium. This is essentially inescapable so long as the president prefers that the agencies successfully coordinate.[20] In order to consider the impact of this equilibrium incentive, we examine two institutional cases.

In the first case, the president can pick a "counterpart" agency for a given agency to coordinate policy with. In such a setting, the president always prefers to pick an agency with aligned incentives in the sense that the agencies share a common optimal policy choice and, furthermore, benefits most from choosing a counterpart with a strong *cardinal* preference for the agency-in-question's most-preferred policy. In the second setting, we consider any given agency's own preference over counterpart agencies. In this setting, the agency always wants its counterpart to have *moderate but*

[20] In game theoretic terms, the president has a *credible commitment problem* in our setting when he or she prefers that the agencies successfully coordinate.

ordinally-misaligned preferences. By choosing an ordinally-misaligned counterpart, the agency induces the president to invest greater effort in helping the agencies coordinate. By choosing a counterpart whose policy preferences are not "too" misaligned with its own in cardinal terms, the agency provides some insurance in the (positive probability) case that the president's coordination efforts are unsuccessful and the agencies must endogenously coordinate policy-making on their own.

Finally, our theory indicates that even when the president is "unbiased" in policy terms (*i.e.*, he or she is indifferent between the possible policy outcomes and merely interested in the agencies successfully coordinating), he or she will generically benefit from using an "unfair" coordinating device in which one of the agencies is more likely than the other to have its preferred-policy chosen when the president's coordination efforts are successful.

Our analysis utilizes two models of subsidized coordination. In our theory, the president knows the two agencies' policy preferences and, based on this, chooses how much to invest in a coordination protocol that coordinates agencies to a particular outcome with a fixed probability. This setup allows us to examine how the alignment of preferences between the agencies affects the executive's optimal level of subsidy. We then consider the impact of *scarce attention* at the agency level. This is consistent with our baseline notion that agency coordination uncertain in equilibrium and allows us to consider the president's induced preferences over the *fairness* of the coordination protocol, which we represent by the relative probabilities that each agency's most-preferred policy outcome is the result when the president's coordination efforts are successful. In this setting, we show how the agencies' incentives to extract more subsidy from the executive, coupled with the executive's incentive to choose a biased coordination protocol, lead to agencies being better off when misaligned with each other. Following the theoretical analysis, we explore the empirical implications of the model and conclude.

3.2 A Simple Model of Policy Coordination

Our baseline model of bureaucratic coordination is based on **the battle of the sexes game**, pictured in Figure 3.1. The parameter $\alpha \in (0,1]$, which we refer to as

	A	B
A	(α, 2-α)	(0, 0)
B	(0, 0)	(2-α, α)

Table 3.1: A Family of Asymmetric Coordination Games ($\alpha \in (0,1]$)

the **alignment** of the agencies' preferences, is the heart of our focus in this article.[21] As α increases, we say that agencies' preferences are more closely aligned and, if $\alpha = 1$, then we say that their preferences are completely aligned.

Equilibrium Analysis. If Agencies 1 and 2 each choose a policy without knowing what policy the other agency chooses,[22] there are three Nash equilibria of the game in Figure 3.1. Two of these are in pure strategies (both agencies choosing $a_i^* = A$ and both agencies choosing $a_i^* = B$). The third equilibrium involves both agencies randomizing between $a_i = A$ and $a_i = B$. Letting $\sigma_i \equiv \Pr[a_i = A]$ denote the probability that agency i chooses policy A, this mixed strategy equilibrium is a function of α:

$$\begin{aligned} \sigma_1^*(\alpha) &= \frac{\alpha}{2}, \qquad \text{and} \\ \sigma_2^*(\alpha) &= \frac{2-\alpha}{2}. \end{aligned}$$

[21]The case of $\alpha = 0$ is omitted, because there a continuum of Nash equilibria and, substantively, the game is no longer a coordination game in that case.

[22]In game theoretic terminology, the agencies are choosing policies "simultaneously," but the main point is that each agency is choosing its policy with uncertainty about what the other agency will and the knowledge that the other agency will also be uncertain about the policy the agency in question will choose.

For simplicity, we refer to this equilibrium profile simply as "the equilibrium," and take a slight detour to justify this focus.[23]

Equilibrium Selection. While the game pictured in in Figure 3.1 has three Nash equilibria, we focus on the mixed strategy equilibrium because it is **anonymous**. The agencies have conflicting preferences over the two pure strategy equilibria, so selecting/focusing on either of the pure strategy equilibria is equivalent to "picking a winner." This is unfortunate, of course, because each of these two equilibria are Pareto superior to the mixed strategy equilibrium. We focus on the mixed strategy equilibrium because it truly reflects the "problem" of coordination.

That said, note that our general analysis does not actually require that agencies must *always* be playing the mixed strategy equilibrium. We could incorporate more structure to allow for the agencies to sometimes have common knowledge which of the pure strategy equilibria will occur (*i.e.*, in the words of [170], a positive probability that either of the two pure strategy equilibria is *focal*). For reasons of space, we do not do so in this article. Now we turn to one standard approach to coordination in coordination environments: pre-play communication.

3.2.1 Coordination & Pre-Play Communication

We are not the first to consider how to foster successful coordination in this type of setting. For example, [71**?**], [167], and [72] incorporate an explicit communication stage in which the players can send cheap talk messages prior to making their simultaneous choices in the coordination game. It is known that such communication in this setting can only increase the probability of achieving one of the pure strategy equilibria. However, this probability depends on how the communication will take place: can both players send messages and if so, do they speak simultaneously or in

[23] We thank an anonymous reviewer for pushing us to engage more with this point.

sequence? If only one player can send messages, the theoretical effect on the probability of cooperation can be quite stark, while the effect is smaller when the two players talk simultaneously.

We agree with [167] that the simultaneous messaging structure is unrealistic and, accordingly, suppose that the agencies take turns and send messages sequentially. While the messaging protocol is "cheap talk," sending a message is not necessarily free.[24] In line with our argument for focusing on the anonymous mixed strategy equilibrium in the absence of communication, we focus only on equilibria that are similarly anonymous.[25] We present a simple model of an alternating messages communication setting, applying recent results by [**?**], in Appendix C.3. The three main takeaways from that analysis are as follows.

1. An anonymous equilibrium where the probability of coordination is equal to 1 can exist, but
2. The communication process in this equilibrium induces positive expected delay, and
3. This delay decreases in the alignment of the agencies' incentives, $\alpha \in [0, 1]$.

If one presumes that the delay from negotiations is costly to the president, the second conclusion suggests one reason that the president might prefer to use the type of

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[24] In spite of messaging being costly, *per se*, the communication protocol is cheap talk because all messages are equally costly to send and leave the payoffs from the coordination game otherwise unaffected.

[25] Formally, we consider only equilibria in which, *conditional on coordination occurring*, each of the two possible coordination outcomes, (A, A) and (B, B), occurs with probability 1/2.

"costly" coordination protocol we examine in this article.[26] Along these lines, the third point mirrors one of the main results of our analysis: the president would prefer that the two agencies have more aligned preferences.[27] Furthermore, this point implies that more misaligned agencies will find the negotiation process more costly themselves as well. Thus, in empirical terms, we believe that our analysis is most pertinent for such agencies. For example, referring to the example of the creation of the DHS in 2002, the misalignment of incentives between the agencies combined within the DHS was widely reported upon.[28] We now turn to the effect of alignment, α, in our baseline model and then turn to the full model of subsidized coordination.

3.2.2 Alignment and Coordination

Before moving on to a more detailed model setup, we present a proposition that is simple but key to our analysis. It states that coordination is more likely to be successful between agencies with more closely aligned preferences and maximized by agencies with completely aligned preferences.

Proposition 12 *The probability of coordination in the mixed strategy equilibrium is strictly increasing in* $\alpha \in [0, 1]$.

The implications of Proposition 12 will appear multiple times in our subsequent anal-

[26] In addition, our analysis can be thought of as a "black box" model of communication, subsidized by the president.

[27] Propositions 12 & 13.

[28] The 9/11 Commission's Final Report described counter-terrorism efforts within the FBI in the late 1990s as follows: "relevant information from the National Security Agency and the CIA often failed to make its way to criminal investigators. Separate reviews in 1999, 2000, and 2001 concluded independently that information sharing was not occurring..." ([152], p. 79.

ysis. In particular, because greater alignment promotes higher success rates in the coordination game between the agencies, it will also reduce the incentive to exert costly effort to augment this probability of success. One of the main conclusions from the analysis below is that, despite Proposition 12, the pair of agencies can have induced preferences for *greater misalignment*, because a third actor, whom we refer to as the "president," may be willing to provide greater subsidies to aid coordination between less closely aligned agencies. We now turn to this extension of the basic model.

3.2.3 Subsidized Coordination

We now suppose that there is a **president** P who (1) wants the agencies to successfully coordinate and (2) who can subsidize the agencies' efforts to coordinate by deploying a **coordination protocol**, denoted by $\pi \in [0,1]$, and invest effort in implementing the protocol, denoted by $c \in [0,1]$. For reasons of both space and robustness, we model (pre-play) coordination in a "black box" fashion. By choosing π, the president chooses the **fairness** of coordination and, by choosing c, the president chooses the **reliability** of implementation of coordination to the agencies.

Fairness of Coordination. The fairness of the protocol is directly characterized by the probability $\pi \in [0,1]$, which represents *the probability that the coordination protocol will recommend that the agencies coordinate on* A, and $1 - \pi$ represents the probability that the protocol will recommend coordination on B. We refer to the protocol as being **fair** if and only if $\pi = {}^1/_2$. If the protocol is unfair ($\pi \neq {}^1/_2$), we refer to Agency 1 as **advantaged** if $\pi > {}^1/_2$ and Agency 2 as **disadvantaged** (the labels switch if $\pi < {}^1/_2$). Below, we allow the president to choose π (Section 3.3). However, in the baseline model analysis, we begin by assuming that π is exogenous and common knowledge.

Reliability of Coordination. While π represents the fairness of the coordination protocol, the protocol's reliability is a function of the president's unilateral investment in the protocol, the choice of which is denoted by $c \in [0,1]$.[29] The value c represents an investment in procedural policy instruments, ranging from developing new regulatory processes and practices that promote information sharing and inter-agency collaboration to more quotidian efforts to check in on and monitor the agencies' relevant decision processes.[30] For simplicity of discussion, we refer to P investing a positive amount, $c > 0$, into the coordination protocol as "bailing out" the agencies from their coordination problem. The direct cost to P of investing c is c^2. Given any investment $c \in [0,1]$, the probability of coordination *failure* is $1 - c$. When the coordination protocol fails, the agencies will play the mixed strategy equilibrium.[31]

Timing of the Game. The timing of information and decision-making is as follows.

1. The alignment value, α, and the coordination protocol, π, are made common

[29] To keep matters transparent, the president chooses c after observing both α and π. Throughout, we assume that both π and α are common knowledge to the president and agencies once the agencies make their decisions.

[30] In line with the discussion in Section 3.2.1, one could interpret higher values of c as the president supporting more rounds of communication in pre-play communication between the agencies. For reasons of space, we leave the linkage of our analysis with such a micro-foundation for future work.

[31] A couple of technical notes are in order. First, we assume that, when the coordination protocol fails, this failure is common knowledge to the two agencies. Secondly, we are considering only equilibria in which neither player conditions on c or π when choosing policy after the message fails. Our equilibrium is indeed an equilibrium — these refinements are in the same spirit as our focus on the mixed strategy equilibrium in the absence of the president having a coordination protocol to use.

knowledge.

2. P chooses a level of investment in coordination, $c \in [0, 1]$.

3. Policy-making by the agencies proceeds as follows:

   (a) With probability $1 - c$, the device fails, and the agencies play the mixed strategy equilibrium.

   (b) With probability $c{\cdot}\pi$, the device coordinates the agencies on A ($a = (A, A)$).

   (c) With probability $c \cdot (1 - \pi)$, the device coordinates the agencies on B ($a = (B, B)$).

4. The choices (a_1, a_2) are revealed, the game concludes, and players receive their payoffs.

Coordination and Coordination in the Administrative State. Examples of coordination protocols in the real world include presidential memoranda or policy directives sent to both agencies regarding how they should work together, including negotiated rulemaking ([57]). Of course, there are also many informal examples such as transactional and/or relational bargaining both within and across agencies ([54], [53, 43]). Our analysis is largely independent of the formality/informality of the coordination protocol: the model of coordination in this article is both minimal/context-free and consistent with "noise" (*e.g.*, coordination failures). We now derive the president's incentives when choosing how much to invest in the reliability of any given coordination protocol, π.

3.2.4 Equilibrium Reliability

In the baseline model in which the fairness of the coordination protocol, π, is exogenous, we first consider P's incentives when choosing how much to invest, c, in the coordination protocol's reliability. For any given protocol, π, P's equilibrium expected payoff depends on α and c:

$$EU_P^*(c \mid \alpha) = \underbrace{c}_{\substack{\text{Prob. successful}\\ \text{pre-play}\\ \text{coordination}}} + \underbrace{(1-c)}_{\substack{\text{Prob. failed}\\ \text{pre-play}\\ \text{coordination}}} \cdot \underbrace{\frac{\alpha(2-\alpha)}{2}}_{\substack{\text{Probability}\\ \text{of coordination}\\ \text{in MSNE}}} - \underbrace{c^2}_{\substack{\text{Direct cost}\\ \text{of coordination}\\ \text{reliability}}}. \tag{3.1}$$

P's optimal choice of reliability is thus

$$c^*(\alpha) = \frac{2 - 2\alpha + \alpha^2}{4}.$$

Notice that π is not included in P's payoff function. This is because we assume that P strictly gains from successful coordination but is otherwise indifferent on which outcome (A or B) the agencies coordinate. This simplifying assumption will allow us (in Section 3.3) to identify conditions under which an *unbiased* P will nonetheless benefit from using a biased coordination protocol (*i.e.*, one with $\pi \neq 1/2$). Our first main conclusion in this baseline model is that P's equilibrium payoff is increasing, and her equilibrium investment level is decreasing, in alignment, α. These are stated in the following proposition.

Proposition 13 *In equilibrium, P's investment in reliability, $c^*(\alpha)$, is strictly decreasing in the agencies' common alignment, α, and P's expected equilibrium payoff is increasing in α.*

Figure 3.1 illustrates $c^*(\alpha)$ and P's equilibrium expected payoff, $EU_P^*(\alpha)$, for $\alpha \in [0,1]$. Intuitively, P's equilibrium payoff is increasing in the agencies' alignment, α. Also intuitive is that P's optimal investment, $c^*(\alpha)$, is decreasing in α. Put simply, the two agencies unambiguously gain from higher investment by P in the coordination protocol. While this effect on P's optimal investment $c^*(\alpha)$ is fairly straightforward, we will see below that this induces the agencies to not share the

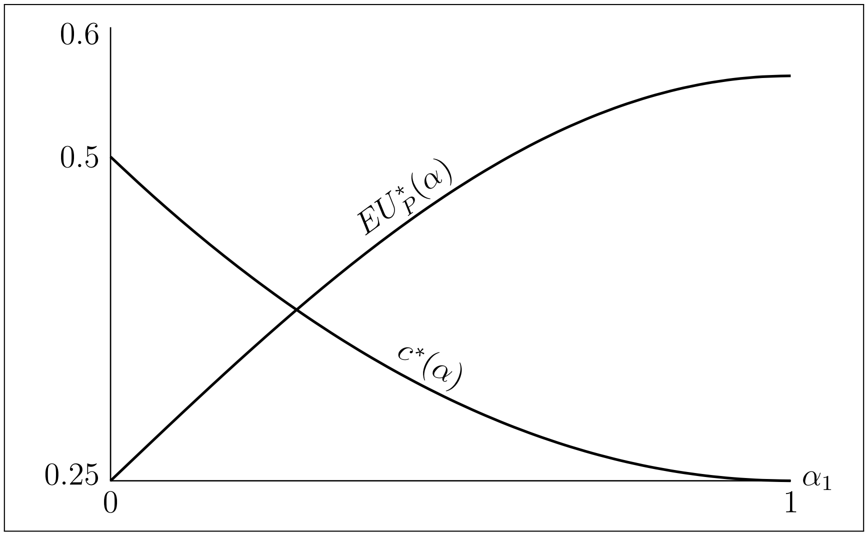


Figure 3.1: Optimal Fair Coordination Reliability as a Function of Alignment

president's preferences for alignment (Proposition 14), in spite of the fact that they do share a common preference for successful coordination.

3.2.5 Agencies' Induced Preferences Over Alignment

Before extending the model to allow the agencies to have heterogeneous alignments, α_1 and α_2, we first take a short detour to consider what the agencies would the prefer for their (common) alignment, α, to be, given the supposition that P will invest $c^*(\alpha)$. Agency 1 and 2's equilibrium payoffs (*i.e.*, based on $c = c^*(\alpha)$), as a function of π, are contained in Appendix C.1. The following proposition illustrates that, while P is indifferent about π, *per se*,[32] the agencies are most assuredly not indifferent to π. Indeed, an unfair coordination protocol ($\pi \neq 1/2$) induces one agency (the one "favored" by the protocol) to prefer some misalignment ($\alpha < 1$) and, in many cases, to most prefer *complete misalignment* ($\alpha = 0$).

[32] Again, this is because we have assumed that, in terms of outcomes, P is purely interested in the agencies coordinating but is indifferent about which outcome they coordinate upon.

Proposition 14 *For any given $\pi \in [0,1]$, Agency 1's equilibrium expected payoff with endogenous reliability is maximized by α^* defined by the following:*

$$\alpha^* = \begin{cases} 1 & \text{if } \pi \le 1/2, \\ \tilde{\alpha}(\pi) \in (0.8, 1) & \text{if } \pi \in (1/2, 0.629382), \\ 0 & \text{if } \pi > 0.629382, \end{cases}$$

where $\tilde{\alpha}(\pi)$ is a strictly decreasing function of π for all $\pi \in (1/2, 0.629382)$.[33]

Proposition 14 has several interesting implications about the agencies' induced preferences over alignment, α, and the fairness of the protocol, π.

Fair Coordination ⇔ Both Agencies Prefer Perfect Alignment. Note that the agencies mutually prefer perfect alignment ($\alpha = 1$) if and only if the coordination protocol is fair (*i.e.*, $\pi = 1/2$). The sufficiency of a fair protocol for inter-agency agreement on alignment is not surprising. The necessity, however, is a little surprising: regardless of π, the agencies have a common interest in coordination for any alignment, α.

Disadvantaged Agencies Prefer Alignment. Because the game is symmetric (the agencies share a common alignment, α, a supposition that we relax below), whenever Agency 1 prefers lower levels of alignment, Agency 2 strictly prefers perfect alignment ($\alpha = 1$), and vice-versa. Proposition 14 implies that, when the president can bail out the agencies in their coordination problem by investing c into the protocol, the agency who is *disadvantaged* by the coordination protocol prefers that the

[33] For completeness, the function $\tilde{\alpha}(\pi)$ is the second root of $4 - 8p + (-2 + 12p)\alpha + (-3 - 6p)\alpha^2 + 2\alpha^3 = 0$; the upper bound of interval for π is the first root of $-53 + 130\pi - 108\pi^2 + 56\pi^3 = 0$.

agencies have aligned preferences. Thus, Proposition 14 indicates a conflict of interests between the agencies whenever the coordination protocol is biased: the agency that is advantaged by a biased protocol would prefer to raise the stakes of successful coordination. *As π becomes more biased in favor of an agency's preferred outcome, that agency would prefer to have a larger payoff from its preferred outcome.*

Agency Preferences with Probabilistic Recommendations ($\pi \in (0,1)$). For many "unfair" coordination protocols,[34] the two agencies may disagree on whether alignment ($\alpha = 1$) is optimal. In fact, the preferences of the advantaged agency (in this case, Agency 1) over alignment, α, are non-monotonic. As an example, Figure 3.2 displays the agencies' equilibrium expected payoffs as a function of α for an unfair coordination protocol with $\pi = 0.6$.

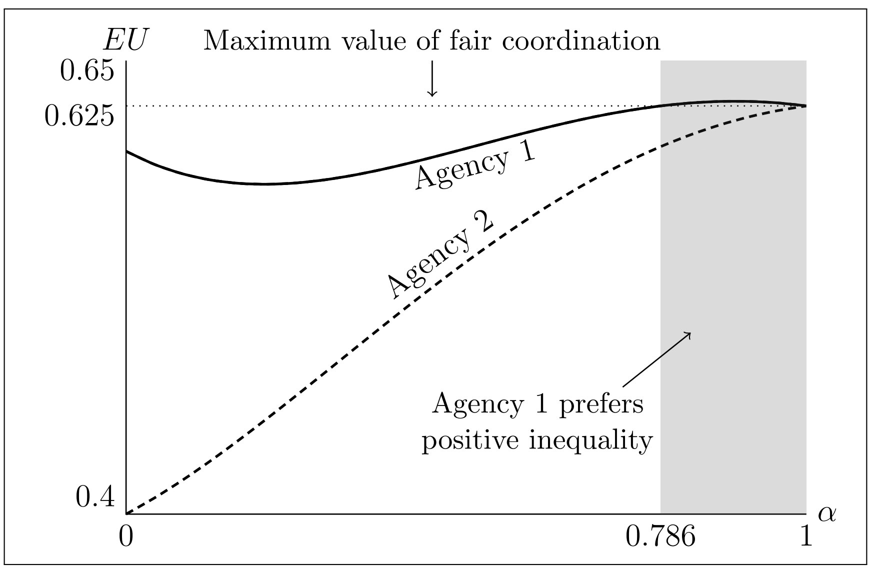


Figure 3.2: Preferences with Unfair Coordination
$\pi = 0.6$

In Figure 3.2, the coordination protocol's fairness is assumed to be $\pi = 0.6$, meaning that the coordination protocol is biased in favor of Agency 1. Interestingly, we

[34] In this particular specification, moderately unfair coordination describes any $\pi \neq 1/2$ that lies in the interval $(0.370618, 0.629382)$.

observe that Agency 1 prefers $\alpha \in [0.786, 1)$ over perfect alignment ($\alpha = 1$). Agency 1 has strong incentives to induce more investment from the president (*i.e.*, $c^*(\alpha)$); this is because the coordination protocol is biased, as it will coordinate the agencies on the outcome that Agency 1 prefers. A small degree of misalignment is therefore beneficial for Agency 1 because it can induce more investment from the president while still ensuring a sufficient degree of coordination with Agency 2 in the mixed strategy equilibrium. Agency 2, however, always does better as the agencies are more closely aligned. Agency 2 has less to gain from the president's additional equilibrium investment because the protocol is biased. Therefore, Agency 2 prefers to simply maximize the chances that the agencies successfully coordinate, i.e., have perfectly aligned preferences.

In this regard, Proposition 14 provides one reason for P to prefer to use a fair coordination protocol rather than an unfair one: if agencies expect that P will use an unfair coordination protocol, then the agencies' induced preferences over α are no longer aligned, unlike when the coordination protocol is fair. If the agencies can shape their own preferences, then P has at least one reason to use a fair protocol ($\pi = 1/2$). However, if alignment is exogenous, then P can benefit from an unfair coordination protocol when the agencies have different alignments, α_1 and α_2. We now turn to this extension, which also allows us to examine the agencies' incentives to align their own preferences.

3.3 Subsidized Coordination with Endogenous Fairness

We now extend the model to allow each agency $i \in \{1, 2\}$ to value coordination on A and B respectively at $\alpha_i \in [0, 2]$. This allows for our model to consider **Pareto-ranked coordination games**. If $\alpha_1 > 1$ and $\alpha_2 < 1$, then both agencies strictly prefer coordinating on A. These payoffs are displayed in Figure 3.2.

	A	B
A	(α_1, 2-α_2)	(0, 0)
B	(0, 0)	(2-α_1, α_2)

Table 3.2: A Bigger Family of Asymmetric Coordination Games: $(\alpha_1, \alpha_2) \in (0, 1]^2$

When $\min[\alpha_1, 2 - \alpha_2] > 1$ or $\max[\alpha_1, 2 - \alpha_2] < 1$, we refer to the agencies as **ordinally aligned**: they share a common ranking of the two coordination outcomes, A or B.[35] When the agencies are ordinally aligned, the equilibrium selection problem is arguably easier (*e.g.*, Pareto efficiency picks a unique outcome), and we will see shortly (Section 3.3.1) that P essentially recognizes this if she can choose the coordination protocol, π.

Importantly, we further relax the presumption that P knows that the agencies will observe the recommendation with certainty. Instead, we suppose that each agency $i \in \{1, 2\}$ has a privately observed **cost of attention**, $\epsilon_i \geq 0$, which it must pay to observe the coordination protocol's recommendation. When this cost is sufficiently high, the agency will simply make policy using a mixed strategy without knowledge of the recommendation. We also assume that the upper bound of the distribution of ϵ_1 and ϵ_2, $k > 0$, is unobserved by P and distributed according to a CDF, $G : \mathbf{R}_+ \to [0, 1]$ that assigns positive probability to k being sufficiently large to rule out observation in equilibrium: $G(k^*(\alpha, \pi)) < 1$, where $\alpha = (\alpha_1, \alpha_2)$.[36]

[35] We omit the special case of $\alpha = (1, 1)$ for reasons that will become clear in Section 3.3.1.

[36] Note that we presume that, if $k < k^*(\alpha_1, \alpha_2, \pi)$, the agencies play the "complete attention equilibrium" with $\epsilon_i^* = k$ for both agencies $i \in \{1, 2\}$. There is a continuum of subgame perfect Nash equilibria in this setting: we are focusing on the unique Pareto efficient equilibrium.

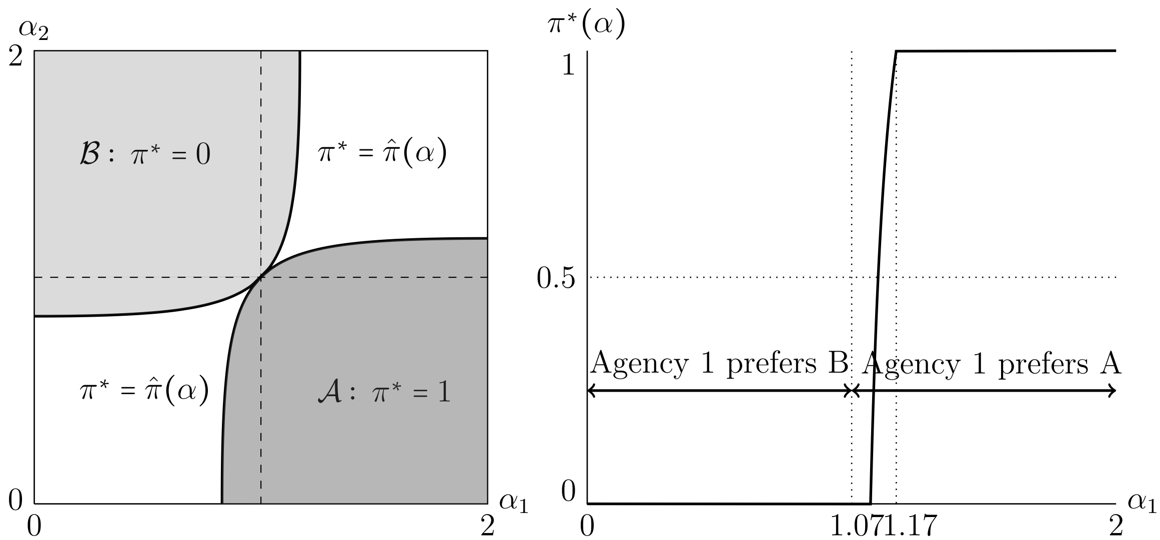
Timing of the Game. The timing of the extended game is as follows.

1. The alignment values, α_1 and α_2, are made common knowledge.
2. P chooses $\pi \in [0,1]$ and a level of investment in coordination, $c \in [0,1]$.
3. P's choices, π and c, are made common knowledge.
4. Each agency i privately observes $\epsilon_i \in \mathbf{R}$.
5. The agencies simultaneously choose whether to observe the recommendation, $\omega_i \in \{0,1\}$.
6. With probability $\omega_1 \cdot \omega_2 \cdot c \cdot \pi$, the device coordinates the agencies on A ($a = (A,A)$).
7. With probability $\omega_1 \cdot \omega_2 \cdot c \cdot (1-\pi)$, the device coordinates the agencies on B ($a = (B,B)$).
8. With probability $1 - \omega_1 \cdot \omega_2 \cdot c$, the agencies play the mixed strategy equilibrium.
9. The choices (a_1, a_2) are revealed and the players receive their payoffs:

$$\begin{aligned} v_i(\omega_i, a) &= u_i(a) - \omega_i \cdot \epsilon_i \quad \text{for each agency } i \in \{1,2\}, \text{ and} \\ v_P(a,c) &= \begin{cases} 1 - c^2 & \text{if } a_i = a_2, \\ -c^2 & \text{otherwise.} \end{cases} \end{aligned}$$

3.3.1 Equilibrium Coordination Fairness, π

If P can choose the coordination protocol, π, her optimal choice depends on $\alpha = (\alpha_1, \alpha_2)$. When the agencies' preferences are ordinally aligned, P prefers to use a degenerate coordination protocol that always recommends that the agencies choose their (mutually) most preferred coordination outcome.[37] This preference for a degenerate coordination protocol is retained for agency preferences that are not "too far from" ordinal alignment. This is illustrated in Figure 3.3a, below, which identifies three qualitative regions. The lower right of the figure (dark gray) represents the alignments that P prefers that the protocol recommends the coordination outcome A, and the upper left of the figure (light gray) represents the alignments that P prefers that the protocol recommends the coordination outcome B. The remaining region (white) represents the alignments that prompt P to use a non-degenerate coordination protocol. This third region includes only situations in which neither of the coordination outcomes is uniquely Pareto efficient.



(a) Endogenous Fairness: Regions of π^* (b) P's Optimal Choice of π ($\alpha_2 = 1.1$)

Figure 3.3: Equilibrium Fairness, $\pi^*(\alpha)$

In the third region, P's optimal protocol, $\hat{\pi}(\alpha)$, is locally sensitive to changes in

[37] Formally, P prefers $\pi^* = 0$ if $\max[\alpha_1, 2-\alpha_2] < 1$ and P prefers $\pi^* = 1$ if $\min[\alpha_1, 2-\alpha_2] > 1$.

the agencies' alignments, α. Specifically, defining the following function:

$$\hat{\pi}(\alpha) \equiv \begin{cases} {}^{1}\!/_{2} & \text{if } \alpha_1 = \alpha_2 = 1, \\ \min\left[1, \max\left[0, \frac{1}{8}\left(\alpha_2 - \alpha_1 + \frac{1}{1-\alpha_1} - \frac{1}{1-\alpha_2} + 4\right)\right]\right] & \text{otherwise,} \end{cases} \tag{3.2}$$

the optimal protocol from P's perspective, as a function of α_1 and α_2 is:

$$\pi^*(\alpha) = \begin{cases} 0 & \text{if} \quad \hat{\pi}(\alpha) < 0 \\ \hat{\pi}(\alpha) & \text{if} \quad \hat{\pi}(\alpha) \in [0,1] \\ 1 & \text{if} \quad \hat{\pi}(\alpha) > 1, \end{cases} \tag{3.3}$$

Figures 3.3a and 3.3b (each derived from Equation (3.2)) both correctly suggest that P's optimal protocol is fair ($\pi = {}^{1}\!/_{2}$) if *and only if* $\alpha_1 = \alpha_2$. Similarly, Equation (3.2) implies that $\pi^*(\alpha)$ increases in α_1 and decreases in α_2. This is in line with the logic described above regarding the flat regions, $\mathcal{A}$ and $\mathcal{B}$. P optimally sets the fairness level of the protocol such that it favors coordination on the outcome favored by the agency i with the highest value of α_i.

Looking at the same problem from a different angle, Figure 3.3b illustrates P's optimal choice of π with respect to Agency 1's alignment when Agency 2's alignment $\alpha_2 = 1.1$, i.e., prefers outcome B over A but is sufficiently indifferent between the two outcomes. When $\alpha_1 \leq 1$, agencies are ordinally aligned. P thus always chooses $\pi^*(\alpha) = 0$ that coordinates agencies on outcome B. When α_1 is larger but sufficiently close to 1, P's optimal choice may be non-degenerate and increasing in α_1. Now the agencies are ordinally misaligned; P chooses a value of $\pi^*(\alpha)$ that coordinates the agencies on both outcomes, each with some positive probability. The probability that the agencies are coordinated on outcome A increases as Agency 1 more strongly prefers outcome A, and with sufficiently large α_1 ($\alpha_1 > 1.17$), P chooses $\pi^*(\alpha) = 1$.

We discuss the fairness of the president's optimal coordination protocol in Section

3.4.1. Before that discussion, we turn to the question of how much the president should invest in the coordination protocol's reliability, c.

3.3.2 Equilibrium Coordination Reliability, c

With the optimal coordination protocol, $\pi^*(\alpha)$, in hand, we can now derive the equilibrium level of investment. In this setting, P's expected payoff depends on $\alpha = (\alpha_1, \alpha_2)$, π, c, and k:

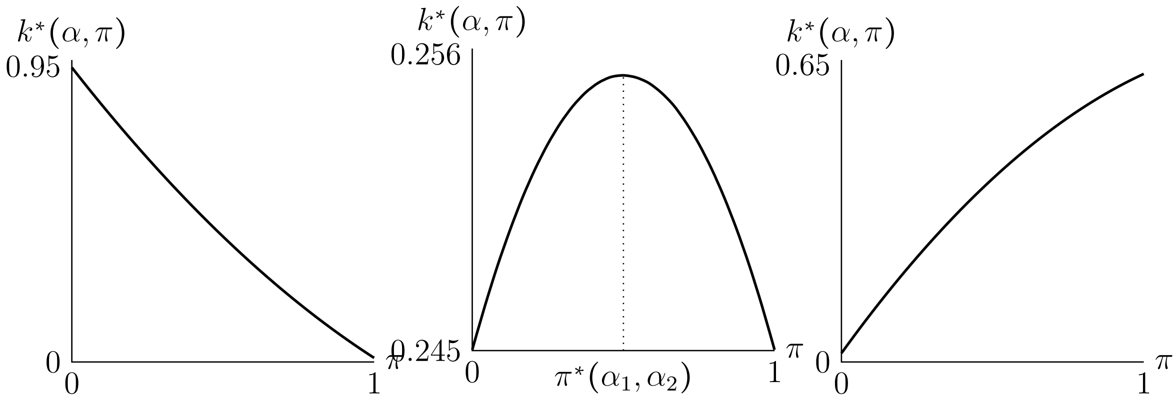
$$u_P(c \mid k) = \begin{cases} c + (1-c)\frac{\alpha_1(2-\alpha_2)+\alpha_2(2-\alpha_1)}{4} - c^2 & \text{if } k < k^*(\alpha,\pi), \\ \frac{\alpha_1(2-\alpha_2)+\alpha_2(2-\alpha_1)}{4} - c^2 & \text{if } k \geq k^*(\alpha,\pi). \end{cases}$$

Note that the investment cost, c, is lost regardless of whether coordination actually occurs, implying that P has a non-trivial trade-off when choosing c as long as P knows that there is a positive probability the agencies will pay attention to the protocol in equilibrium. Accordingly, the optimal investment in this setting will be some number in the interval $(0, c^*(\alpha))$, where $c^*(\alpha)$ is

$$c^*(\alpha) = \begin{cases} \frac{1}{4}(\alpha_1 + 2 - \alpha_2 - \alpha_1(2-\alpha_2)) & \text{if} \quad k < k^*(\alpha,\pi) \\ 0 & \text{if} \quad k > k^*(\alpha,\pi). \end{cases} \tag{3.4}$$

Because investment is always costly but useful only if $k < k^*(\alpha, \pi^*(\alpha))$, the exact value of the optimal investment in this setting will (intuitively) depend on the distribution of k: the optimal investment will be an increasing function of $G(k^*(\alpha, \pi^*(\alpha))) \in (0,1)$.

The three panes of Figure 3.4 display the maximum cost of attention $k^*(\alpha,\pi)$ the agencies are willing to incur, given their alignments. P's objective is to choose a value of π that maximizes $k^*(\alpha,\pi)$, as this would maximize the chances that agencies observe the recommendation. When agencies are aligned, P always recommends the outcome that both agencies prefer; P's optimal choice of π is therefore either 0 or



(a) $\alpha_1 = 0.25$ (b) $\alpha_1 = 1.1$ (c) $\alpha_1 = 1.75$

Figure 3.4: Maximum Cost of Attention that Agencies are Willing to Incur, $\alpha_2 = 0.9$

1 (see Figure 3.4a). P will find it optimal to choose an interior value of π only if the agencies are misaligned and neither agency strongly prefers one outcome over another.[38] Figure 3.4 illustrates two other general properties:

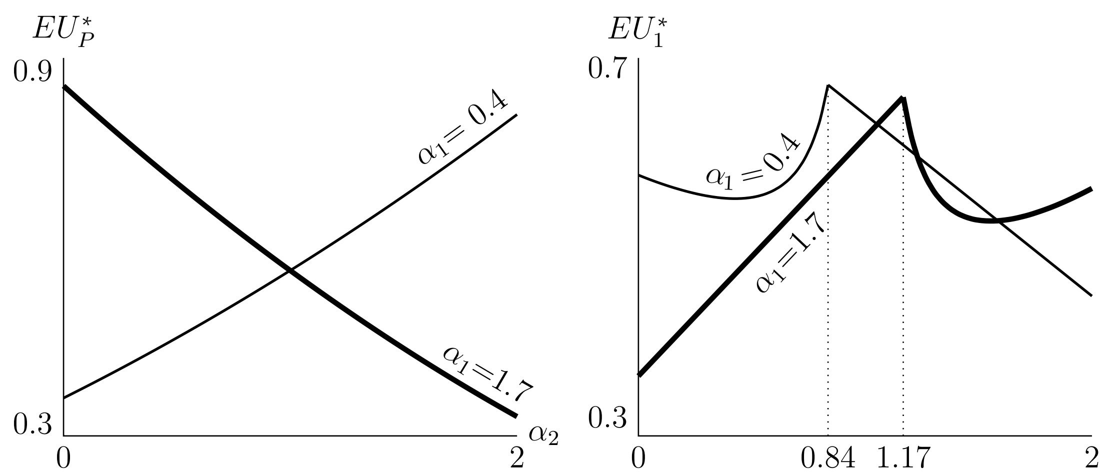
- agencies are less willing to pay attention as they become more indifferent to the two outcomes (see Figure 3.4b), and
- given that (*i.e.*, $k < k^*(\alpha,\pi)$), both agencies pay full attention: accordingly, P's optimal choice of reliability $c^*(\alpha)$ is the same as in Section 3.2.4.

Viewed more broadly, Figure 3.4 implies that the attention problem affects the agencies' payoffs only through its effect on P's choice of fairness. We detail how her choice of fairness $\pi^*(\alpha)$ changes with respect to different alignment values in Appendix C.2.1. We now turn to the question of who P and the agencies, respectively, would choose the alignment given the equilibrium paths (including P's choice of π and c) for every pair of alignments.

[38] If either agency has sufficiently strong preferences for one of the two outcomes, then P will find it optimal to use a degenerate coordination protocol - see Figure 3.4c.

3.3.3 Choosing Agencies to Coordinate

In this section, we examine both P and Agency 1's induced preferences over the alignment between Agency 1 and Agency 2.[39] Specifically, we suppose that Agency 1 must be involved in policy-making, with an exogenous and known alignment, $\alpha_1 \in [0,1]$. We then consider which agency P and Agency 1, respectively, would choose as the "Agency 2" to work with Agency 1. The main substantive finding of this analysis is that Agency 1 and P would choose a different counterpart agency to serve as Agency 2. This conclusion is illustrated in Figures 3.5a (showing P's induced preferences over the alignment of Agency 2, α_2) and 3.5b (showing Agency 1's own preferences over α_2).



(a) Principal's Equilibrium Payoff (b) Agency 1's Equilibrium Payoff

Figure 3.5: Induced Preferences Over α_2, Given α_1 ("Perfectly Aligned": $\alpha_2 = 2 - \alpha_1$)

Figure 3.5a illustrates that P's expected payoff is maximized by choosing the agency with policy preferences that are "most highly aligned" with Agency 1 (*i.e.*, the agency $j \neq 1$ with the largest alignment value, $2 - \alpha_j$), *regardless of* Agency 1's alignment value, α_1. P's preferences are straightforward; she always wants agencies

[39]Because of the symmetry of the problem, Agency 1's preferences about Agency 2's alignment, α_2, mirror Agency 2's preferences over Agency 1's alignment, α_1.

to be ordinally aligned, and conditional on alignment, she wants an agency to have a very strong preference toward an outcome. The idea behind this is that P wants to maximize the probability that agencies coordinate via the mixed strategy equilibrium as opposed to through the pre-play coordination device in order to minimize the cost of investment $c^*(\alpha)$. This is visualized in Figure 3.5a. When $\alpha_1 = 1.7$, P is best off when $\alpha_2 = 0$, in other words, when Agency 2 prefers outcome B and prefers it to the strongest possible degree. Similarly, when $\alpha_1 = 0.4$, P prefers $\alpha_2 = 2$.

Conversely, when Agency 1 is in charge of choosing its counterpart, Agency 1 *always* wants the counterpart to be ordinally-opposed but sufficiently indifferent between the two outcomes. In spite of this being a coordination problem (and therefore, somewhat common value in nature), the agencies may have distinct preferences not only because they actually have differing preferences, but also because they have different marginal values from P's investment in the protocol, c^*, and these marginal values are themselves sensitive to the exact values of the alignments, $\alpha = (\alpha_1, \alpha_2)$. Two examples of this are illustrated in Figure 3.5b. The thick-lined curve portrays Agency 1's induced preference over Agency 2's alignment, α_2, when Agency 1 prefers coordination on outcome B ($\alpha_1 = 0.4$). In this scenario, Agency 1's expected payoff, conditional on Agency 2's alignment, α_2, given its own alignment is $\alpha_1 = 0.4$, is maximized by $\alpha_2 \approx 0.84$. Under such an alignment by Agency 2, given $\alpha_1 = 0.4$, the two agencies have ordinally-opposed alignments. The agencies are acting in anticipation of P's actions; sufficient misalignment between the agencies induces P to invest more in $c^*(\alpha)$. Similarly, even when Agency 1's relative preference for its preferred coordination outcome is stronger ($\alpha_1 = 1.7$), Agency 1's expected payoff, given its own alignment, $\alpha_1 = 1.7$, is maximized by $\alpha_2 \approx 1.17$.

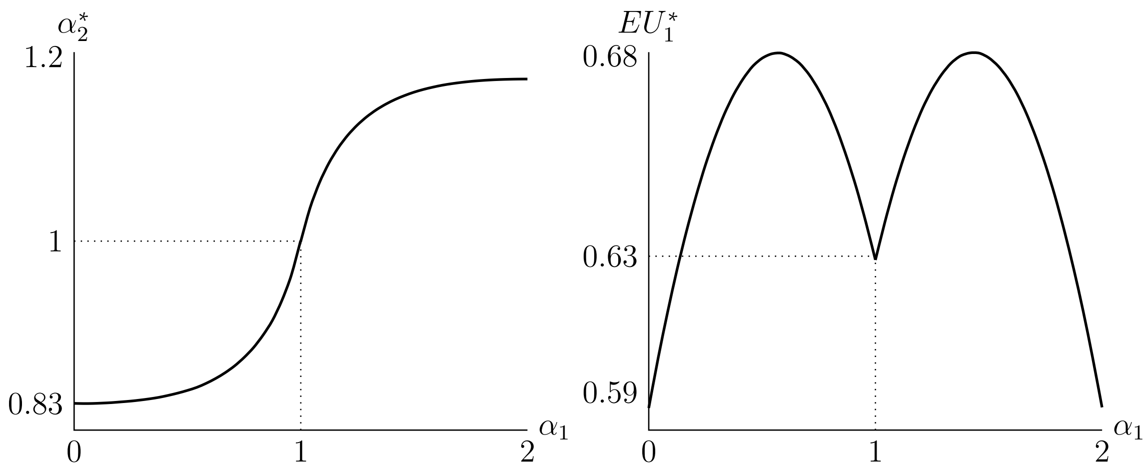
This contrast between P's and Agency 1's induced preferences over alignment of Agency 2 highlights the importance of *who* gets to pick the agencies to coordinate. The following proposition summarizes this intuition.

Proposition 15 *Consider P and Agency 1's induced preferences over α_1 given α_2.*

- *P always prefers the agencies to be ordinally aligned. When $\alpha_1 \leq 1$, P chooses $\alpha_2^* = 2$; when $\alpha_1 > 1$, P chooses $\alpha_2^* = 0$.*
- *Agency 1 always prefers the agencies to be ordinally opposed. Its optimal choice α_2^* increases in α_1.*

Figure 3.6 illustrates the logic behind Proposition 15 in more detail. We observe from Figure 3.6a that given Agency 1's alignment α_1, it always chooses an agency that is misaligned in preferences since this induces more subsidy from P. However, Agency 1 doesn't want its counterpart to prefer the other outcome too much, as P would then set the coordination protocol to favor the other agency. In short, it optimally chooses an agency that prefers a different policy outcome but only prefers it mildly over the other. P in equilibrium invests more in c to coordinate the agencies (compared to the case where both agencies are ordinally-aligned) and sets fairness π such that favors Agency 1: this is the best possible scenario for Agency 1. Additionally, its optimal choice of α_2 increases in α_1.

Agency 1's equilibrium payoff given that it can pick "Agency 2" is depicted in Figure 3.6b. Somewhat surprisingly, Agency 1 is worst off with extreme preferences (α_1 is 0 or 2) even when it has the power to choose who to coordinate with. It might seem that Agency 1's chances of successful coordination will be maximized when it strongly prefers an outcome and chooses the other agency to be more or less indifferent between the outcomes, which would induce P to choose $\pi = 1$ in equilibrium. However, this is suboptimal for Agency 1 because with the given alignments the agencies can successfully coordinate on their own that P is discouraged from investing in reliability c to facilitate their coordination.



(a) Agency 1's Optimal Choice of α_2^* (b) Agency 1's Equilibrium Payoff

Figure 3.6: Agency 1's Induced Preferences With Respect to Agency 2's Alignment, α_2

3.4 So Why Are there Organizational Divisions?

As mentioned in the introduction, the problem of policy coordination is well-recognized by policy-makers and scholars alike. This recognition in the United States is demonstrated by the regularity with which the federal government is reorganized. At least a casual reflection on periods of reorganization (*e.g.*, the advent of regulatory agencies in the late 19th/early 20th century, New Deal, demobilization after WWII, the Great Society, the creation of the EPA and OSHA in the 1970s, creation of DHS after 9/11 ([88]), the reorganization of MMS following the Deepwater Horizon disaster) indicates the potency of policy failures to spur such efforts. Reogrnization efforts are costly and complicated, so that is not too surprising. However, as also alluded to in the introduction, formal divisions of authority remain quite common in the executive branch. For example, the Department of Labor (and OSHA, which is formally located within the Department of Labor) and the National Labor Relations Board (NLRB) have mutually overlapping policy responsibilities. However, the NLRB is an independent agency that, at least in in theory, is insulated from direct presidential control.

There are many theoretical reasons that such organizational divisions might emerge in equilibrium (*e.g.*, [1]). Here we focus on three that our theory might be seen as augmenting without directly addressing them: adverse selection, constraining executive power, and complementary expertise.

Adverse Selection. In some contexts, "successful coordination" by two agencies might be worrisome. Our theory omits concerns about *adverse selection* ([48, 49], [78, 77], [87]). Specifically, the president's and agencies' policy preferences are common knowledge: the only uncertainty our theory addresses is that of *moral hazard*. The values of redundancy are a standard argument in favor of overlapping jurisdictions (*e.g.*, [187, 188, 189], [80, 83, 86]).

Concerns about moral hazard and/or adverse selection might induce Congress and/or the president to create two "pools of experts" with separate career incentives to help "audit" the recommendations of each agency ([17], [191], [159]). Such pools of experts exist in several forms in the US federal government, including advisory committees ([10], [184], [126]), inspectors general ([129]), and — less formally — citizen groups and regulated interests ([141], [30]). None of these solutions are perfect, as the literature on "agency capture" illustrates ([21], [124], [51], [137]). Our theory sets these concerns to the side principally because our model does not include a "public" to whom the president and/or agencies should be accountable.

Constraining Executive Power. Particularly since the executive branch reorganization described and authorized by the Homeland Security Act of 2002,[40] scholars have become increasingly concerned with the potency of the executive branch, the degree to which it might infringe on civil liberties and, increasingly, worries about a "deep state" in which the structure and decision-making of bureaucrats is too insulated from political & electoral accountability. As presently developed, our theory

[40] Public Law 107–296, enacted November 25, 2002

has very little to say about these concerns because, in addition to not including the public in the model, the model also does not consider the career concerns or other motivations of individuals within each of the agencies (*e.g.*, [79], [156]).

Our theory is more closely related to a thread of the literature that argues that bureaucratic overlap might usefully *constrain* the president's powers. For example, Katyal argues that the normal checks and balances described in Article I, Section 7 of the US Constitution are largely ineffective in terms of empowering Congress to constrain presidential overreach (particularly after a statute has already been enacted). Instead, Katyal argues that assigning overlapping missions to multiple bureaucratic agencies can be more effective in limiting overreach:

> "A well-functioning bureaucracy contains agencies with differing missions and objectives that intentionally overlap to create friction. Just as the standard separation-of-powers paradigms (legislature v. courts, executive v. courts, legislature v. executive) overlap to produce friction, so too do their internal variants." ([113], p. 2317)

Katyal is aware of the downside of coordination problems, of course, acknowledging that

> "when there is no neutral decision-maker within the government in cases of disagreement, the system risks breaking down." ([113], p. 2317)

We believe our theory is consistent with Katyal's argument, albeit without considering the separation of powers issues and accountability challenges raised by institutional design reforms. Specifically, our theory indicates situations in which the president will find it optimal to *not* assist/subsidize agencies' coordination efforts (Equation (3.4), when $k > k^*(\alpha, \pi)$). Our parameter k effectively represents "all of the other things that agencies need to do": higher values imply that the agency is likely to be too busy to pay attention to the president's coordination efforts. The effect of k in our argument is similar to Katyal's implementation proposals ([113], pp. 2235–42), which rely on reporting requirements to provide transparency and increase the costs of presidential meddling in bureaucratic decision-making and negotiation between agencies.

Complementary Expertise. Our theory is purposely agnostic about why the two agencies must coordinate on the policy decision in question. A traditional notion of why an agency of unelected civil servants is tasked with setting and/or enforcing policy in a given area is that these civil servants possess some expertise in the area in question. Of course, much expertise is task-specific ([79]), and as the opening quote from the *Uniform Guidelines* indicates, many public policies require multiple tasks, sometimes spanning the expertise and statutory jurisdiction of multiple agencies.

Unsurprisingly, this has been recognized for a long time. We believe that one of the federal policy-making procedural innovations in the late 20th century — negotiated rulemaking — illustrates recognition of some of the broader points of our theory. Negotiated rulemaking emerged in the 1980s,[41] and is seen as central to both the perceptions and realities of modern administration, ranging from issues such as legitimacy ([74], [155]) to policy areas such as education ([**?**]), the environment ([**?**]), and transportation ([**?**]). Our theory is too thin to really engage with the debates about the efficacy of negotiated rulemaking as a coordination device, but it is clearly an example of a procedural innovation driven at least in part to increase coordination between agencies. In this vein, our theory indicates that the desire by the president for agencies to actually engage in negotiated rulemaking (which is essentially voluntary) is higher when the agencies in question have misaligned incentives. This possibly raises an explanation for the mixed empirical assessment of negotiated rulemaking's empirical efficiency (see the discussion between [57**?**], [**?**], and [74]):

[41] Negotiated Rulemaking Act of 1990, Public Law 101-648, enacted Nov. 29, 1990.

negotiated rulemaking is arguably costly and, without extrinsic "carrots and sticks," it is not clear why the agencies that most need negotiated rulemaking — agencies with less well-aligned interests — would find it in their own interest to essentially subsidize this kind of coordinating device *if the president is a potential subsidizer of these efforts as well.*

3.4.1 Endogenous Inequality

In our model, the president and agencies all benefit from inter-agency coordination and have common preferences over policy. Our theory shows how these incentives to maximize coordination can ironically prompt the agencies to select themselves into a higher degree of latent inequality. In addition, the theory indicates that a president faced with sufficiently misaligned agencies may also endogenously choose an unfair coordination protocol. We discuss each of these conclusions and the logic behind them.

Agency Incentives to Create Misalignment. The possibility of a presidential subsidy creates a second-order incentive for the agencies to be initially misaligned in preferences with one another. When an agency is given the opportunity to choose its counterpart, we expect to observe the agency to *always* choose a partner with different policy preferences; this is because the agency acts in anticipation of the president's coordination effort. By intentionally increasing the latent inequality between the agencies, the agency encourages the president to invest in the protocol, thereby maximizing the ex-post probability of coordination. The agency essentially passes the responsibility of facilitating coordination onto the president.[42]

[42] We would be remiss to not recall the sign that President Harry S. Truman famously had on his desk, which read, "The buck stops here."

Unfair Coordination Protocols. Our theory indicates that the president's optimal coordination protocol is almost always "unfair" in the sense that it privileges one of the two outcomes, A or B, unless the agencies preferences over the two coordination outcomes are identical aside from the fact that they are opposed (*i.e.*, $\alpha_1 = \alpha_2$). An unfair coordination protocol is optimal for the president only when the agencies are ordinally misaligned and have the option to not observe the president's recommendation. This possibility of scarce attention induces the president to choose an unfair protocol such that maximizes the probability that the agencies observe the recommendation.

Recalling that the theory assumes that the president is *per se* indifferent between coordination on A and coordination on B, this theoretical conclusion demonstrates a challenge when inferring the president's priorities from his or her choice of coordination protocol. When the coordinating agencies have different cardinal preferences over the possible policy outcomes (A and B) *and* they must pay a cost to pay attention to the coordination protocol, the president will find it optimal to bias the coordination protocol to favor the policy that maximizes the sum of the agencies' payoffs (Figure 3.3a). In this setting, this will be indistinguishable from the president favoring the agency with the "strongest" preferences between the two coordination outcomes. Empirically, this might be reflected by a president who is otherwise indifferent between the two potential policies to draft presidential memoranda, policy directives, or make staffing appointments that may seem as if she favors one agency over the other.

On a related note, this prediction of the theory is also roughly consistent with the president seeking to maximize the sum of the agencies' payoffs (*i.e.*, Benthamite welfare maximization), which is also closely to equilibrium selection/forward induction arguments such as *payoff dominance* ([97]). This is not "why" the president finds it optimal to bias the coordination protocol in this setting, but this again illuminates an inferential challenge for scholars attempting to distinguish between different causal mechanisms that might guide presidential priority setting and centralization/coordination efforts.

3.5 Conclusion

Coordination problems are ubiquitous in bureaucratic policy-making. Accordingly, presidents are inevitably confronted with the task of persuading agencies to work together in pursuit of cohesive policy implementation. In this article, we have provided a game-theoretic explanation of how the alignment of preferences between the agencies changes both the level of effort that the president will exert in achieving coordination (*i.e.*, how "reliable" the efforts will be), the policy "bias" in the president's coordination efforts. (*i.e.*, how "fair" the efforts will be) optimal level of subsidy and, ultimately, how the president's incentives will affect agencies' preferences over the alignment of their interests with the agency that they are tasked with coordinating their policy efforts.

Substantively, the model yields several conclusions. First, even if the president and agencies have common preferences over policy, the possibility of presidential subsidy provides the agencies with a second-order incentive to prefer some misalignment over their policy preferences. This is because the possibility of miscoordination between agencies induces the president to invest in more subsidy to facilitate their coordination. Such incentives highlight the importance of who gets to pick the agencies to coordinate. When the president is given the power to pick a "counterpart" agency for a given agency to coordinate policy with, he or she always prefers an agency with ordinally aligned preferences; conversely, the given agency always prefers its counterpart to be moderate but ordinally misaligned. Lastly, we consider the president's induced preferences over the fairness of the coordination protocol and show that he or she generally benefits from an "unfair" coordinating device in which one of the agencies is more likely than the other to have its preferred-policy chosen.

There are several directions one could extend the model to address related questions. For example, the agencies' decisions are very black-boxed in the simple model we presented in this article. Questions of staffing (*e.g.*, [30], [156]) and investment in expertise ([79, 84]) would be interesting explore when these decisions are foreseen as potentially affecting the agency's alignment with other agencies with whom they may be tasked to coordinate in the future. Similarly, it would interesting to consider how the possibility of these coordination efforts affects how voters and regulated interests should lobby legislators and how these legislators should respond to such efforts ([93, 94]). Finally, a common link between the various extensions that we see as most interesting is that they extend the dynamic nature of the process modeled here (*i.e.*, the president commits to a coordination protocol prior to the agencies then playing a coordination game). There are many interesting and important phenomena one could include in more dynamic model, such as learning by the agencies and president ([45]), disasters ([6], [87]), and agency capacity ([190], [192]). One of the appeals of leveraging a framework similar to the one we have presented in this article is that the coordination problem provides a natural way to capture notions such as endogenous uncertainty and/or policy failures.

Appendix A

Strategic Experiments Under Regulatory Uncertainty

A.1 Proof

Proposition 16 *If* $\mathbb{E}[\omega \mid \omega \leq x + c] > x - c$*, then it is optimal for Firm to fully learn* $\omega > x + c$ *and no other information.*

Proof: If the experiment reveals that $\omega > x + c$, the posterior mean is $s = \omega$. Since $s > x + c$, Firm chooses to go to court, resulting in a payoff of $s - c$. Conversely, if $\omega \leq x + c$, the posterior mean is pooled, yielding $s = \mathbb{E}[\omega \mid \omega \leq x + c]$. Since $s \in (x - c, x + c]$, neither goes to court, and Firm receives a payoff of x. Graphically, we can verify that the induced posterior means and the corresponding payoffs lie at the intersection of the indirect utility function $U(s)$ and the smallest feasible convex function $\phi(s)$:

$$\phi(s) = \begin{cases} x & \text{if } s \leq x + c \\ s - c & \text{if } s > x + c \end{cases}$$

which is a piecewise linear function that passes through the points $(0, x)$, $(x + c, x)$, and $(1, 1-c)$. ∎

Proposition 17 *If $\mathbb{E}[\omega|\omega \le x+c] \le x-c \le \mathbb{E}[\omega]$, then it is optimal for Firm to fully learn $\omega > s^*$ and no other information, where s^* is the value such that $\mathbb{E}[\omega|\omega \le s] = x-c$.*

Proof: If the experiment reveals that $\omega > s^*$, the posterior mean is $s = \omega$. Since $s > x+c$, Firm chooses to go to court, resulting in a payoff of $s-c$. Conversely, if $\omega \le s^*$, the posterior mean is pooled, yielding $s = x-c$. Since $s = x-c$, neither goes to court, and Firm receives a payoff of x. Graphically, we can verify that the induced posterior means and the corresponding payoffs lie at the intersection of the indirect utility function $U(s)$ and the smallest feasible convex function $\phi(s)$:

$$\phi(s) = \begin{cases} \frac{(s^*-x-c)s+(s^*+x-c)c}{s^*-x+c} & \text{if } s \le s^* \\ s-c & \text{if } s > s^* \end{cases}$$

which is a piecewise linear function that passes through the points $(x-c, x)$, (s^*, s^*-c), and $(1, 1-c)$. ∎

Proposition 18 *If $\mathbb{E}[\omega] < x-c$, then it is optimal for Firm to fully learn $\omega < s_*$ and no other information, where s_* is the value such that $\mathbb{E}[\omega|\omega \ge s] = x-c$.*

Proof: If the experiment reveals that $\omega < s^*$, the posterior mean is $s = \omega$. Since $s < x-c$, Regulator chooses to go to court, and Firm receives a payoff of s. Conversely, if $\omega \ge s^*$, the posterior mean is pooled, yielding $s = x-c$. Since $s = x-c$, neither goes to court, and Firm receives a payoff of x. Graphically, we can verify that the induced posterior means and the corresponding payoffs lie at the intersection of the indirect utility function $U(s)$ and the smallest feasible convex function $\phi(s)$:

$$\phi(s) = \begin{cases} s & \text{if } s < s^* \\ \frac{(x-s^*)s-s^*c}{x-c-s^*} & \text{if } s \ge s^* \end{cases}$$

which is a piecewise linear function that passes through the points $(0,0)$, (s^*, s^*), and $(x-c, x)$. ∎

Proposition 19 *Both s_* and s^* decrease as F increases in the sense of first-order stochastic dominance. Equivalently, the equilibrium informativeness of the experiment is non-monotonic with respect to her prior belief about the product.*

Proof: I examine the effect of F on equilibrium cutoffs. First, consider cutoff s_*, which satisfies

$$\mathbb{E}[\omega \mid \omega \geq s_*] = x - c.$$

All else equal (including s_*), the right-hand side of the equation increases as F increases in the sense of first-order stochastic dominance. Thus, s_* must decrease for the equation to hold. In the high-risk equilibrium, information is revealed with probability $F(s_*)$. Consider F' that first-order stochastically dominates F. Let s_{**} denote the cutoff in equilibrium given F'. Comparing $F(s_*)$ and $F'(s_{**})$, it follows that $F(s_*) > F'(s_*)$ by the definition of first-order stochastic dominance, and $F'(s_*) > F'(s_{**})$ because the cutoff decreases in F. Therefore, the probability that some information is revealed decreases in F for the high-risk case. At the "upper bound" where $\mathbb{E}[\omega] \to x - c$, the probability reaches zero because $s_* \to 0$.

Second, consider cutoff s^*, which satisfies

$$\mathbb{E}[\omega \mid \omega \leq s^*] = x - c.$$

Similarly, all else equal, including s^*, the right-hand side of the equation increases as F increases in the sense of first-order stochastic dominance. Thus, s^* must decrease for the equation to hold. In the medium-risk equilibrium, information is revealed with probability $1 - F(s^*)$. Similarly, consider first-order stochastically dominant distribution F' and corresponding cutoff s^{**}. Comparing $1 - F(s^*)$ and $1 - F'(s^{**})$, it follows that $1 - F(s^*) < 1 - F'(s^*)$ by the definition of first-order stochastic dominance, and $1 - F'(s^*) < 1 - F'(s^{**})$ because the cutoff decreases in F. Therefore, the probability that some information is revealed increases in F in the medium-risk case. A similar logic applies to the low-risk case, where the cutoff is constant at $x + c$.

To summarize, as F increases in the sense of first-order stochastic dominance, the equilibrium informativeness of the experiment initially decreases, eventually reaching zero in the high-risk case. Subsequently, the informativeness increases in the medium- and low-risk cases. ∎

Proposition 20 *Firm's equilibrium payoff is non-monotonic with respect to her status quo payoff* x*. In particular, Firm prefers lower* x *if* $\mathbb{E}[\omega] < x - c$*.*

Proof: In the low-risk equilibrium, Firm receives

$$\int_0^{x+c} (x) dF(\omega) + \int_{x+c}^{1} (\omega - c) dF(\omega).$$

Consider a larger $x' > x$ such that results in low-risk case equilibrium. Firm receives

$$\begin{aligned}
&\int_0^{x'+c} (x') dF(\omega) + \int_{x'+c}^{1} (\omega - c) dF(\omega) \\
&= \int_0^{x+c} (x') dF(\omega) + \int_{x+c}^{x'+c} (x') dF(\omega) + \int_{x'+c}^{1} (\omega - c) dF(\omega) \\
&> \int_0^{x+c} (x) dF(\omega) + \int_{x+c}^{x'+c} (\omega - c) dF(\omega) + \int_{x'+c}^{1} (\omega - c) dF(\omega) \\
&= \int_0^{x+c} (x) dF(\omega) + \int_{x+c}^{1} (\omega - c) dF(\omega),
\end{aligned}$$

which is larger than the payoff induced by the original x. In other words, conditional on the low-risk equilibrium, Firm's utility increases in x.

In the medium-risk equilibrium, Firm receives

$$\begin{aligned}
&\int_0^{s^*}(x)dF(\omega) + \int_{s^*}^1(\omega - c)dF(\omega)\\
&= \int_0^{s^*}(\omega + c)dF(\omega) + \int_{s^*}^1(\omega - c)dF(\omega)\\
&= \int_0^1(\omega)dF(\omega) + 2\int_0^{s^*}(c)dF(\omega) - c.
\end{aligned}$$

Note that s^* increases in x because the right-hand side of the condition $\mathbb{E}[\omega|\omega \le s^*] = x - c$ increases in x. Then, conditional on the medium-risk equilibrium, Firm's utility increases in x.

In the high-risk equilibrium, Firm receives

$$\begin{aligned}
&\int_0^{s_*}(\omega)dF(\omega) + \int_{s_*}^1(x)dF(\omega)\\
&= \int_0^{s_*}(\omega)dF(\omega) + \int_{s_*}^1(\omega + c)dF(\omega)\\
&= \int_0^1(\omega)dF(\omega) + \int_{s_*}^1(c)dF(\omega).
\end{aligned}$$

Note that s_* increases in x following a similar logic. Conditional on the high-risk equilibrium, Firm's utility decreases in x.

To summarize, Firm's utility is non-monotonic in x: it increases in x in the low- and medium-risk equilibria but decreases in x in high-risk equilibrium. Consequently, under the high-risk equilibrium, Firm prefers to begin the game with a lower x, if feasible. ∎

Proposition 21 *Consider a low-risk case. Regulator prefers Firm's choice of information over no information if* $\mathbb{E}[\omega] > x + c$ *and* $\mathbb{E}[\omega|\omega < x + c] > x$.

Proof: In the low-risk equilibrium, Regulator receives

$$\int_0^{x+c}(1 - x)dF(\omega) + \int_{x+c}^1(1 - \omega)dF(\omega).$$

Without information, Firm goes to court because $\mathbb{E}[\omega] > x + c$. Then, Regulator receives

$$
\begin{aligned}
&\int_0^1 (1-\omega)dF(\omega) \\
&= \int_0^{x+c} (1-\omega)dF(\omega) + \int_{x+c}^1 (1-\omega)dF(\omega) \\
&< \int_0^{x+c} (1-x)dF(\omega) + \int_{x+c}^1 (1-\omega)dF(\omega) \\
&\Leftrightarrow \int_0^{x+c} (1-\omega)dF(\omega) < \int_0^{x+c} (1-x)dF(\omega) \\
&\Leftrightarrow \int_0^{x+c} (x)dF(\omega) < \int_0^{x+c} (\omega)dF(\omega),
\end{aligned}
$$

which is equivalent to the assumption $\mathbb{E}[\omega|\omega < x + c] > x$. In other words, for the low-risk case, Regulator prefers Firm's choice of information over no information if (1) Firm goes to court without information and (2) the prior distribution conditional on $\omega < x + c$ is skewed to the left of x. ∎

Proposition 22 *Suppose players can bargain over their initial status quo division.*

1. *Firm always prefers to give up her pie and buy Regulator's silence. The new division results in collusion if the prior probability is high ($\pi > 1 - 2c$) and Firm goes to court otherwise.*

2. *Regulator prefers to give up the pie in exchange for Firm's silence only with sufficiently high prior ($\pi > 1 - 2c$).*

Proof: In this proposition, I only consider an example of binary ω. The complete analysis of this version of the model is in Appendix A.5. For the pre-game settlement to be feasible, there must exist Pareto improving x'. I first identify the set of such x'. Then, I look for Firm's optimal choice of x' if it exists.

1. If Firm goes to court in equilibrium given the initial x, there does not exist Pareto improving x'.

2. If Firm fully reveals ω in equilibrium given the initial x, there may exist Pareto improving x' such that induces mutual silence. This is because Regulator's payoff discontinuously jumps when the equilibrium transitions from Firm going to court to mutual silence. Firm's optimal choice of new division is

$$x' = \pi + (1 - \pi)x > 1 - c.$$

3. If Firm partially reveals $\omega = 1$ in equilibrium, there may exist Pareto improving x' such that induces mutual silence. Similarly, this is because Regulator's payoff discontinuously jumps when the equilibrium outcome transitions from Firm going to court to mutual silence. Firm's optimal choice of new division is

$$x' = \frac{c + \pi(1 - x)}{1 - x + c} \in (1 - c, c + \pi).$$

4. If Firm partially reveals $\omega = 0$ in equilibrium, there always exists Pareto improving x' such that induces mutual silence if $c > (1 - \pi)/2$ and Firm going to court otherwise. This is because Regulator's payoff is constant in x while Firm's payoff is decreasing in x. Firm's optimal choice of new division is

$$x' = c + \pi.$$

To summarize, if Regulator goes to court in equilibrium (after Firm partially reveals $\omega = 0$), then Firm always has the incentive to offer $x' = c + \pi$ which is smaller than the initial division $x > c + \pi$. If Firm goes to court in equilibrium (after Firm fully or partially reveals $\omega = 1$), then Regulator may have the incentive to accept a new offer $x' > x$ such that induces mutual silence. The necessary condition for such an offer to exist is $\pi > 1 - 2c$, as implied by the conditions for x' above. ∎

A.2 Complete Characterization of Equilibrium

In this section, I provide a complete equilibrium analysis of the benchmark model. As shown in Figure A.1, $U(s)$ can take largely four different shapes depending on x and c. First, Figure A.1a shows that $U(s)$ is constant at x when $x \in (1-c, c)$. Firm's choice of G does not matter here; any s will lead to a subgame equilibrium where both remain silent. Next, Figure A.1b shows that $U(s)$ is already continuous and convex when $x \leq \min\{c, 1-c\}$. This implies that Firm's optimal choice here is to generate perfect information.

The remaining two cases require further analysis because the indirect utility is not continuous. Figure A.2 divides Figure A.1c into two subcases. Figure A.2a is when the risk is low for Firm, i.e., $\mathbb{E}[\omega] \geq x - c$. Without information, both players remain silent and this is the best outcome for Firm. Therefore, Firm's optimal choice is to generate no information. Figure A.2b is when the risk is high for Firm, i.e., $\mathbb{E}[\omega] < x - c$. Since Regulator goes to court without information, Firm pools ω above a cutoff to deter going to court. It follows that the optimal cutoff is s_* such that satisfies $\mathbb{E}[\omega|\omega \geq s_*] = x - c$, which is the minimal cutoff that deters Regulator going to court.

Figure 1.2-1.4 in the main section are three subcases of Figure A.1d. Figure 1.2 is when the risk is low for Firm, i.e., $\mathbb{E}[\omega|\omega \leq x + c] > x - c$. As shown by $\phi(s)$, Firm reveals ω above $x + c$ and goes to court; both players remain silent otherwise. Figure 1.3 is when the risk is medium for Firm, i.e., $\mathbb{E}[\omega|\omega \leq x + c] \leq x - c \leq \mathbb{E}[\omega]$. Here, Firm cannot induce mutual silence by pooling ω below $x + c$. It follows that Firm must employ a larger cutoff to do so. The optimal cutoff is then s^* such that satisfies $\mathbb{E}[\omega|\omega \leq s^*] = x - c$, which is the minimal cutoff that can deter going to court. Figure 1.4 is when the risk is high for Firm, i.e., $\mathbb{E}[\omega] < x - c$. This is equivalent to that from Figure A.2b.

Figure A.3 illustrates how the equilibrium outcome depends on x and $\mathbb{E}[\omega]$. For

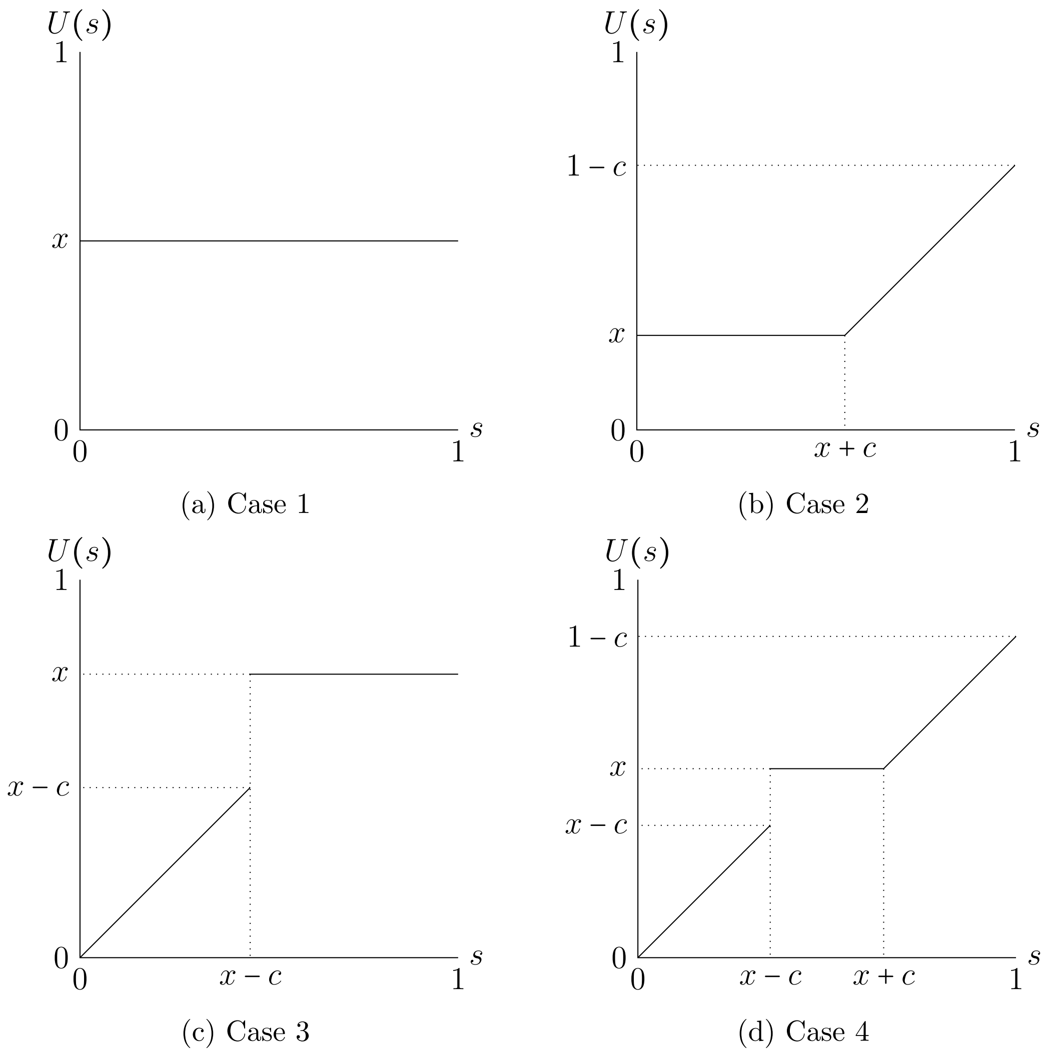
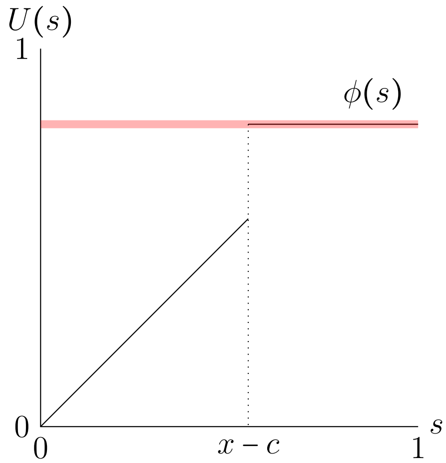
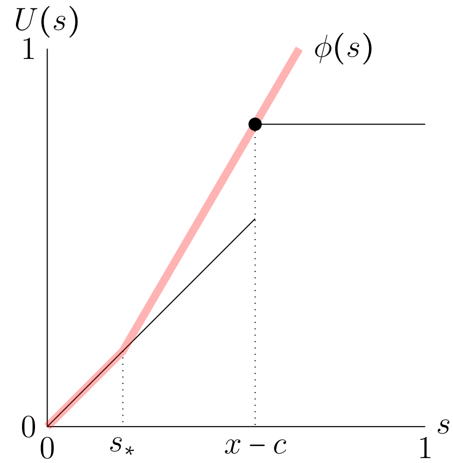


Figure A.1: This figure plots Firm's indirect utility function $U(s)$ of which shape depends on x, c. The first case is when $x \in (1-c, c)$. The second case is when $x \leq \min\{c, 1-c\}$. The third case is when $x \geq \max\{c, 1-c\}$. The fourth case is when $x \in (c, 1-c)$.



(a) Low Risk



(b) High Risk

Figure A.2: This figure plots Firm's indirect utility function $U(s)$ (black solid) and the smallest feasible convex function $\phi(s)$ (red translucent) above $U(s)$, given $x \geq \max\{c, 1-c\}$. The left panel represents the case where $\mathbb{E}[\omega] < x - c$. The right panel represents the case where $\mathbb{E}[\omega] \geq x - c$.

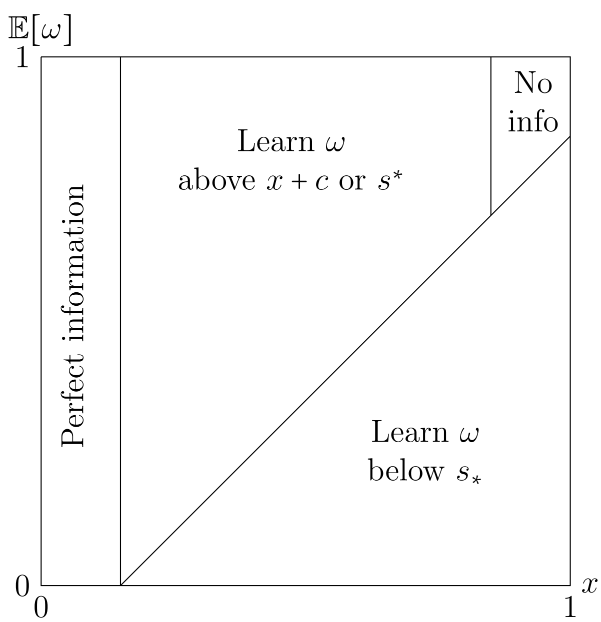


Figure A.3: This figure plots how Firm's optimal choice of the signal depends on status quo x and prior mean $\mathbb{E}[\omega]$ given $c = 0.15$.

sufficiently small x, Firm fully reveals ω because Regulator does not have the incentive to go to court for all beliefs. Then, Firm can perfectly learn ω without any consequence because information cannot be used against her. For sufficiently large x and $\mathbb{E}[\omega]$, Firm learns nothing. This is because Firm is already satisfied with the status quo, and Regulator has no incentive to go to court without information. For x relatively larger than $\mathbb{E}[\omega]$, Firm reveals ω below s_*; this is when Regulator is confident enough to go to court without information. Therefore, Firm gives up the worst states in order to induce mutual silence otherwise. For moderate x and sufficiently large $\mathbb{E}[\omega]$, Firm reveals ω above $x + c$ or s^*; the exact cutoff is determined by the condition $\mathbb{E}[\omega|\omega \leq x + c] \leq x - c$. To summarize,

1. Firm's choice of signal does not matter if $x \in (1 - c, c)$ because neither goes to court for all beliefs.

2. It is optimal for Firm to fully learn ω if $x \leq \min\{c, 1 - c\}$. In the subgame, neither goes to court for $\omega \leq x + c$ and Firm goes to court for $\omega > x + c$.

3. It is optimal for Firm to generate no information and induce mutual silence in the subgame if $\max\{c, 1-, c\} \leq x \leq \mathbb{E}[\omega] + c$.

4. It is optimal for Firm to learn ω above $x + c$ and no other information if $0 < x - c < \mathbb{E}[\omega|\omega \leq x + c] < \mathbb{E}[\omega]$. In the subgame, neither goes to court for $\omega \leq x + c$ and Firm goes to court for $\omega > x + c$. This is the low-risk case.

5. It is optimal for Firm to learn ω above s^* and no other information if $\mathbb{E}[\omega|\omega \leq x + c] \leq x - c \leq \mathbb{E}[\omega]$. In the subgame, neither goes to court for $\omega \leq s^*$ and Firm goes to court for $\omega > s^*$. This is the medium-risk case.

6. It is optimal for Firm to learn ω below s_* and no other information if $\mathbb{E}[\omega] < x - c$. In the subgame, neither goes to court for $\omega \geq s_*$ and Regulator goes to court for $\omega < s_*$. This is the high-risk case.

A.3 Comparative Statics

In Proposition 5, I discussed the effect of status quo x on Firm's utility. In this section, I assess the effect of cost c on Firm's utility. In the low-risk equilibrium, Firm receives

$$\int_0^{x+c} (x) dF(\omega) + \int_{x+c}^{1} (\omega - c) dF(w).$$

Consider a larger $c' > c$ such that results in the low-risk equilibrium. Firm receives

$$\begin{aligned}
&\int_0^{x+c'} (x) dF(\omega) + \int_{x+c'}^{1} (\omega - c) dF(w) \\
=& \int_0^{x+c} (x) dF(\omega) = \int_0^{x+c'} (x) dF(\omega) + \int_{x+c'}^{1} (\omega - c) dF(\omega) \\
<& \int_0^{x+c} (x) dF(\omega) = \int_0^{x+c'} (\omega - c) dF(\omega) + \int_{x+c'}^{1} (\omega - c) dF(\omega) \\
=& \int_0^{x+c} (x) dF(\omega) + \int_{x+c}^{1} (\omega - c) dF(w),
\end{aligned}$$

which is smaller than the payoff induced by the original c. In other words, conditional on the low-risk equilibrium, Firm's utility *decreases* in c.

In the medium-risk equilibrium, Firm receives

$$\int_0^{1} (\omega) dF(\omega) + 2 \int_0^{s^*} (c) dF(\omega) - c.$$

Note that s^* decreases in c because the right-hand side of condition $\mathbb{E}[\omega|\omega \leq s^*] = x - c$ decreases in c. Then, indirect and direct effects of c on the second term of the expression are countervailing. In other words, in the medium-risk equilibrium, the effect of c cannot be determined without further assuming the shape of prior distribution F.

In the high-risk equilibrium, Firm receives

$$\int_0^1 (\omega)dF(\omega) + \int_{s_*}^1 (c)dF(\omega).$$

Note that s_* decreases in c. Therefore, conditional on the high-risk equilibrium, Firm's utility increases in c.

A.4 Exogeneous Absence of Information

In this section, I compare Regulator's utilities between Firm's choice of information and the exogenous absence of information. In the low-risk equilibrium, Regulator receives

$$\int_0^{x+c} (1-x)dF(\omega) + \int_{x+c}^1 (1-\omega)dF(\omega).$$

Suppose $\mathbb{E}[\omega] > x + c$. I have established that Regulator prefers Firm's choice of information if $\mathbb{E}[\omega|\omega < x+c] > x$ and no information otherwise. Suppose $\mathbb{E}[\omega] \leq x+c$. Then, neither goes to court without information. Regulator receives a payoff of $1-x$. In other words, Firm *does not* go to court for $\omega > x+c$ unlike in the baseline model. Regulator prefers no information for this reason.

In the medium-risk equilibrium, Regulator receives

$$\begin{aligned}
&\int_0^{s^*} (1-x)dF(\omega) + \int_{s^*}^1 (1-\omega)dF(\omega) \\
=&1 - \int_0^{s^*} (x)dF(\omega) - \int_{s^*}^1 (\omega)dF(\omega) \\
=&1 - \int_0^{s^*} (\omega+c)dF(\omega) - \int_{s^*}^1 (\omega)dF(\omega) \\
=&1 - \int_0^1 (\omega)dF(\omega) - \int_0^{s^*} (c)dF(\omega).
\end{aligned}$$

Suppose $\mathbb{E}[\omega] > s^*$. Then, Firm goes to court and Regulator receives a payoff of

$1 - \mathbb{E}[\omega]$. Regulator prefers no information. If $\mathbb{E}[\omega] \leq s^*$, neither goes to court without information. Regulator receives a payoff of $1 - x$. Similar to the low-risk case, Regulator prefers no information.

In the high-risk equilibrium, Regulator receives

$$\begin{aligned}
&\int_0^{s_*} (1 - \omega - c) dF(\omega) + \int_{s_*}^1 (1 - x) dF(\omega) \\
=&1 - \int_0^{s_*} (x) dF(\omega + c) - \int_{s_*}^1 (x) dF(\omega) \\
=&1 - \int_0^{s_*} (x) dF(\omega + c) - \int_{s_*}^1 (\omega + c) dF(\omega) \\
=&1 - \int_0^1 (\omega) dF(\omega) - c.
\end{aligned}$$

Without information, Regulator goes to court and receives a payoff of $1 - \mathbb{E}[\omega] - c$. Regulator is indifferent between Firm's choice of information and the exogeneous absence of information.

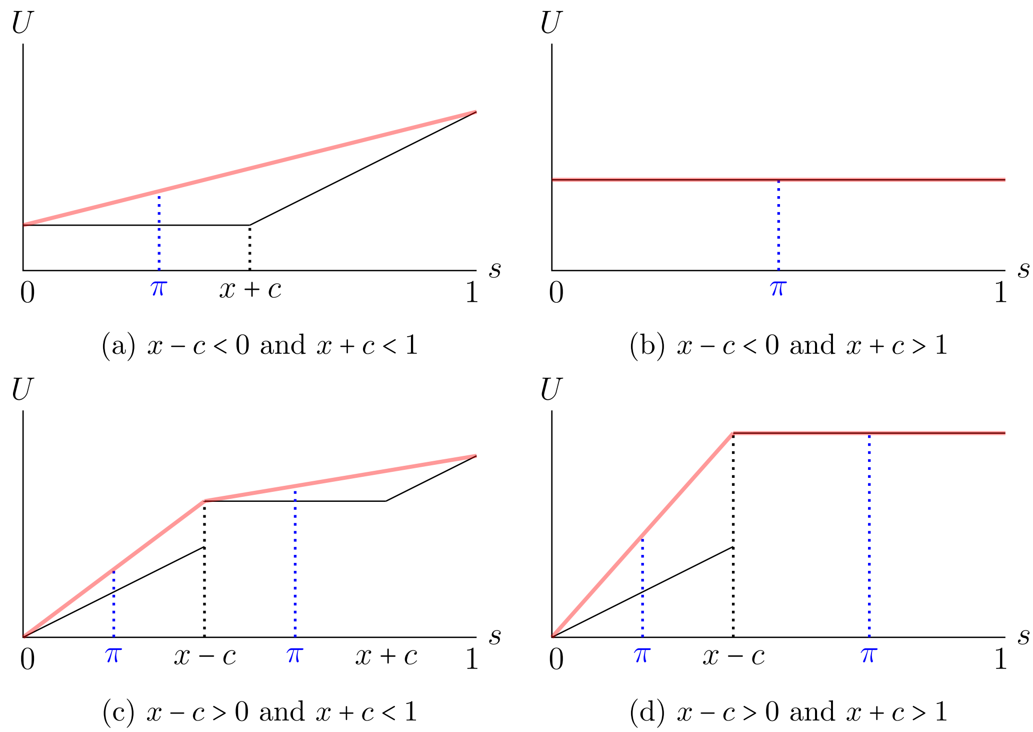
A.5 Example: Binary State

Consider the limit case of the benchmark model where state ω is binary. It is straightforward to apply the derived implications from the main analysis to this setting. However, it is useful to solve the model again with a concavification method as observed by [112].

1. Firm's optimal choice of signal does not matter if $x \in (1 - c, c)$ because both players remain silent for all beliefs.

2. It is optimal for Firm to fully learn ω if $x \leq \min\{c, 1 - c\}$. In the subgame, both players remain silent for $\omega = 0$ and Firm goes to court for $\omega = 1$.

3. It is optimal for Firm to provide no information and induce mutual silence in the subgame if $x \geq \max\{c, 1 - c\}$ and $\pi \geq x - c$.



(a) $x - c < 0$ and $x + c < 1$

(b) $x - c < 0$ and $x + c > 1$

(c) $x - c > 0$ and $x + c < 1$

(d) $x - c > 0$ and $x + c > 1$

Figure A.4: These figures plot Firm's indirect utility function $U(s)$ (black sold) and the smallest concave function that uniformly stays above $U(s)$ (red translucent).

4. It is optimal for Firm to partially learn $\omega = 1$ so that induced posterior belief (absent information) is $x - c$ if $x \in (c, 1 - c)$ and $\pi \geq x - c$. In the subgame, Firm goes to court when $\omega = 1$ is revealed, and both players remain silent otherwise.

5. It is optimal for Firm to partially learn $\omega = 0$ so that induced posterior belief (absent information) is $x - c$ if $\pi < x - c$. In the subgame, Regulator goes to court when $\omega = 0$ is revealed, and both players remain silent otherwise.

Note that low-risk case does not exist in a binary setting. Recall that the Bernoulli distribution is an extreme case of dispersion given the mean; the risk is never low enough to satisfy the condition $\mathbb{E}[\omega | \omega \leq x + c] > x - c$. Based on this binary ω setting, I examine three extensions of the model. The first extension with the pre-game settlement is presented in Proposition 7. I present the other two below.

A.5.1 Privately Informed Firm

In this section, I present Firm's interim optimal choice of signal when ex-ante optimal choice unravels given private information. Recall that the ex-ante optimal experiment unravels for high-risk (partially reveal $\omega = 0$) and medium-risk (partially reveal $\omega = 1$) cases.

Suppose $\pi < x - c$ and $x + c < 1$. Then, Firm's ex-ante optimal choice is to reveal $\omega = 0$ with probability q_0 such that satisfies $\pi/(\pi + (1-\pi)(1-q_0)) = x - c$. In equilibrium, Regulator goes to court when $\omega = 0$ is revealed, and both remain silent otherwise. Therefore, Firm knowing $\omega = 0$ receives $(1 - q_0)x$ and Firm knowing $\omega = 1$ receives x in equilibrium. If Firm fully discloses, she instead receives 0 and $1 - c$ for each ω. Therefore, Firm knowing $\omega = 1$ has the incentive to deviate from the ex-ante optimal mechanism and reveal her knowledge. The signal can be interim optimal by choosing smaller $q < q_0$ because Firm can lower the posterior belief mean enough to *induce* Regulator to go to court by doing so. Then, Firm knowing $\omega = 0$ receives 0 and Firm knowing $\omega = 1$ receives 1. Essentially, it is interim optimal for Firm to not provide any information.

Now suppose $0 < x - c \leq \pi$ and $x + c < 1$. Then, Firm's ex-ante optimal choice is to reveal $\omega = 1$ with probability q_1 such that satisfies $\pi(1 - q_1)/(\pi(1 - q_1) + 1 - \pi) = x - c$. In equilibrium, Firm goes to court when $\omega = 1$ is revealed, and both remain silent otherwise. Therefore, Firm knowing $\omega = 0$ receives x and Firm knowing $\omega = 1$ receives $q_1(1 - c) + (1 - q_1)x$ in equilibrium. As before, Firm knowing $\omega = 1$ has the incentive to deviate from the ex-ante optimal mechanism and reveal her knowledge. Note that Firm receives x when ω is not revealed because Regulator chooses to remain silent when the posterior mean is $x - c$. However, Regulator is, in fact, indifferent between remaining silent and going to court here. By assuming that Regulator goes to court instead, the same strategy becomes interim optimal because Firm now receives $q_1(1 - c) + 1 - q_1$. This is the ex-ante optimal interim optimal because q_1 maximizes the probability that Firm receives 1, not $1 - c$.

A.5.2 "Getting It Right"

Additionally, I consider an extension where Regulator's objective is to "get it right" rather than to pursue $\omega = 0$. Then, the payoff structure of the conflict stage is as below.

Firm \ Regulator	N	C
N	$(x, -\|x - \omega\|)$	$(\omega, -c)$
C	$(\omega - c, 0)$	$(\omega - c, -c)$

Table A.1: Payoff Structure

Nash equilibria for the conflict stage are as follows.[1]

1. Both remain silent if $(2x - 1)\mathbb{E}[\omega|s] \geq x - c$.

2. Firm remains silent and Regulator goes to court if $(2x - 1)\mathbb{E}[\omega|s] < x - c$.

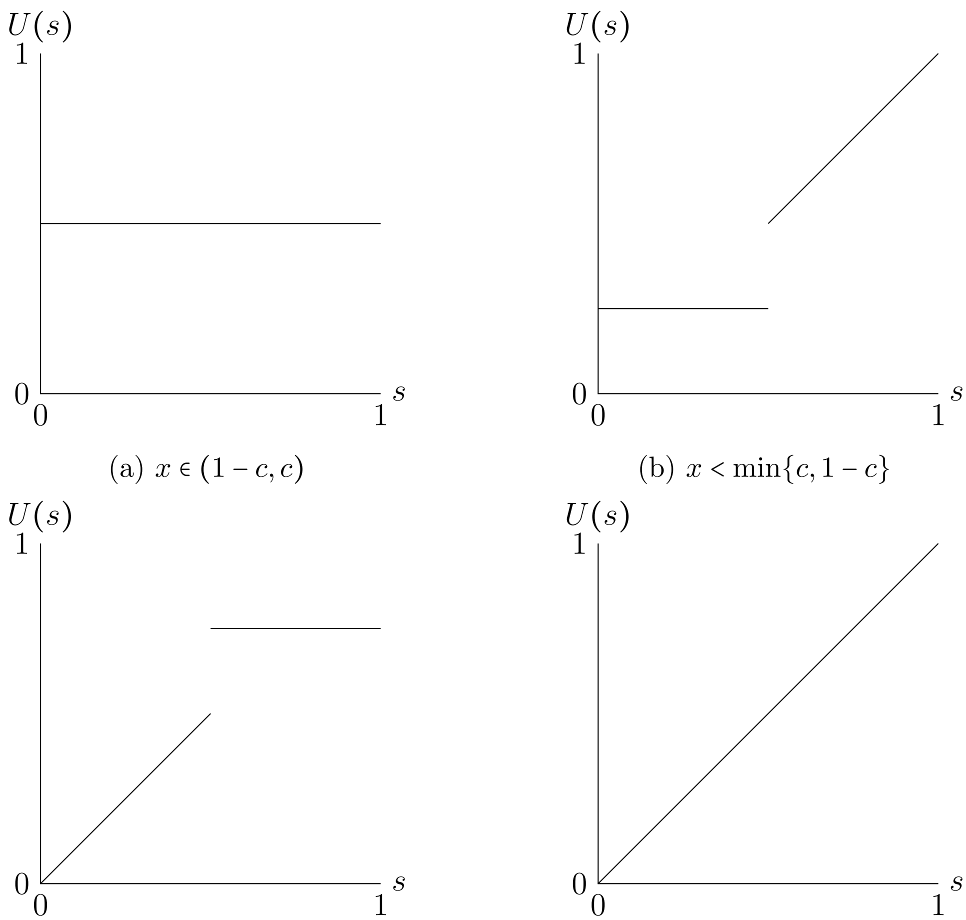
The indirect utility of Firm is

$$U(s) = \begin{cases} x & \text{if } (2x-1)s \geq x - c \\ s & \text{if } (2x-1)s < x - c \end{cases}$$

As in the benchmark model, $U(s)$ can take largely four different shapes depending on x and c. When $x \in (1 - c, c)$, $U(s)$ is constant at x. Therefore, Firm's choice of G does not matter here; any s leads to a subgame equilibrium where both remain

[1] Technically, another subgame equilibrium exists: Firm goes to court, and Regulator remains silent if $\mathbb{E}[\omega|s] > x + c$. This parameter space is a subset of the parameter space that induces equilibrium where Regulator goes to court instead. Therefore, I assume that Regulator goes to court when a multiplicity of equilibria exists.

silent. When $x \le \min\{c, 1-c\}$, Firm's optimal choice of G is to fully reveal ω by connecting $(0, x)$ and $(1, 1)$. This strategy is the same as that from the benchmark model given same x and c. When $x \in (c, 1-c)$, the utility is linear and continuous. Therefore, Firm's choice of G does not matter; any s leads to a subgame equilibrium where Regulator goes to court.



(a) $x \in (1-c, c)$ (b) $x < \min\{c, 1-c\}$

(c) $x > \max\{c, 1-c\}$ (d) $x \in (c, 1-c)$

Figure A.5: This figure plots indirect utility depending on x and c.

When $x \ge \max\{c, 1-c\}$, there are four subcases:

- **Case 1.** If $\pi < (x-c)/(2x-1)$ and $(x-c)/(2x-1) < x$, Firm partially learns $\omega = 0$. If ω is realized, Regulator goes to court. Otherwise, both players remain silent with posterior belief $(x-c)/(2x-1)$.

- **Case 2.** If $\pi \geq (x - c)/(2x - 1)$ and $(x - c)/(2x - 1) < x$, Firm generates no information. In the subgame equilibrium, both players remain silent.

- **Case 3.** If $\pi < (x - c)/(2x - 1)$ and $(x - c)/(2x - 1) \geq x$, Firm generates no information. In the subgame equilibrium, Regulator goes to court.

- **Case 4.** If $\pi \geq (x - c)/(2x - 1)$ and $(x - c)/(2x - 1) \geq x$, Firm partially learns $\omega = 1$. If ω is realized, both players remain silent. Otherwise, Regulator goes to court with posterior belief $(x - c)/(2x - 1)$.

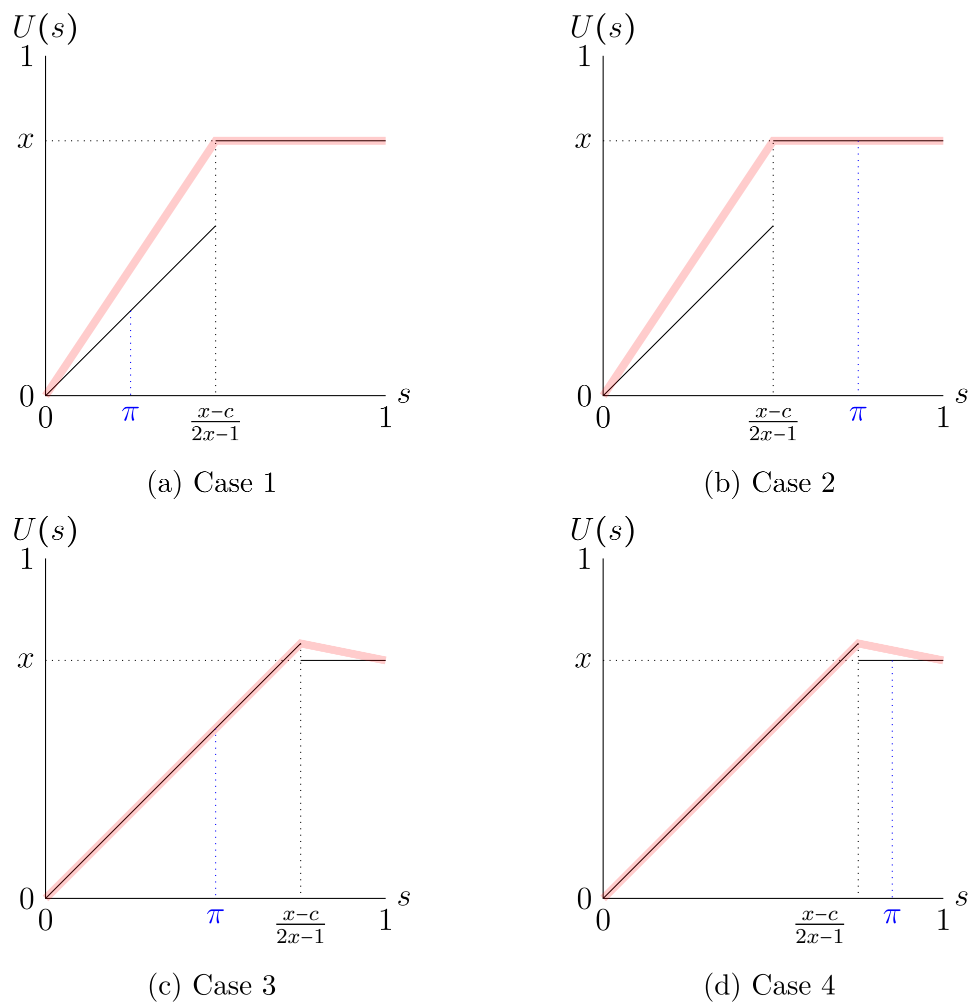


Figure A.6: This figure plots Firm's indirect utility given $x \geq \max\{c, 1 - c\}$. The red translucent line is the smallest concave function that uniformly stays above $U(s)$.

A.6 Heterogeneous Cost

I consider an extension where cost c is heterogeneous. Specifically, assume that $c_F = c$ and $c_R = c + \gamma$ where $c \in (0,1)$ and $\gamma \in (0, 1-c)$. This implies that $0 < c_F < c_R < 1$. Then, the payoff structure of the conflict stage is as described below.

		Regulator N	Regulator C
Firm	N	$(x, 1-x)$	$(\omega, 1-\omega-c_R)$
Firm	C	$(\omega - c_F, 1-\omega)$	$(\omega - c_F, 1-\omega-c_R)$

Table A.2: Payoff Structure

Solving for the Nash equilibrium for the conflict stage,

1. Firm remains silent and Regulator goes to court if $\mathbb{E}[\omega|s] < x - c_R$.
2. Firm goes to court and Regulator remains silent if $\mathbb{E}[\omega|s] > x + c_F$.
3. Both remain silent if $\mathbb{E}[\omega|s] \in [x - c_R, x + c_F]$.

The corresponding indirect utility of Firm is

$$U(s) = \begin{cases} s & \text{if } s < x - c - \gamma \\ x & \text{if } s \in [x - c - \gamma, x + c] \\ s - c & \text{if } s > x + c. \end{cases}$$

Note that the only difference from the benchmark model is the threshold that deters Regulator from going to court. The equilibrium conditions are not too deviating either:

1. Firm's choice of signal does not matter if $x \in (1-c, c+\gamma)$ because both players remain silent for all beliefs.
2. It is optimal for Firm to fully reveal ω if $x \leq \min\{c+\gamma, 1-c\}$. In the subgame, both players remain silent for $\omega \leq x + c$ and Firm goes to court for $\omega > x + c$.

3. It is optimal for Firm to provide no information and induce mutual silence in the subgame if $\max\{c+\gamma, 1-c\} \le x \le \mathbb{E}[\omega] + c + \gamma$.

4. It is optimal for Firm to reveal ω above $x+c$ and provide no other information if $0 < x - c - \gamma < \mathbb{E}[\omega | \omega \le x + c] < \mathbb{E}[\omega]$. In the subgame, both players remain silent for $\omega \le x + c$ and Firm goes to court for $\omega > x + c$.

5. It is optimal for Firm to reveal ω above s^* and provide no other information, where $\mathbb{E}[\omega | \omega \le s^*] = x - c - \gamma$. This is if $\mathbb{E}[\omega | \omega \le x + c] \le x - c - \gamma \le \mathbb{E}[\omega]$. In the subgame, both players remain silent for $\omega \le s^*$, and Firm goes to court for $\omega > s^*$.

6. It is optimal for Firm to reveal ω below s_* and provide no other information, where $\mathbb{E}[\omega | \omega \ge s_*] = x - c - \gamma$. This is if $\mathbb{E}[\omega] < x - c - \gamma$. In the subgame, both players remain silent for $\omega \ge s_*$, and Regulator goes to court for $\omega < s_*$.

As in the benchmark model, assume that $x \in (c+\gamma, 1-c)$. It directly follows that as γ increases, the equilibrium changes to high-, medium-, and low-risk case.

Firm's utility in the low-risk case does not depend on γ. Firm's utility in the medium-risk case is $\mathbb{E}[\omega] + \mathbb{P}(\omega \le s^*)(c+\gamma) + \mathbb{P}(\omega > s^*)(-c)$, which increases in γ because the probability of going to court increases in γ. Firm's utility in the high-risk case is $\mathbb{E}[\omega] + \mathbb{P}(\omega \ge s_*)(c+\gamma)$, which increases in γ. Next, Regulator's utility in the low-risk case does not depend on γ. Regulator's utility in the medium-risk case is $1 - \mathbb{E}[\omega] - \mathbb{P}(\omega \le s^*)(c+\gamma)$, which decreases in γ. Regulator's utility in the high-risk case is $1 - \mathbb{E}[\omega] - c - \gamma$, which decreases in γ.

Appendix B

Bargaining for Longevity

B.1 Proofs

Proposition 23 *Let* $A = (1-p)/(1-\delta(1-p))$ *and* $B = 1/(1-\delta)$. *In equilibrium,*

- *Party 1 offers* $x^{\dagger} \equiv \omega_2(1-\delta)$ *and both parties never leave in equilibrium if*

$$\omega_2 < B - A \quad and \quad \omega_1 + \omega_2 < B.$$

- *Party 1 offers* $x^{\ddagger} \equiv (1-\delta(1-p))\omega_2/1-p$ *and Party 1 will leave in equilibrium if*

$$\omega_2 < \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad and \quad \omega_1 + \omega_2 > B.$$

- *Party 1 offers* 0 *and Party 2 will leave in equilibrium if*

$$\omega_1 < A \quad and \quad \omega_2 > B - A.$$

- *Party 1 offers* 0 *and both parties will leave in equilibrium if*

$$\omega_1 > A \quad and \quad \omega_2 > \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad and \quad \omega_1 + \omega_2 > B.$$

Proof: Not leaving is a weakly dominant strategy when $\omega_i^t = 0$. Therefore, there are four possible strategy profiles: 1) *both never leave*, 2) *Party 1 will leave* when $\omega_1^t = \omega_1$ and Party 2 never leaves, 3) Party 1 never leaves and *Party 2 will leave* when $\omega_2^t = \omega_2$, and 4) *both will leave* when $\omega_i^t = \omega_i$.

1. Consider the strategy profile where *both parties never leave* for all ω_i^t. Let V and W respectively denote Party 1 and Party 2's continuation values. Then, they satisfy the following Bellman equations:

$$V = 1 - x + \delta V \quad \text{and} \quad W = x + \delta W.$$

The solutions are

$$V = \frac{1-x}{1-\delta} \quad \text{and} \quad W = \frac{x}{1-\delta}.$$

Conditions for such a strategy profile are as follows:

$$\omega_1 < 1 - x + \delta V \quad \text{and} \quad \omega_2 < x + \delta W.$$

It follows that offer x must be moderate to remove any incentive to unilaterally deviate from this strategy profile. In other words,

$$(1-\delta)\omega_2 < x < 1 - (1-\delta)\omega_1.$$

2. Consider the strategy profile where *Party 1 will leave* when $\omega_1^t = \omega_1$ and *Party 2 never leaves* for all ω_2^t. Then, they satisfy the following Bellman equations:

$$V = (1-p)(1 - x + \delta V) + p\omega_1 \quad \text{and} \quad W = (1-p)(x + \delta W).$$

The solutions are

$$V = \frac{(1-p)(1-x) + p\omega_1}{1 - \delta(1-p)} \quad \text{and} \quad W = \frac{(1-p)x}{1-\delta(1-p)}.$$

Conditions for such a strategy profile are as follows:

$$\omega_1 > 1 - x + \delta V \quad \text{and} \quad \omega_2 < (1-p)(x + \delta W).$$

It follows that offer x must be sufficiently large. In other words,

$$x > \max\left\{1 - (1-\delta)\omega_1, \frac{(1-\delta(1-p))\omega_2}{1-p}\right\}.$$

3. Consider the strategy profile where *Party 1 never leaves* for all ω_1^t and *Party 2 will leave* when $\omega_2^t = \omega_2$. Then, they satisfy the following Bellman equations:

$$V = (1-p)(1 - x + \delta V) \quad \text{and} \quad W = (1-p)(x + \delta W) + p\omega_2.$$

The solutions are

$$V = \frac{(1-p)(1-x)}{1-\delta(1-p)} \quad \text{and} \quad W = \frac{(1-p)x + p\omega_2}{1-\delta(1-p)}.$$

Conditions for such a strategy profile are as follows:

$$\omega_1 < (1-p)(1 - x + \delta V) \quad \text{and} \quad \omega_2 > x + \delta W.$$

It follows that offer x must be sufficiently small. In other words,

$$x < \min\left\{1 - \frac{(1-\delta(1-p))\omega_1}{1-p}, (1-\delta)\omega_2\right\}.$$

4. Consider the strategy profile where *both parties will leave* when $\omega_i^t = \omega_i$. Then, they satisfy the following Bellman equations:

$$V = (1-p)^2(1 - x + \delta V) + p\omega_1 \quad \text{and} \quad W = (1-p)^2(x + \delta W) + p\omega_2.$$

The solutions are

$$V = \frac{(1-p)^2(1-x) + p\omega_1}{1-\delta(1-p)^2} \quad \text{and} \quad W = \frac{(1-p)^2 x + p\omega_2}{1-\delta(1-p)^2}.$$

Conditions for such a strategy profile are as follows:

$$\omega_1 > (1-p)(1-x+\delta V) \quad \text{and} \quad \omega_2 > (1-p)(x+\delta W).$$

It follows that offer x must be moderate. In other words,

$$1 - \frac{(1-\delta(1-p))\omega_1}{1-p} < x < \frac{(1-\delta(1-p))\omega_2}{1-p}.$$

These four cases together are exhaustive but not mutually exclusive. More specifically, the first (*both never leave*) and the fourth (*both will leave*) cases may overlap - the same offer x can lead to multiple equilibria. I assume that *both parties never leave* in such a case. Since Party 1's continuation value V is decreasing in offer x for all outcomes, Party 1's optimal choice of x conditional on a fixed outcome is to choose a minimum x such that results in the same outcome. Since x is between 0 and 1, such x may or may not be feasible depending on parameters $\omega_1, \omega_2, \delta$, and p. After identifying the feasible minimum offer for each outcome, I compare the corresponding utilities to derive the optimal offer and the subsequent equilibrium outcome in Proposition 8. ∎

Proposition 24 *Let x^* be Party 1's optimal offer in equilibrium as a function of exogenous outside option ω_1. Conditional on sufficiently low outside option of Party 2, $\omega_2 < (1-p)/(1-\delta(1-p))$, there always exists some $\hat{\omega}_1$ such that*

$$\lim_{\omega_1 \to \hat{\omega}_1^-} x^*(\omega_1) < \lim_{\omega_1 \to \hat{\omega}_1^+} x^*(\omega_1).$$

Proof: From Proposition 8, note that (1) neither $x^\dagger$ nor $x^\ddagger$ depends on ω_1 and (2) $x^\ddagger$ is always greater than $x^\dagger$. Therefore, the optimal offer as a function of ω_1 is a piecewise constant function of which the value discontinuously switches as the equilibrium outcome changes. In particular, consider the second equilibrium. I rewrite the conditions as follows:

$$\omega_1 > \max\left\{B - \omega_2, C \equiv \frac{(1-\delta(1-p)^2)\omega_2 - Ap}{A\delta p^2}\right\} \quad \text{and} \quad \omega_2 < A.$$

For the optimal offer to be $x^\ddagger$, ω_1 must be sufficiently high conditional on ω_2 being sufficiently low. Furthermore, the threshold for ω_1 is always greater than 0 for all values of ω_2, p, and δ. Below the threshold, the optimal offer is either 0 or $x^\dagger$, which are smaller than $x^\ddagger$. Above the threshold, the optimal offer is $x^\ddagger$. Therefore, the left-hand limit of x^* at the threshold is always smaller than the right-hand limit of x^* conditional on $\omega_2 < A$. ∎

Corollary 25 *Party 1's optimal offer x^* in equilibrium is larger than half when*

1. *Party 1 concedes to stay and $\omega_2 > 1/(2-2\delta)$.*

2. *Party 1 concedes to leave and $\omega_2 > (1-p)/(2(1-\delta(1-p)))$.*

Proof: From Proposition 8, it directly follows that Party 2's outside option should be sufficiently low ($\omega_2 < \tilde{\omega}_2 = B - A$) for the optimal offer to be positive ($x^\dagger > 0$). This is when *Both never leave* and *1 will leave*. In the *Both never leave* equilibrium, $x^\dagger$ is greater than half when $\omega_2 > 1/(2-2\delta)$; in the *1 will leave* equilibrium, $x^\dagger$ is greater than half when $\omega_2 > (1-p)/(2(1-\delta(1-p)))$. In other words, ω_2 needs to be sufficiently low but not too low for Party 1 to optimally offer more than half in equilibrium. ∎

Proposition 26 *Let EU_2^* be Party 2's expected utility in equilibrium as a function of exogenous outside option ω_2. Then, there always exists $\hat{\omega}_2$ that satisfies*

$$\lim_{\omega_2 \to \hat{\omega}_2^-} EU_2^*(\omega_2) > \lim_{\omega_2 \to \hat{\omega}_2^+} EU_2^*(\omega_2).$$

Proof: From Proposition 8, we know that the optimal offer and equilibrium outcome depends on ω_2. Specifically, there are largely three cases of how the equilibrium shifts.

1. If $\omega_1 < A$, then equilibrium shifts from *Both never leave* to *2 will leave* at $\omega_2 = B - A$. The utility discontinuously drops.

2. If $\omega_1 > A$ and $\min\{(Ap + A\delta p^2\omega_1)/(1-\delta(1-p)^2), A\} < B - \omega_1$, then equilibrium shifts from *Both never leave* to *Both will leave* at $\omega_2 = B - \omega_1$. The utility discontinuously drops.

3. If $\omega_1 > A$ and $\min\{(Ap + A\delta p^2\omega_1)/(1-\delta(1-p)^2), A\} > B - \omega_1$, then equilibrium shifts from *1 will leave* to *Both will leave* at $\min\{(Ap+A\delta p^2\omega_1)/(1-\delta(1-p)^2), A\}$. The utility discontinuously drops. ∎

B.2 Additional Extension 1: Extracting from Party 2

In this section, I relax the assumption on Party 1's choice of x. More specifically, I allow Party 1 to choose any $x \in \mathbb{R}$ instead of from an interval $[0,1]$. In particular, the negative value of x represents an *extraction* by Party 1. If Party 1 could set a negative x, i.e., demand $|x|$ amount from Party 2 in each period, will things play out differently? Party 1 does have a unilateral proposer power in the model, but technically Party 2 has a veto power in the sense that it can leave from the very first period in the maintenance stage. If he leaves in the first period, Party 2 will receive his draw in that period and the partnership will end, meaning that Party 1's "unfair" allocation of resources won't affect his payoff in any way. It follows from this reasoning that with negative x, Party 2 might leave right away, especially given that the minimum outside option payoff he can get is 0. However, the analysis shows that this may not be the case. To keep the model parsimonious, I assume a homogeneous outside option, i.e., $\omega = \omega_1 = \omega_2$. Below I summarize equilibrium outcomes and their conditions.

1. Party 1 offers $\omega(1-\delta)$ and *both parties never leave* in equilibrium. This is when

$$\omega < \min\left\{\frac{1}{2(1-\delta)}, \frac{p}{(1-d)(1-d(1-p)^2)}\right\}.$$

2. Party 1 offers $-\delta p\omega$ and *Party 2 will leave* in equilibrium. This is when

$$\frac{p}{(1-d)(1-d(1-p)^2)} < \omega < \frac{1-p}{1-\delta(1-p^2)}.$$

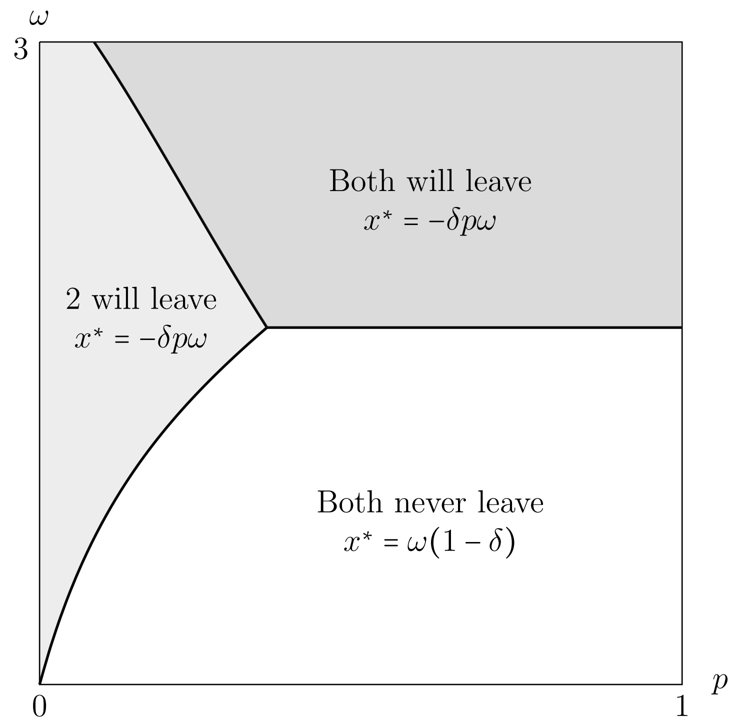


Figure B.1: Equilibrium Outcomes with Extraction
$\delta = 0.7$

3. Party 1 offers $-\delta p\omega$ and *both parties will leave* in equilibrium. This is when

$$\omega > \max\left\{\frac{1}{2(1-\delta)}, \frac{1-p}{1-\delta(1-p^2)}\right\}.$$

Figure B.1 illustrates the results. Somewhat surprisingly, we observe an equilibrium where Party 1 offers $x^* = -\delta p\omega < 0$ when ω is sufficiently high and Party 2 does not leave conditional on $\omega_2^t = 0$. In other words, even when Party 1 demands $|x|$ from Party 2, the partnership still lasts for a positive amount of period; this is because Party 2 is willing to pay the cost to wait for a potential high draw of outside option ω.

Results further show that parties are indeed more likely to leave the coalition in this version of the model, but only to a very small margin. As we see in Figure B.2, Party 2's behavior changes only in the gray region. Under these conditions, Party

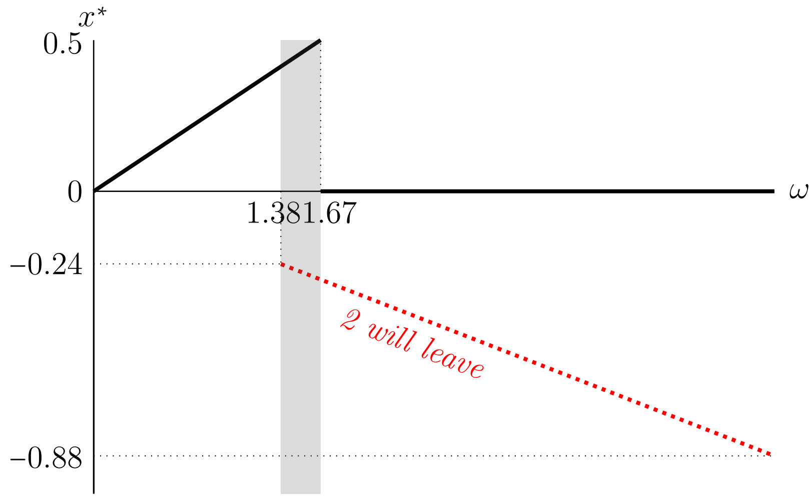


Figure B.2: Optimal Compromise x^* with Extraction
$\delta = 0.7$, $p = 0.25$

2 never leaves in the baseline model but leaves after drawing a high outside option in this extension. However, Party 2's payoff is strictly worse off than in the baseline model because Party 1 can propose a negative x instead of 0.

B.3 Additional Extension 2: Correlated Outside Options

In this extension, I relax the assumption on the *distribution* of outside option ω_i^t. Let r be the conditional probability of outside option draws $Pr(\omega_i^t = \omega | \omega_j^t = \omega)$, as can be seen in Table B.1. Positive correlation ($r > p$) means that if Party 1 draws ω_1 in a period, Party 2 is also more likely to receive that value and vice versa; if negatively correlated ($r < p$), a higher draw of outside option for Party 1 means that Party 2 is less likely to get one and vice versa. If $r = p$ the two are independent. I assume a homogeneous outside option.

	$\omega_2^t = 0$	$\omega_2^t = \omega$
$\omega_1^t = 0$	$1 - 2p + pr$	$p(1-r)$
$\omega_1^t = \omega$	$p(1-r)$	pr

Table B.1: Joint Distribution of Outside Option Draws

I summarize the equilibrium conditions below.

1. Party 1 offers $(1-\delta)\omega$ and *both parties never leave* in equilibrium. This is when

$$\omega < \min\left\{\frac{1}{2(1-\delta)}, \frac{p}{(1-\delta)(1-\delta(1-p))}, \max\left\{\frac{1-r}{1-\delta(1-p)}, \frac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\right\}.$$

2. Party 1 offers $(1-\delta(1-p))\omega/(1-r)$ and *Party 1 will leave* in equilibrium. This is when

$$\frac{1}{2(1-\delta)} < \omega < \frac{1-r}{1-\delta(1-p)} \quad \text{and} \quad r < 2 - \frac{1-\delta(1-p)^2}{p}.$$

3. Party 1 offers 0 and *Party 2 will leave* in equilibrium. This is when

$$\min\left\{\begin{matrix}\frac{1}{2(1-\delta)}, \\ \frac{p}{(1-\delta)(1-\delta(1-p))}\end{matrix}\right\} < \omega < \max\left\{\begin{matrix}\frac{1-r}{1-\delta(1-p)}, \\ \min\left\{\frac{1}{2(1-\delta)}, \frac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\end{matrix}\right\} \text{ and } r > 2 - \frac{1-\delta(1-p)^2}{p}.$$

4. Party 1 offers 0 and *both parties will leave* in equilibrium. This is when

$$\omega \quad > \max\left\{\tfrac{1-r}{1-\delta(1-p)}, \min\left\{\tfrac{1}{2(1-\delta)}, \tfrac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\right\}.$$

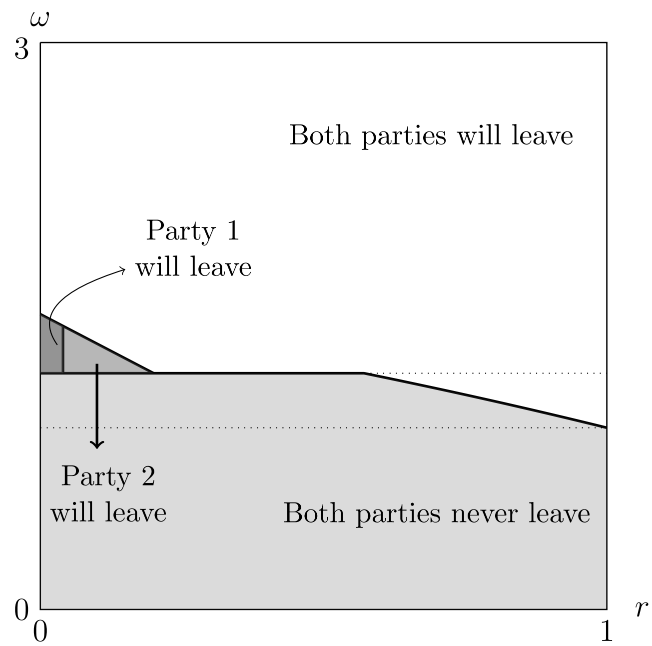


Figure B.3: Equilibrum Outcomes with Correlated Outside Options
$\delta = 0.6$, $p = 0.4$

Figure B.3 depicts the equilibrium outcomes in this version of the model. Note that the region between the two dotted lines in Figure B.3 denotes the area where the equilibrium changes from *both never leave* to *both will leave* as r increases. In other words, a more positive correlation between parties' outside options may lead to a *shorter* duration of agreement. This happens when:

$$\frac{p}{(1-\delta)(1+p-\delta(1-p))} < \omega < \min\left\{\frac{1}{2(1-\delta)}, \frac{p}{(1-\delta)(1-\delta(1-p))}\right\}.$$

Additionally, we see that there exists a region where parties are in agreement over r. Both parties are willing to increase r and let their outside options be more positively correlated when:

$$\omega \quad > \max\left\{\frac{1-r}{1-\delta(1-p)}, \min\left\{\frac{1}{2(1-\delta)}, \frac{p(2-r)}{(1-\delta)(1-\delta+p+\delta p(2-r))}\right\}\right\}.$$

One possible way is to interpret correlation parameter r as ideological diversity between parties, where high r means that parties have low ideological diversity and vice versa. In this regard, this result speaks to the studies on cabinet stability that examine the influence of a government's ideological diversity on its durability. While most works find a strong positive association between ideological polarization and the risk of cabinet termination [117, 125], some evidence conversely indicates a risk-increasing effect of minimal connected winning coalitions [95, 168, 99, 106, 22, 122]. This model implies that these mixed empirical results are expected when parties' outside option ω is sufficiently moderate; a coalition of "strange bedfellows" made up of ideologically divergent parties can in fact decrease the risk of breakdown.

B.4 Additional Extension 3: Lower Breakdown Costs

I have assumed throughout the paper that a party's defection is always costly to the other party who had decided to stay. However, despite having faced a new election involuntarily due to the other party's defection, a party may still have a favorable prospect in the period or enjoy some positive externality [3, 182]. Taking this into account, I assume in this extension that a party can still draw his or her high outside option ω_i with probability p even when the other party has defected in the given period. The payoff matrix is as follows:

		Party 2	
		$a_2^t = 0$	$a_2^t = 1$
Party 1	$a_1^t = 0$	$(1-x, x)$	(ω_1^t, ω_2^t)
	$a_1^t = 1$	(ω_1^t, ω_2^t)	(ω_1^t, ω_2^t)

Table B.2: Payoff Structure with Lower Breakdown Costs

I summarize the equilibrium conditions below.

1. Party 1 offers $x^\dagger$ and *both parties never leave* in equilibrium. This is when

$$\omega_2 < \frac{p(1-(1-\delta)p\omega_1)}{(1-\delta)(1-\delta(1-p))} \quad \text{and} \quad \omega_2 < \frac{1}{1-\delta} - \omega_1.$$

2. Party 1 offers 0 and *both parties will leave* in equilibrium. This is when

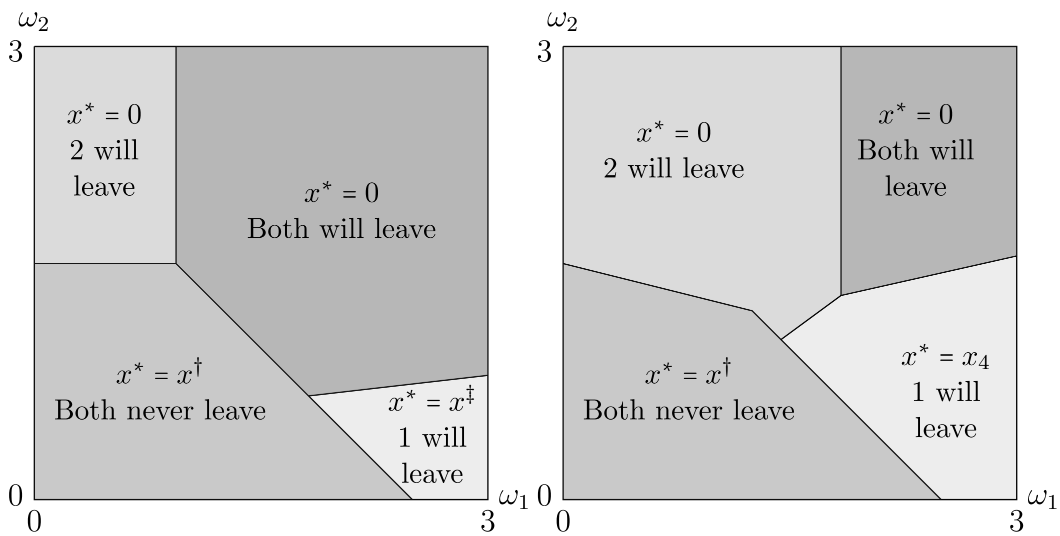
$$\omega_1 > \frac{1}{1-\delta(1-p+p^2)} \quad \text{and} \quad \omega_2 > \min\left\{\frac{1}{1-\delta(1-p+p^2)}, \frac{p(1+\delta p\omega_1)}{(1-\delta(1-p)^2)(1-\delta+\delta(1-p)p)}\right\}.$$

3. Party 1 offers $(1-\delta(1-p(1-p)))\omega_2$ and *Party 1 will leave* in equilibrium. This

is when

$$\frac{1}{1-\delta} - \omega_1 < \omega_2 < \min\left\{\frac{p(1-(1-\delta)p\omega_1)}{(1-\delta)(1-\delta(1-p))}, \frac{p(1+\delta p\omega_1)}{(1-\delta(1-p)^2)(1-\delta+\delta(1-p)p)}, \frac{p\omega_1}{1-\delta+\delta(1-p)p}\right\}.$$

4. Party 1 offers 0 and *Party 2 will leave* in equilibrium otherwise.



(a) Baseline Model (b) Lower Breakdown Costs

Figure B.4: Comparison of Equilibrium Outcomes
$\delta = 0.6$, $p = 0.4$

Figure B.4 compares this extension with the baseline model where the defected party always receives 0. Intuitively, with the relaxed assumption, we observe that *unilateral* defection is more common than in the baseline model. This is coming from the fact that now parties are less induced to leave when the other party leaves since the party can still draw his or her high outside option with positive probability. Further note that $x^\ddagger$ is always greater than x_4. This is because it takes a larger offer to convince Party 2 to stay in the agreement, given his risk of receiving 0 after Party 1's defection.

B.5 Additional Extension 4: Incorporating Audience Costs

In this extension, I add a parameter $c \in (0, \omega)$ that captures the audience cost that the defector incurs from abandoning the partnership. Below are the parties' payoffs in this version of the model; I assume homogeneous ω.

		Party 2	
		$a_2^t = 0$	$a_2^t = 1$
Party 1	$a_1^t = 0$	$(1 - x, x)$	$(\omega^t, \omega^t - c)$
	$a_1^t = 1$	$(\omega^t - c, \omega^t)$	$(\omega^t - c, \omega^t - c)$

Table B.3: Payoff Structure with Audience Costs

Note that when we assume the payoff structure to be identical to the baseline model, adding c does not affect any of the equilibrium outcomes so long as c is not too high, as this simply increases the parties' disincentives to leave by c. In order to make the game non-trivially different from the baseline model, I adopt the payoff structure in Appendix B.4 where parties have an incentive to wait and "free ride" on the opponent's decision to end the coalition even if a positive outside option is drawn. As in the baseline model, there are four cases: 1) *both never leave*, 2) *Party 1 will leave* when $\omega_1^t = \omega_1$ and Party 2 never leaves, 3) Party 1 never leaves and *Party 2 will leave* when $\omega_2^t = \omega_2$, and 4) *both will leave* when $\omega_i^t = \omega_i$. There also are two types of subgame equilibrium multiplicity in this version:

1. Cases 1 and 2 may coexist. As in the baseline model, I assume that Case 1 prevails.

2. Cases 3 and 4 may coexist. The multiplicity range is symmetric around 1/2 with respect to x. Therefore, I assume that Case 3 prevails when $x > 1/2$ and Case 4 prevails when $x < 1/2$. In other words, a more dissatisfied party will leave in equilibrium.

I summarize the equilibrium conditions below.

1. Party 1 offers $(1-\delta)(\omega-c)$ and *both parties never leave* in equilibrium. This is when

$$\omega < \min\left\{\frac{c(-1+\delta)(1+\delta(-1+p))-p}{(-1+\delta)(-1+\delta(-1+p)+p^2)}, c+\frac{1}{2-2\delta}\right\}.$$

2. Party 1 offers 0 and *both parties will leave* in equilibrium. This is when

$$\omega > \frac{1+c+c\delta(-1+p)-p}{(-1+p)(-1+\delta+\delta(-1+p)p)}.$$

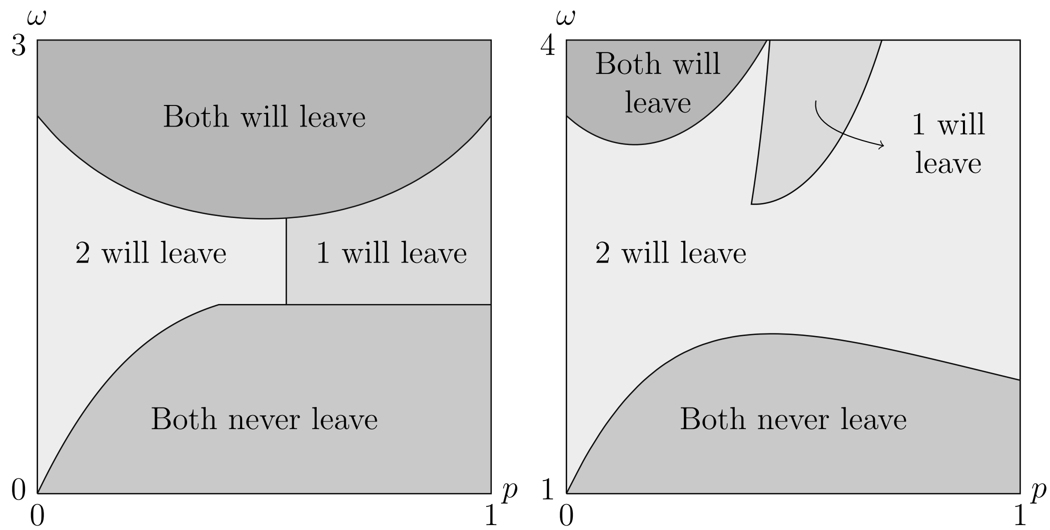
3. Party 1 offers $\left(\delta+\frac{1}{-1+p}\right)+(1-\delta(1-p(1-p)))\omega$ or $\frac{1}{2}$ and *Party 1 will leave* in equilibrium. This is when

$$\max\left\{-\frac{c}{-1+p}+\frac{1}{2p}, c+\frac{1}{2-2\delta}\right\} < \omega < \frac{1+c+c\delta(-1+p)-p}{(-1+p)(-1+\delta+\delta(-1+p)p)} \quad \text{and} \quad c > \frac{(-1+\delta+p+\delta(-1+p)p)\omega}{-1+\delta}.$$

4. Party 1 offers 0 and *Party 2 will leave* in equilibrium otherwise.

Figure B.5 illustrates the above result. First, Figure B.5a assumes zero cost of defecting $c = 0$. Note that the figure is different from the baseline model because of the 1) homogeneous ω assumption and 2) relaxed assumption on what parties receive given the other party's defection (payoff structure in Appendix B.4). Our equilibrium of interest—the buyout equilibrium—still exists in this version, more specifically when outside option ω is moderate and the probability of drawing such outside option p is high. Moderate ω, although convoluted because it represents the outside option of both parties, captures the intuition that the outside option is not too low that Party 1 wants to leave but is not too high that Party 1 can persuade Party 2 not to leave. Sufficiently high p further increases Party 1's incentive to leave.

In Figure B.5b where the cost of leaving c is 1, we observe that the results are



(a) No cost ($c = 0$) (b) Audience cost ($c = 1$)

Figure B.5: Comparison of Equilibrium Outcomes
$\delta = 0.6$

qualitatively consistent with the baseline model, with changes to the equilibrium results in the expected direction. Notably, the region where Party 1 proposes $x = 0$ and Party 2 leaves increases. This is because Party 1 is generally less incentivized to offer a compromise to Party 2, as the presence of the audience cost deters Party 2 from defecting to a certain degree. Party 2, following an offer of 0, leaves after he draws a favorable outside option. The buyout equilibrium is also present in this version. Now, outside option ω has to be higher to sustain this equilibrium, as Party 1 also has to pay the cost $c = 1$ in order to leave; probability p needs to be moderate, as Party 1 is reluctant to offer Party 2 anything when p is low and she is unable to persuade Party 2 to stay if it is too high. Other results are in accordance with the baseline model.

B.6 Additional Extension 5: Preferences for Commitment

I additionally consider a version of the model where only Party 2 can decide whether or not to withdraw from the partnership in the maintenance stage. Substantively, we can interpret this as parties facing asymmetric audience costs where Party 1's cost is considerably larger than that of Party 2.[1] For simplicity, I omit explicit considerations of audience costs and simply compare the case where both parties can defect from the partnership (baseline model) with the one where only Party 2 can choose to leave (commitment model). Below I first lay out a complete equilibrium analysis of the commitment model.

Now the maintenance stage is Party 2's dynamic discrete choice problem. I first solve for Party 2's optimal stationary strategy with respect to ω_2^t, which depends on x. Then, Party 1 will choose an optimal offer x^* in the contracting stage in anticipation of Party 2's best response in the maintenance stage. Let W denote Party 2's continuation value. Party 2 prefers to leave when

$$\omega_2^t > x + \delta W.$$

It immediately follows that not leaving is a dominant strategy when $\omega_2^t = 0$. Therefore, Party 2 essentially has two different strategies: 1) never leave for all ω_2^t, and 2) leave when $\omega_2^t = \omega_2$.

1. Consider the strategy profile where Party 2 never leaves for all ω_2^t. Then, the stationary MPE requires that continuation value W satisfies the following Bell-

[1] If both parties are constrained to never leave the agreement, it is always a weakly dominant strategy for Party 1 to offer nothing to Party 2.

man equation:

$$W = x + \delta W.$$

The solution for this equation is

$$W = \frac{x}{1-\delta}.$$

Party 2 has an incentive to employ this strategy if Party 1's offer is sufficiently large:

$$x > (1-\delta)\omega_2.$$

2. Consider the strategy profile where Party 2 leaves when $\omega_2^t = \omega_2$. Then, the stationary MPE requires that continuation value W satisfies the following Bellman equation:

$$W = (1-p)(x + \delta W) + p \cdot \omega_2.$$

The solution for this equation is

$$W = \frac{x + p\omega_2}{1-\delta(1-p)}.$$

Party 2 has an incentive to employ this strategy if the offer is sufficiently small:

$$x < (1-\delta)\omega_2.$$

Let EU_1 be Party 1's total expected utility as a function of choice $x \in [0,1]$. Then,

$$EU_1(x) = \begin{cases} \frac{(1-p)(1-x)}{1-\delta(1-p)} & \text{if } x < (1-\delta)\omega_2 \\ \frac{1-x}{1-\delta} & \text{if } x > (1-\delta)\omega_2. \end{cases}$$

Depending on exogenous parameters δ, p and ω_2, Party 1's optimal choice of offer and the subsequent equilibrium outcome are as follows:

1. Party 1 offers $x^\dagger$ and *Party 2 never leaves* in equilibrium if $\omega_2 < \tilde{\omega}_2$,

2. Party 1 offers 0 and *Party 2 will leave* in equilibrium if $\omega_2 > \tilde{\omega}_2$,

where

$$\tilde{\omega}_2 \equiv \frac{p}{(1-\delta)(1-\delta(1-p))}.$$

The equilibrium results for the baseline model are detailed in Proposition 9. Now I merge the conditions of both models to compare parties' utilities and establish results on Pareto optimality. There are mainly six different cases.

1. *Party 2 will leave* in both models when

$$\omega_1 < A \quad \text{and} \quad \omega_2 > B - A.$$

   Parties are indifferent between the two models. The condition requires a sufficiently low ω_1 and a sufficiently high ω_2.

2. *Both parties never leave* in both models when

$$\omega_2 < B - A \quad \text{and} \quad \omega_1 + \omega_2 < B.$$

   Parties are indifferent between the two models. The condition requires sufficiently low ω_1 and ω_2.

3. *Both parties never leave* in the commitment model and *Party 1 will leave* in the baseline model when

$$\omega_2 < \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A, B-A\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

Party 2 is indifferent between the two versions; Pareto optimality is established by Party 1's preference. If $\omega_1 < B$, Party 1 prefers the commitment model, and Party 1 prefers the baseline model otherwise.

4. *Both parties never leave* in the commitment model and *both parties will leave* in the baseline model when

$$\omega_1 > A \quad \text{and} \quad \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} < \omega_2 < B - A \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

Party 2 always prefers the commitment model. If Party 1 also prefers the commitment model, then Pareto optimality is established. This is when

$$(1-\delta)(1-\delta(1-p)^2)\omega_2 < p(2-p-(1-\delta)\omega_1).$$

The conditions require moderate ω_1 and ω_2. Party 1 prefers the baseline model otherwise; parties' preferences over the institutions diverge in this case. The conditions require moderate (but relatively higher) ω_1 and ω_2.

5. *Party 2 will leave* in the commitment model and *Party 1 will leave* in the baseline model when

$$B - A < \omega_2 < \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

Both parties always prefer the baseline model; Pareto optimality is established. The conditions require a sufficiently high ω_1 and a moderate ω_2.

6. *Both parties never leave* in the commitment model and *both parties will leave* in the baseline model when

$$\omega_1 > A \quad \text{and} \quad \omega_2 > \max\left\{B - A, \min\left\{\frac{Ap + A\delta p^2\omega_1}{(1-\delta(1-p)^2)}, A\right\}\right\} \quad \text{and} \quad \omega_1 + \omega_2 > B.$$

   Party 1 always prefers the baseline model, while Party 2 always prefers the commitment model; parties' preferences for institutions diverge. The conditions require sufficiently high ω_1 and ω_2.

Rearranging these conditions derives the implications stated below:

1. If either ω_1 or ω_2 is sufficiently low, parties are indifferent between the two models.

2. If both ω_1 and ω_2 are sufficiently high, parties' preferences diverge.

3. If both ω_1 and ω_2 are moderate, both parties are weakly better off in the commitment model.

4. If ω_1 is sufficiently high and ω_2 is sufficiently low, both parties are weakly better off in the baseline model.

Now consider Party 1 and Party 2's welfare in comparison with the results from the baseline model. We can observe that parties may agree on which game to play. Both parties may prefer that Party 1 commits to the partnership and be unable to leave; conversely, they may want Party 1 to have the option to leave. The red dotted lines in Figure B.6 and B.7 represent the model with commitment, while the black lines represent the results without commitment (baseline model).

Figure B.6 illustrates the case where both parties favor Party 1's inability to leave. From Figure B.6a, we see that Party 1 in general is better off without commitment. It would seem clear that increasing Party 1's flexibility in her choice to leave can only

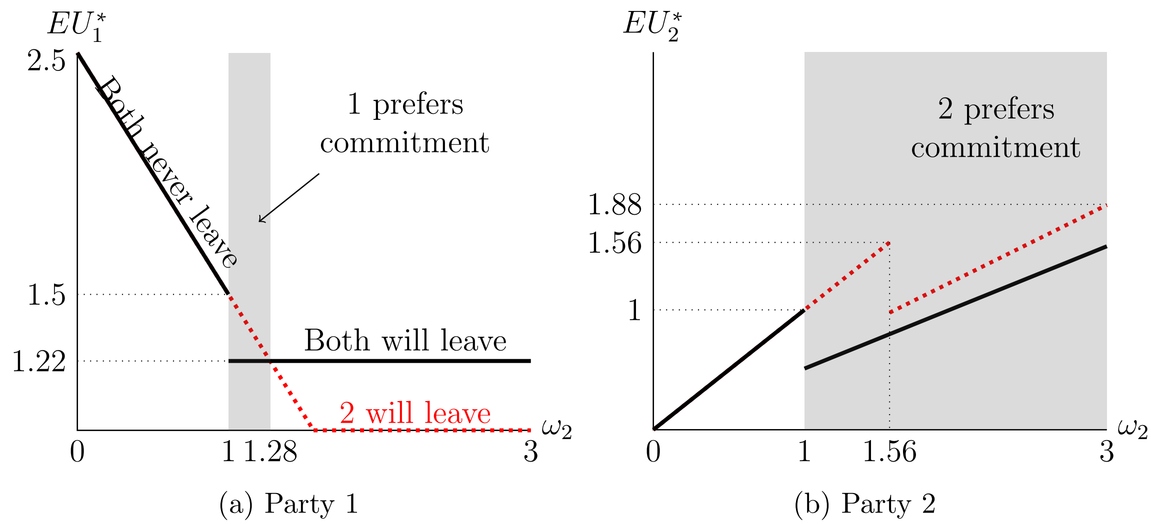


Figure B.6: Comparison of Equilibrium Expected Payoffs
$\delta = 0.6, p = 0.4, \omega_1 = 1.5$

increase Party 1's expected payoff. Similarly, one might think that Party 2 can not be helped by Party 1's increase in flexibility. However, this possibility, if foreseen by Party 2, introduces a credibility problem that becomes more costly for Party 1. When Party 2 has a moderate outside option, he is better off receiving the continued stream of payoff in the partnership rather than taking a not-too-high outside option and leaving, but with the possibility of Party 1's "betrayal" in the extension model he is incentivized to leave. With Party 1's credible commitment, Party 2 is now willing to never leave. Party 1 may thus prefer to concede her ability to leave the partnership in return for a longer duration of the coalition. This happens when the outside options of parties are moderate (shaded region in Figure B.6a).

Figure B.7 represents an opposite case. Party 1's outside option ω_1 is very high that given these parameters, for any value of ω_2 Party 1 ultimately leaves the agreement after she draws ω_1. One might think that Party 2 would prefer that Party 1 commits to the relationship and never leaves, since otherwise he knows that Party 1 will leave with certainty in the future. Somewhat surprisingly, there is a region where Party 2 is better off when Party 1 is able to leave the agreement. This is closely re-

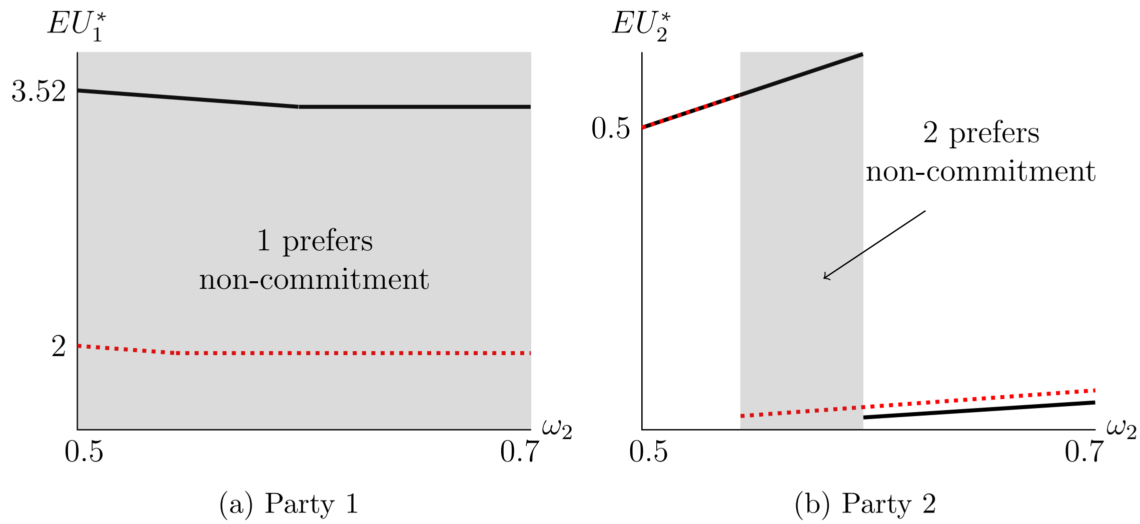


Figure B.7: Comparison of Equilibrium Expected Payoffs
$\delta = 0.6, p = 0.1, \omega_1 = 9.5$

lated to the mechanism behind the buyout equilibrium (see Figure 2.2) where Party 1 concedes by offering Party 2 a larger share of resources in exchange for a secure exit strategy in the future. This shapes Party 2's preference for institutions, as he may prefer Party 1's ability to withdraw from the agreement since this increases her willingness to compromise.

Figure B.8 is a graphical illustration of the above results. Put together, there exist regions where parties agree on the institutional choice. When ω_1 and ω_2 are "not too low, not too high," both parties may prefer to have Party 1 commit to the partnership. Party 1 proposes more in the baseline model but prefers to do so, as this induces Party 2 to stay in the partnership longer. When ω_1 is sufficiently high but ω_2 is sufficiently low, both parties may conversely prefer that Party 1 has the ability to leave the partnership as implied by Figure B.7. Additionally, when either ω_1 or ω_2 is sufficiently low, parties are indifferent between the two games because the equilibrium outcome is perfectly identical for both models. Otherwise, parties disagree on their preferred game choice.

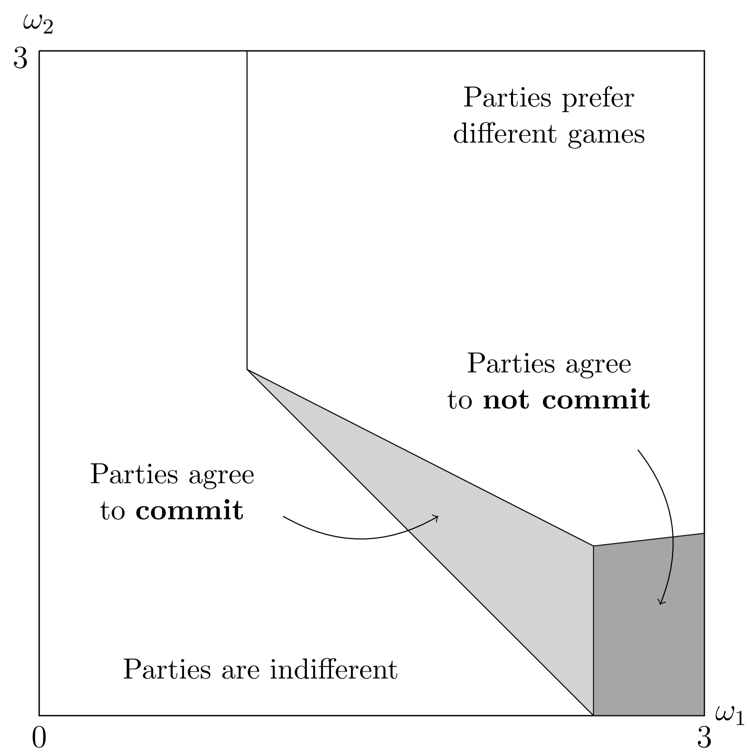


Figure B.8: Parties' Preferences Over Games
$\delta = 0.6, p = 0.4$

B.7 Additional Extension 6: Incorporating Renegotiation

In this section, I allow Party 1 to make a second offer x' to Party 2 when he unilaterally announces that he will leave. I assume homogeneous ω; I further fix $\delta = 0.6$ and $p = 0.4$ for tractability. If Party 2 accepts the offer, each party receives $(1 - x', x')$, and the game proceeds to the maintenance stage governed by a new allocation of x'. Renegotiation succeeds with probability σ; with probability $1 - \sigma$, the game immediately ends as in the baseline model. As σ tends to zero, this extension becomes equivalent to the baseline model without renegotiation. As σ increases, renegotiation is more likely to succeed.

I solve this extension by backward induction. I first examine what the optimal offer by Party 1 and the corresponding subgame equilibrium is given that Party 2 decides to leave. Then, I analyze what the initial offer of Party 1 will be given that Party 2 can ask for renegotiation later in the bargaining process. If Party 2 announces to leave after drawing ω, Party 2 accepts the new offer x' if $x' + \delta\hat{W}(x') > \omega$ where $\hat{W}$ is the continuation value of renegotiation outcome given x'. If Party 2 announces to leave after drawing 0, Party 2 accepts new offer x' since $x' + \delta\hat{W}(x') > 0$. It is always better for Party 1 to achieve any renegotiation since $1 - x' + \delta\hat{V}(x') > 0$; in addition, Party 1 aims to maximize the LHS conditional on acceptance.

It follows that Party 1 always has the incentive to renegotiate because it is always better to prolong the game for at least one more period than to end the game with a zero payoff. Therefore, the feasibility of renegotiation solely depends on the existence of new x' that can convince Party 2 with a positive outside option to stay. I summarize the equilibrium conditions below.

1. Party 1 offers $x^\dagger$ and *both parties never leave* in equilibrium. This is when

$$\omega_2 < \min\left\{\frac{5-2\omega_2}{2}, \max\left\{\frac{25(1-\sigma)}{2(8-5\sigma)}, \min\left\{\frac{15}{16}, \frac{60-15\omega_1}{49}\right\}\right\}\right\}.$$

2. Party 1 offers 0 and *Party 2 will leave* in equilibrium; after renegotiation, Party 1 offers $x^\dagger$ and *both parties never leave.* This is when

$$\max\left\{\frac{25(1-\sigma)}{2(8-5\sigma)}, \min\left\{\frac{15}{16}, \frac{60-15\omega_1}{49}\right\}\right\} < \omega_2 < \frac{5-2\omega_1}{2}.$$

3. Party 1 offers 0 and *Party 2 will leave* in equilibrium; after renegotiation, Party 1 offers $\tilde{x} \equiv 68\omega_2/125$ and *both parties will leave.* This is when

$$\frac{5-2\omega_1}{2} < \omega_2 < \min\left\{\frac{125}{68}, \frac{735-384\omega_1+25\sigma(25+6\omega_1)}{340\sigma}\right\}.$$

4. Party 1 offers 0 and *Party 2 will leave* in equilibrium; there is no counteroffer. This is when

$$\omega_2 > \max\left\{\frac{125}{68}, \frac{5-2\omega_1}{2}\right\} \quad \text{and} \quad \omega_1 < \frac{15}{16}.$$

5. Party 1 offers $\hat{x} \equiv 16(5+2\sigma)\omega_2/75$ and *Party 1 will leave* in equilibrium. This is when

$$\frac{5-2\omega_1}{2} < \omega_2 < \max\left\{\begin{array}{l} \min\left\{\frac{75(1-\sigma)(25+6\omega_1)}{3920-432\sigma}, \frac{675+162\omega_1}{2288}\right\}, \\ \min\left\{\frac{375(1-\sigma)(25+6\omega_1)}{4352(5-3\sigma)}, \frac{675+162\omega_1}{3920}\right\} \end{array}\right\}.$$

6. Party 1 offers $x^\ddagger$ and *Party 1 will leave* in equilibrium. This is when

$$\max\left\{\frac{5-2\omega_1}{2}, \frac{675+162\omega_1}{2288}\right\} < \omega_2 < \frac{15(49-40\sigma)(25+6\omega_1)}{38416-8160\sigma}.$$

7. Party 1 offers $\bar{x} \equiv 2(227\sigma - 45)/375$ and *both parties will leave* in equilibrium; after renegotiation, Party 1 offers $x^{\ddagger}$ and *Party 1 will leave*. This is when

$$\max\left\{\frac{5-2\omega_1}{2}, \frac{375(1-\sigma)(25+6\omega_1)}{4352(5-3\sigma)}\right\} < \omega_2 < \frac{675+162\omega_1}{3920}.$$

8. Party 1 offers 0 and *both parties will leave* in equilibrium; after renegotiation, Party 1 offers $x^{\ddagger}$ and *Party 1 will leave* after renegotiation. This is when

$$\max\left\{\frac{5-2\omega_1}{2}, \frac{675+162\omega_1}{3920}, \frac{75(1-\sigma)(25+6\omega_1)}{3920-432\sigma}\right\} < \omega_2 < \frac{675+162\omega_1}{2288}.$$

9. Party 1 offers 0 and *both parties will leave* in equilibrium; after renegotiation, Party 1 offers $\tilde{x}$ and *both parties will leave*. This is when

$$\max\left\{\begin{matrix}\frac{5-2\omega_1}{2}, \frac{735-384\omega_1+25\sigma(25+6\omega_1)}{340\sigma}, \\ \frac{675+162\omega_1}{2288}, \frac{15(49-40\sigma)(25+6\omega_1)}{38416-8160\sigma}\end{matrix}\right\} < \omega_2 < \frac{125}{68}.$$

10. Party 1 offers 0 and *both parties will leave* in equilibrium given $x^* = 0$; there is no counteroffer. This is when

$$\omega_2 > \frac{125}{68} \quad \text{and} \quad \omega_1 > \frac{15}{16}.$$

Figure B.9 illustrates Party 1's optimal offer in both the initial bargaining stage and the renegotiation stage, as well as the corresponding equilibrium outcomes. Equilibria with the same initial bargaining outcomes are colored in the same shade. As expected, Party 1 offers 0 more often in this extension since she can simply offer more to Party 2 *after* Party 2 announces to leave. Successful renegotiation with $x' > 0$ after an initial offer of 0 occurs when Party 2's outside option ω_2 is moderate. Further notice that the logic of the buyout equilibrium is still present. When ω_1 is sufficiently

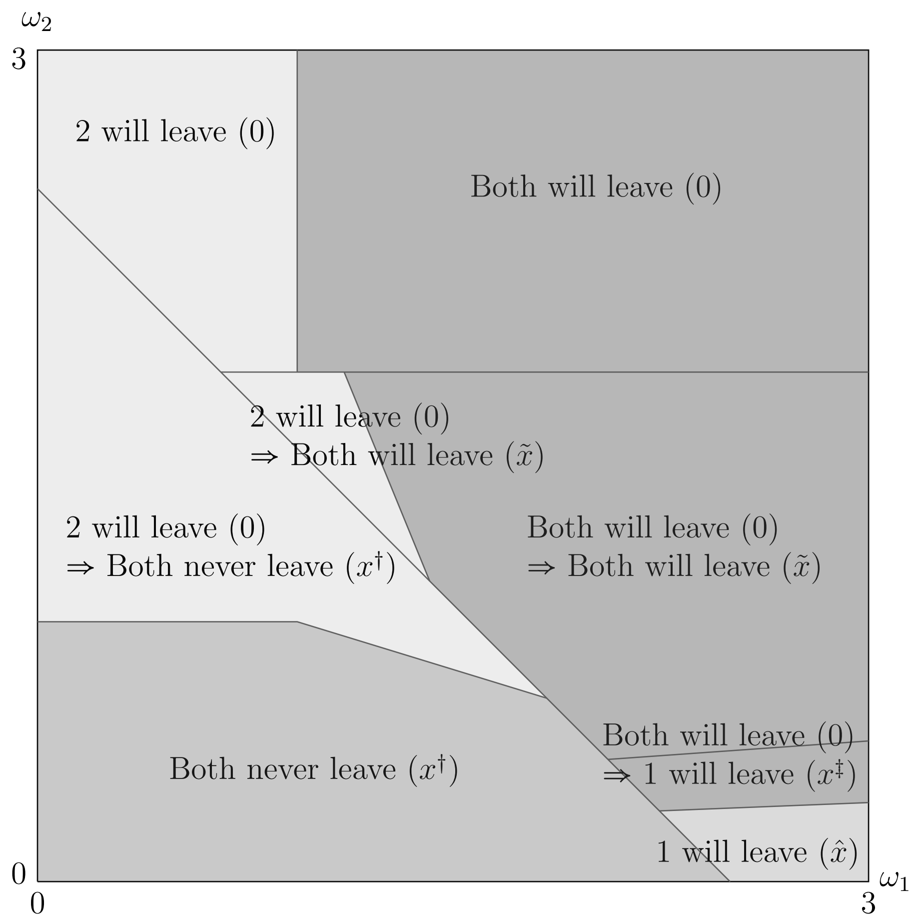


Figure B.9: Equilibrium Outcomes with Renegotiation
$\delta = 0.6, \sigma = 0.8$

high relative to ω_2, Party 1 in equilibrium concedes to Party 2 but leaves after drawing a high outside option. With renegotiation, however, there exists an additional equilibrium where Party 1 "buys" Party 2's cooperation only after renegotiation.

B.8 Additional Extension 7: Continuous Outside Options

In this section, I re-solve the baseline model using a continuous distribution and show that the results extend outside the Bernoulli distribution setting. I set ω_i to be distributed continuously according to a Normal(μ, σ) distribution. I choose Normal distribution as a conservative test to examine if the results still hold for an unbounded and continuous distribution. Unfortunately, we are unable to get closed-form solutions with the distribution; I instead run simulations and report numerical solutions to provide insight into how the parameters in my model affect the equilibrium behavior of parties. Specifically, I examine the effect of changes in mean μ, which best represents the changes in the size of outside options. We first know that

1. Party 1 leaves when $1 - x + \delta V < \omega_1^t$,
2. Party 2 leaves when $x + \delta W < \omega_2^t$.

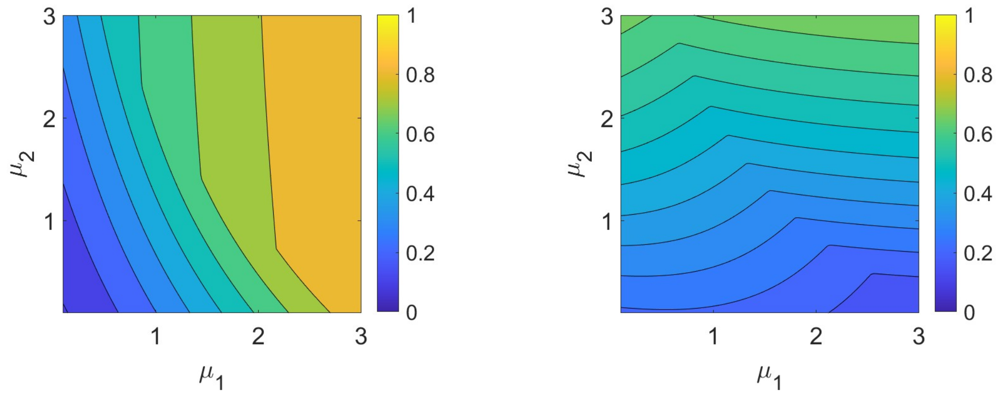
With the distributional assumption, the probability that each party leaves can be expressed as

$$P = 1 - \Phi(1 - x + \delta V; \mu_1, \sigma) \quad \text{and}$$
$$Q = 1 - \Phi(x + \delta W; \mu_2, \sigma),$$

where Φ is the cumulative density function (CDF) of Normal distribution given μ_i and σ. In equilibrium, continuation value V and W must satisfy the following Bellman equations:

$$V = (1 - P)(1 - x + \delta V) + P \cdot E[\omega_1 | \omega_1 > 1 - x + \delta V] \quad \text{and}$$
$$W = (1 - Q)(x + \delta W) + Q \cdot E[\omega_2 | \omega_2 > x + \delta W].$$

Below I provide numerical results for parameter values $\delta = 0.6$ and $\sigma = 1$.



(a) Probability that Party 1 Leaves (b) Probability that Party 2 Leaves

Figure B.10: Probability that Parties Leave
$\delta = 0.6, \sigma = 1$

First, note that by assuming that outside options are normally distributed, draws of outside options can be infinitely large numbers. Equilibria where parties never leave are therefore impossible because there is always a positive probability that the outside option is better than what Party 1 can offer.[2] Otherwise, however, the main dynamics of the game do not largely change relative to the baseline model. From Figure B.10a and B.10b, we can see that when μ_1 and μ_2 are both low, the probability of leaving is low for both parties (which is the region where *both parties never leave* in the baseline model; see Figure 2.1). When μ_1 is high but μ_2 is low, the probability of leaving is high for Party 1 but low for Party 2 (*Party 1 will leave* in the baseline model). When μ_1 is low but μ_2 is high, the probability of leaving is low for Party 1 but high for Party 2 (*Party 2 will leave* in the baseline model). Lastly, when μ_1 and μ_2 are both high, the probability of leaving is high for both parties (*both will leave* in the baseline model).

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[2] See [116] for a model of strategic election timing that uses a dynamic optimal stopping problem with continuous shocks.

Appendix C

Coordination in Bureaucratic Policy-Making

C.1 Online Technical Appendix

In this section, we provide derivations and proofs for the claims made in the body of the article.

Proposition 27 *The probability of coordination in the mixed strategy equilibrium is strictly increasing in* $\alpha \in [0,1]$.

Proof: The probability of coordination in the mixed strategy equilibrium is

$$\frac{\alpha}{2} \cdot \frac{2-\alpha}{2} + \frac{2-\alpha}{2} \cdot \frac{\alpha}{2} = \frac{\alpha(2-\alpha)}{2}.$$

Its first partial derivative with respect to α, $1-\alpha$, is larger than 0; the probability is therefore strictly increasing in $\alpha \in [0,1]$. ∎

Proposition 28 *In equilibrium, P's investment in reliability,* $c^*(\alpha)$, *is strictly decreasing in the agencies' common alignment,* α, *and P's expected equilibrium payoff* *is increasing in α.*

Proof: Recall that P's equilibrium expected payoff depends on α and c:

$$EU_P^*(c \mid \alpha) = c + (1-c) \cdot \frac{\alpha(2-\alpha)}{2} - c^2.$$

With this in hand, it is simple to derive P's optimal reliability, $c^*(\alpha)$:

$$c^*(\alpha) = \frac{2-2\alpha+\alpha^2}{4},$$

which is decreasing in $\alpha \in [0,1]$, and P's corresponding equilibrium payoff is

$$EU_P^*(\alpha) = \frac{1}{16}\left(\alpha^2 - 2\alpha - 2\right)^2,$$

which is increasing in $\alpha \in [0,1]$. ∎

Proposition 29 *For any given $\pi \in [0,1]$, Agency 1's equilibrium expected payoff with endogenous reliability is maximized by α^* defined by the following:*

$$\alpha^* = \begin{cases} 1 & \text{if } \pi \le 1/2, \\ \tilde{\alpha}(\pi) \in (0.8, 1) & \text{if } \pi \in (1/2, 0.629382), \\ 0 & \text{if } \pi > 0.629382, \end{cases}$$

where $\tilde{\alpha}(\pi)$ is a strictly decreasing function of π for all $\pi \in (1/2, 0.629382)$.

Proof: Agency 1's equilibrium expected payoff is

$$\frac{2-2\alpha+\alpha^2}{4} \cdot \pi \cdot (2-\alpha) + \frac{2-2\alpha+\alpha^2}{4} \cdot (1-\pi) \cdot \alpha + \left(1 - \frac{2-2\alpha+\alpha^2}{4}\right) \cdot \alpha \cdot \frac{2-\alpha}{2}. \quad \text{(C.1)}$$

First, Equation C.1 is increasing in α if $\pi < 1/2$. Therefore, Agency 1's equilibrium expected payoff is maximized at $\alpha = 1$. Second, this equation is decreasing in α if π is approximately larger than 0.727083.[1] Therefore, Agency 1's equilibrium expected payoff is maximized at $\alpha = 0$. Lastly, Equation C.1 is decreasing then increasing then decreasing in α otherwise. Therefore, we need to consider two maximizer candidates: the second root of the first-order condition and $\alpha = 0$. It follows that the second root maximizes if π is approximately smaller than 0.629382 and $\alpha = 0$ maximizes otherwise. ∎

Proposition 30 *Consider P and Agency 1's induced preferences over* α_1 *given* α_2.

- *P always prefers the agencies to be ordinally aligned. When* $\alpha_1 < 1$, *she chooses* $\alpha_2 = 2$; *when* $\alpha_1 > 1$, *she chooses* $\alpha_2 = 0$.
- *Agency 1 always prefers the agencies to be ordinally opposed. Its optimal choice* α_2^* *increases in* α_1.

Proof: In order to prove the proposition, we first provide a detailed analysis of our extended model of subsidized coordination with endogenous fairness. In this version, we (1) allow the agencies to have different alignments, (2) incorporate agencies' privately observed attention cost $\epsilon_i \in R$ drawn from a Uniform$[0, k]$ distribution, and (3) allow the president to choose the fairness of the protocol π.

The Agencies' Incentives. Each agency makes two choices in the process, but we focus on the observation decision. The only restriction we are imposing on the agencies' choice of a_i is that the agencies play the mixed strategy equilibrium unless both agencies pay attention to the recommendation. We now turn to this decision.

[1] The exact value is $(3 + 2\sqrt{2\sqrt{3} - 3})/6$.

Uniformly Distributed Costs of Attention. Supposing that ϵ_1 and ϵ_2 are each independently distributed according to the Uniform$[0,k]$ distribution for some fixed and known $k > 0$, Agency 1 should observe the recommendation if

$$\epsilon_1 \leq p_1^*(\pi, c) \cdot c^2 \cdot \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1)\right)\left(\left(\pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) + (1 - \pi)\,\alpha_2\right),$$

and Agency 2 should observe the recommendation if

$$\epsilon_2 \leq p_2^*(\pi, c) \cdot c^2 \cdot \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1)\right)\left(\left(\pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) + (1 - \pi)\,\alpha_2\right).$$

Thus, in any equilibrium, the agencies' cutoffs, ϵ_1^* & ϵ_2^*, must satisfy the following:

$$\begin{aligned}
\epsilon_1^* &= \epsilon_1^* \cdot c^2 \cdot \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1)\right)\left(\left(\pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) + (1 - \pi)\,\alpha_2\right),\\
\epsilon_2^* &= \epsilon_2^* \cdot c^2 \cdot \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1)\right)\left(\left(\pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) + (1 - \pi)\,\alpha_2\right),
\end{aligned}$$

There is always an equilibrium in which neither agency pays attention $(\epsilon_1^*, \epsilon_2^*) = (0,0)$. When a positive attention equilibrium exists, there is an equilibrium in which both agencies observe the recommendation with probability 1 (*i.e.*, $\epsilon_i^* = k$ for both $i \in \{1,2\}$). Such an equilibrium exists if and only if

$$k < k^*(\alpha, \pi) \equiv \frac{1}{4}\left((\alpha_1 - 2)^2 + 4(\alpha_1 - 1)\pi\right)\left(\alpha_2^2 - 4(\alpha_2 - 1)\pi\right).$$

The Principal's Optimal Fairness $\pi^*(\alpha)$. P's optimal protocol design is to maximize k^*. Note that k^* is a convex function of π if agencies are aligned, and a concave function of π if misaligned. $k^*(\alpha, \pi) > 0$ for all π. It follows that P's optimal design when agencies are aligned is

$$\pi^*(\alpha) = \begin{cases} 1 & \text{if} \quad \alpha_1 \geq 1, \alpha_2 < 1 \\ 0 & \text{if} \quad \alpha_1 < 1, \alpha_2 \geq 1. \end{cases}$$

When the agencies are misaligned, P chooses

$$\pi^*(\alpha) = \begin{cases} 0 & \text{if} \quad \hat{\pi}(\alpha) < 0 \\ \hat{\pi}(\alpha) & \text{if} \quad \hat{\pi}(\alpha) \in [0,1] \\ 1 & \text{if} \quad \hat{\pi}(\alpha) > 1 \end{cases}$$

where

$$\hat{\pi}(\alpha) \equiv \begin{cases} {}^1\!/_2 & \text{if } \alpha_1 = \alpha_2 = 1, \\ \frac{1}{8}\left(\alpha_2 - \alpha_1 + \frac{1}{1-\alpha_1} - \frac{1}{1-\alpha_2} + 4\right) & \text{otherwise.} \end{cases}$$

The Principal's Optimal Investment $c^*(\alpha)$. Conditional on α, π, and k, P's optimal investment is

$$c^*(\alpha) = \begin{cases} \frac{1}{4}(\alpha_1 + 2 - \alpha_2 - \alpha_1(2 - \alpha_2)) & \text{if } k < k^*(\alpha, \pi), \\ 0 & \text{if } k \geq k^*(\alpha, \pi). \end{cases} \tag{C.2}$$

Note that Equation C.2 implies that $c^*(\alpha)$ is independent of π. This is for two reasons:

1. P is assumed to be focused only on maximizing the probability of successful coordination, independent of which of the two outcomes is achieved (*i.e.*, P is indifferent between (A, A) and (B, B)).

2. P's optimal choice of coordination protocol, $\pi^*(\alpha)$, is chosen to equalize the marginal impact of c on the equilibrium probability that Agency 1 will pay attention and its marginal effect on the equilibrium probability that Agency 2 will

pay attention, because the two values are complements from P's perspective.

Second, as either agency's preferences become more aligned, P will in equilibrium invest less in coordination when either or both of the agencies are more aligned:

$$\frac{\partial c^*(\alpha)}{\alpha_i} < 0, \quad \text{for each } i \in \{1,2\}.$$

Choosing "Agency 2." P's equilibrium expected utility is

$$c^*(\alpha) + (1 - c^*(\alpha))\frac{\alpha_1 + \alpha_2 - \alpha_1\alpha_2}{2} - (c^*(\alpha))^2. \tag{C.3}$$

Equation C.3 is increasing in α_2 if $\alpha_1 < 1$. Therefore, $\alpha_2 = 2$ maximizes the utility. This equation is decreasing in α_2 if $\alpha_1 > 1$. Therefore, $\alpha_2 = 0$ maximizes the utility.

Agency 1's equilibrium expected utility is

$$c^*(\alpha)(\pi^*(\alpha)\alpha_1 + (1 - \pi^*(\alpha))(2 - \alpha_1)) + (1 - c^*(\alpha))\frac{(2 - \alpha_1)\alpha_1}{2}$$

Note that π^* is decreasing in α_2. First, suppose that $\alpha_1 < 1$. Then, the function displays the following features: decreasing in α_2 when $\pi^*(\alpha) = 1$; convex in α_2 when $\pi^*(\alpha) \in (0,1)$; decreasing in α_2 when $\pi^*(\alpha) = 0$. Therefore, we need to consider two maximize candidates: the smallest α_2 such that $\pi^*(\alpha) = 0$ and $\alpha_2 = 0$. It follows that the maximizer is always the smallest α_2 such that $\pi^*(\alpha) = 0$. Formally, this is α_2 such that satisfies $\hat{\pi}(\alpha) = 0$: i.e.,

$$\frac{(2 - \alpha_1)(2 - \alpha_1 - \sqrt{8 - (8 - \alpha_1)\alpha_1})}{2(\alpha_1 - 1)}$$

This is always smaller than 1 (ordinally opposed) and increasing in α_1.

Second, suppose that $\alpha_1 > 1$. Then, the function displays the following features: increasing in α_2 when $\pi^*(\alpha) = 1$; convex in α_2 when $\pi^*(\alpha) \in (0,1)$; increasing in α_2

when $\pi^*(\alpha) = 0$. Therefore, we need to consider two maximize candidates: the largest α_2 such that $\pi^*(\alpha) = 1$ and $\alpha_2 = 2$. It follows that the maximizer is always the largest α_2 such that $\pi^*(\alpha) = 1$. Formally, this is α_2 such that satisfies $\hat{\pi}(\alpha) = 1$: i.e.,

$$\frac{2\sqrt{\alpha_1(4+\alpha_1)-4}}{\sqrt{\alpha_1(4+\alpha_1)-4}+\alpha_1}$$

This is always larger than 1 (ordinally opposed) and increasing in α_1. ∎

C.2 Additional Illustrations of the Model

C.2.1 Incentive Compatibility in Costly Coordination

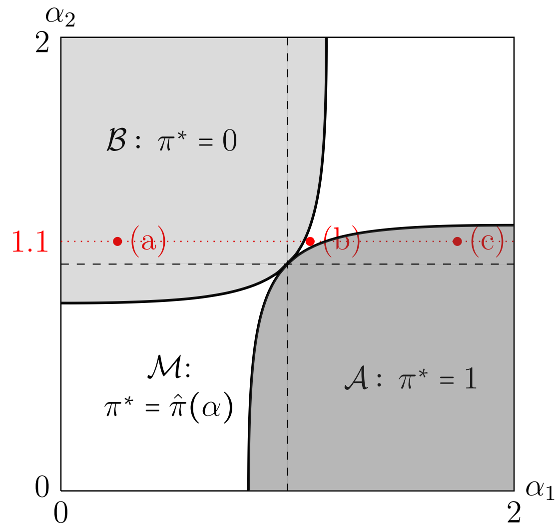
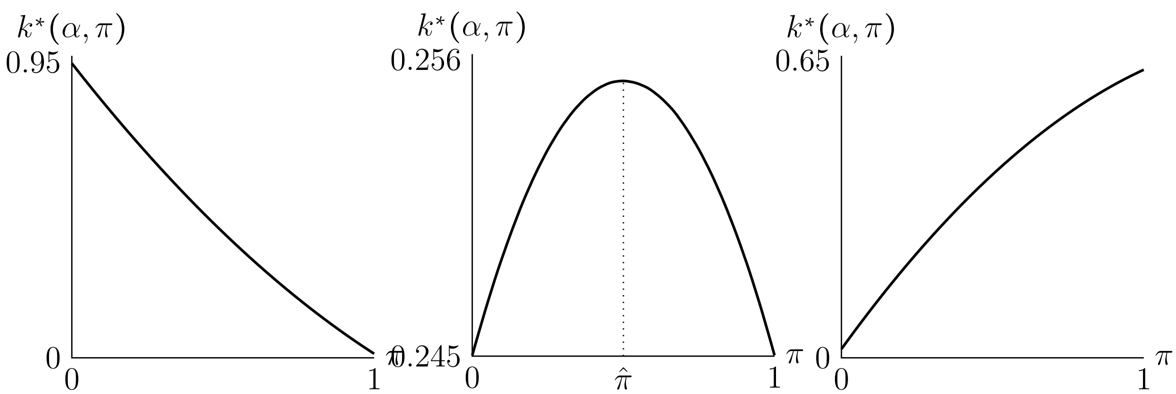


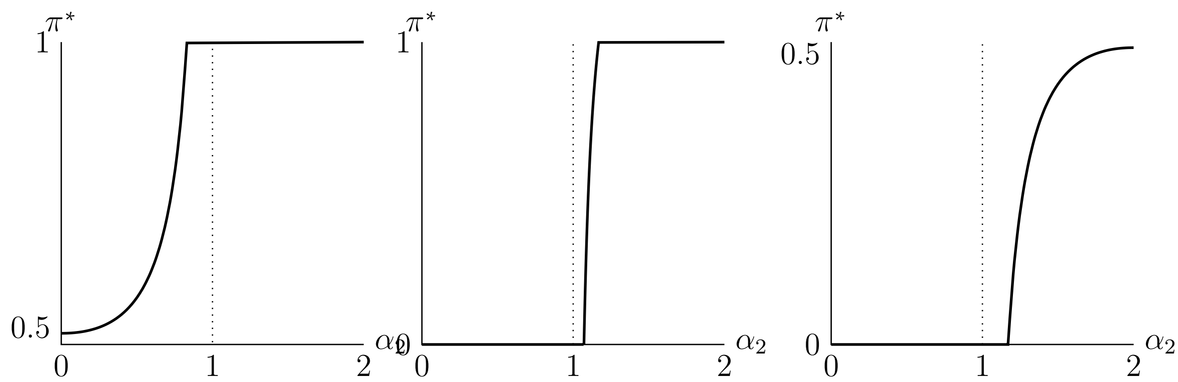
Figure C.1: Regions of π^*



(a) $\alpha_1 = 0.25$ (b) $\alpha_1 = 1.1$ (c) $\alpha_1 = 1.75$

Figure C.2: Maximum Cost of Attention that Agencies are Willing to Incur, $\alpha_2 = 1.1$

Figure C.2 illustrates the maximum costs of attention that agencies are willing to incur when $\alpha_2 = 1.1$, i.e., the red dotted line in Figure C.1. Each subfigure of Figure C.2 corresponds with the labels on the dotted line. Similarly, Figure C.3 denotes P's optimal choice of fairness $\pi^*(\alpha)$ given different alignment values. Note that when the agencies are aligned in terms of their preferences, P's choice is always degenerate.



(a) $\alpha_1 = 0.25$ (b) $\alpha_1 = 1.1$ (c) $\alpha_1 = 1.75$

Figure C.3: Principal's Optimal Choice of π

When they are misaligned, P may choose a non-degenerate $\pi^*(\alpha)$ or a degenerate value that favors an agency with a stronger preference. Given these values of $k^*(\alpha,\pi)$ and $\pi^*(\alpha)$, each agency's expected payoffs from its observation choice are as follows:

$$\begin{aligned}
EU_1(\omega_1 = 1) &= p_2^*(\pi,c)\cdot c\cdot(\pi\alpha_1 + (1-\pi)(2-\alpha_1)) + (1 - p_2^*(\pi,c)\cdot c)\frac{\alpha_1(2-\alpha_1)}{2} - \epsilon_1,\\
EU_1(\omega_1 = 0) &= \frac{\alpha_1(2-\alpha_1)}{2}, \text{ and}\\
EU_2(\omega_2 = 1) &= p_1^*(\pi,c)\cdot c\cdot(\pi(2-\alpha_2) + (1-\pi)\alpha_2) + (1 - p_1^*(\pi,c)\cdot c)\frac{\alpha_2(2-\alpha_2)}{2} - \epsilon_2,\\
EU_2(\omega_2 = 0) &= \frac{\alpha_2(2-\alpha_2)}{2}, \text{ and}
\end{aligned}$$

Thus, Agency 1 should observe the recommendation if

$$\begin{aligned}
\epsilon_1 &\leq p_2^*(\pi,c)\cdot c\cdot\left(\pi\alpha_1 + (1-\pi)(2-\alpha_1) - \frac{\alpha_1(2-\alpha_1)}{2}\right),\\
&\leq p_2^*(\pi,c)\cdot c\cdot\left(\pi\alpha_1 + \left(1-\pi-\frac{\alpha_1}{2}\right)(2-\alpha_1)\right),
\end{aligned}$$

and, similarly, Agency 2 should observe the recommendation if

$$\begin{aligned}
\epsilon_2 &\leq p_1^*(\pi,c)\cdot c\cdot\left(\pi(2-\alpha_2) + (1-\pi)\alpha_2 - \frac{\alpha_2(2-\alpha_2)}{2}\right),\\
&\leq p_1^*(\pi,c)\cdot c\cdot\left(\left(\pi-\frac{\alpha_2}{2}\right)(2-\alpha_2) + (1-\pi)\,\alpha_2\right).
\end{aligned}$$

Thus, given p_2^*, Agency 1 will pay attention with probability

$$p_1^*(\pi_2^* \mid \pi, c) = F_1\left(p_2^*(\pi, c) \cdot c \cdot \left(\pi\alpha_1 + \left(1 - \pi - \frac{\alpha_1}{2}\right)(2 - \alpha_1)\right)\right),$$

and, given p_1^*, Agency 2 will pay attention with probability

$$p_2^*(\pi_1^* \mid \pi, c) = F_2\left(p_1^*(\pi, c) \cdot c \cdot \left(\left(\pi - \frac{\alpha_2}{2}\right)(2 - \alpha_2) + (1 - \pi)\,\alpha_2\right)\right).$$

C.2.2 Defining $\mathcal{M}$, $\mathcal{B}$, and $\mathcal{A}$

Here we define the region of alignments, $\mathcal{M} \subset [0,1]^2$, in which P's optimal coordination protocol is locally sensitive to $\alpha \equiv (\alpha_1, \alpha_2)$. To do this, define the following intermediary regions:

$$\begin{aligned}
X(\alpha) &\equiv \left\{\alpha \in [0,1]^2 : 2\alpha_1(\alpha_2 - 1) > (\alpha_2 - 2)\left(\alpha_2 + \sqrt{(\alpha_2 - 8)\alpha_2 + 8} - 2\right)\right\}, \\
Y(\alpha) &\equiv \left\{\alpha \in [0,1]^2 : 2\alpha_1\alpha_2 + \alpha_2\sqrt{\alpha_2(\alpha_2 + 4) - 4} + 4 < 2\alpha_1 + \alpha_2(\alpha_2 + 4)\right\}, \text{ and} \\
Z(\alpha) &\equiv \left\{\alpha \in [0,1]^2 : \alpha_2 + 2 \leq 2\sqrt{2}\right\}.
\end{aligned}$$

Then, $\mathcal{M}$ is defined by the following:

$$\mathcal{M} \equiv X(\alpha) \cap \left(Y(\alpha) \cup Z(\alpha)\right),$$

and the regions $\mathcal{B}$ and $\mathcal{A}$ are a partition of the complement of $\mathcal{M}$ in $[0,1]^2$:

$$\begin{aligned}
\mathcal{B} &\equiv 2\alpha_1(\alpha_2 - 1) + \alpha_2\left(\sqrt{\alpha_2(\alpha_2 + 4) - 4} - 4\right) + 4 > \alpha_2^2, \text{ and} \\
\mathcal{A} &\equiv 2\alpha_1(\alpha_2 - 1) \leq (\alpha_2 - 2)\left(\alpha_2 + \sqrt{(\alpha_2 - 8)\alpha_2 + 8} - 2\right).
\end{aligned}$$

C.3 A Strategic Communication Extension

In this appendix, we apply the results of [**?**] — who consider one-sided and two-sided pre-play cheap talk communication — to our framework.

Suppose that the players know that they will eventually play the game displayed in Table 3.1, for exogenous and commonly known $\alpha \in [0,1]$:

	A	B
A	(α, 2-α)	(0, 0)
B	(0, 0)	(2-α, α)

Prior to playing the game, however, the players can send messages to each other. For simplicity, we will suppose that the players can communicate using a restricted message space consisting of exactly two messages, $m \in \{A, B\}$. Following [**?**] and other scholars (consider [71**?**], [167], and [72]), we assume that these messages are endowed with intuitive meaning (and this is common knowledge between the players): message $m \in \{A, B\}$ corresponds to recommending the $a = (m, m)$ action profile. Finally, there is a third "message" that either player can send whenever it is their turn to send a message. We denote this message by $m = \varphi$, which corresponds to the player in question unilaterally terminating the communication stage and moving the players from the pre-play communication stage into the coordination game.

While the messaging protocol is cheap talk, communication is potentially costly.[2] Time is assumed to be discrete, across periods $t \in \{1, 2, \ldots, T\}$, where T is exogenous, common knowledge, and $T = \infty$ is possible. In each period t, exactly one player will be the sender in any given time period and the identity of the message sender in each period t is common knowledge at the outset of pre-play communication. Each message

[2] In game theoretic terms, a messaging/signaling protocol is "cheap talk" if the cost of sending any given message is identical for all messages and independent of any other payoff relevant factors, even if the cost is positive.

sent (other than $m = \varphi$) costs both players $\gamma \geq 0$. Thus, if communication takes n periods, the players final payoffs are as given in Figure C.4. A (possibly empty) ordered list of messages, $(m_1, m_2, \ldots, m_n)$ is a **conversation**. If the list contains only one element, $m_1 \in \{A, B\}$ or if $m_n = m_{n-1}$, then the conversation reached an **agreement**. If agreement is not reached, then the players are assumed to play the **focal** equilibrium, which in this case is the unique mixed strategy equilibrium of the game displayed in Table 3.1 (see Assumption 1 in [**?**]).

	A	B
A	$(\alpha - n \cdot \gamma,\ 2 - \alpha - n \cdot \gamma)$	$(-n \cdot \gamma,\ -n \cdot \gamma)$
B	$(-n \cdot \gamma,\ -n \cdot \gamma)$	$(2 - \alpha - n \cdot \gamma,\ \alpha - n \cdot \gamma)$

Figure C.4: Communication Game Payoffs, Given $n \in \{0, 1, \ldots\}$ Periods of Communication

Following [**?**],[3] define the following thresholds:

$$\begin{aligned} \gamma_1 &= \frac{\alpha^2}{2}, \\ \gamma_2 &= \frac{(2-\alpha)^2}{2}, \text{ and} \\ \gamma_3 &= \min\left\{\frac{\alpha^2}{4}, \frac{(2-\alpha)^2}{6}, 2-\alpha\right\}. \end{aligned}$$

Notice that

$$\gamma_3 = \begin{cases} \frac{(2-\alpha)^2}{6} & \text{if } \alpha > 2 \cdot \sqrt{6} - 4 \approx 0.9, \\ \frac{\alpha^2}{4} & \text{if } \alpha \in (0, 2 \cdot \sqrt{6} - 4), \end{cases}$$

[3] To make the comparison as clear as possible, note that the notation in [**?**] reduce to the following within the framing presented in Table 3.1:

	A	B
A	$(b,\ a)$	$(0,\ 0)$
B	$(0,\ 0)$	$(a,\ b)$

and, because $\alpha \in (0,1]$,

$$\gamma_3 < \gamma_1 < \gamma_2.$$

"Pure Communication" Equilibria. We first consider SPNE in which players use deterministic ("pure") communication strategies. The only outcomes of the communication game that can be supported in a SPNE are as follows:[4]

1. *Immediate Concession (IC)*: Player 1 sends $m_1 = A$ and Player 2 ends the conversation ($m_2 = \varphi$), after which the players play (A, A). This equilibrium exists if and only if $\gamma \leq \gamma_1$.

2. *Immediate Demand (ID)*: Player 1 sends $m_1 = B$ and Player 2 ends the conversation ($m_2 = \varphi$), after which the players play (B, B). This equilibrium exists if and only if $\gamma \leq \gamma_2$.

3. *Delayed Demands (DD)*: Player 1 sends either message $m_1 \in \{A, B\}$, Player 2 sends $m_2 = B$, Player 1 responds with $m_3 = B$, Player 2 ends the conversation ($m_4 = \varphi$), after which the players play (B, B). This equilibrium exists if and only if $\gamma \leq \gamma_3$.

4. *Immediate Termination (IT)*: Player 1 immediately ends the conversation ($m_1 = \varphi$), after which the players play the mixed strategy equilibrium. This equilibrium — the only SPNE in which communication "fails" with positive probability — exists if and only if $\gamma \geq \gamma_1$.

Note that, because $\gamma_2 > \gamma_1 > \gamma_3$, the DD conversation is supportable in SPNE only if the IC and ID conversations are also each supportable in SPNE. Thus, when communication is sufficiently cheap ($\gamma \leq \gamma_1$), there are multiple SPNE that achieve policy coordination with certainty. If $\gamma > 0$, the DD equilibrium is inefficient, because

[4] This is simply a restatement of Proposition 1 in [**?**].

it requires 3 rounds of communication, while the IC and ID equilibria each require only one round of communication. If $\alpha < 1$, Player 1 strictly prefers the ID equilibrium to the IC equilibrium. In spite of the fact that Player 1 moves first and strictly prefers ID to IC, the IC conversation is nonetheless an SPNE because Player 2's responses to Player 1 obviously play a role in whether Player 1 can "select" his or her preferred SPNE: this is because communication is two-sided. Accordingly, the equilibrium multiplicity problem is not set aside even if we accept the notion that the two-sided communication is exogenously structured.

Furthermore, if $\gamma \leq \gamma_1$, there is a "noisy communication" equilibrium in which the players essentially engage in a sort of war of attrition, probabilistically sending "demand" messages until one of the two players sends a conceding message. We now describe this equilibrium.

"Noisy Communication" Equilibria. Define the following values:

$$\begin{aligned} q_1(\alpha,\gamma) &= \frac{1-\alpha}{1-\alpha+\gamma}, \\ q_2(\alpha,\gamma) &= \frac{2(1-\alpha-\gamma)}{2(1-\alpha)+\gamma}, \\ q(\alpha,\gamma) &= \frac{2(1-\alpha)-\gamma}{2(1-\alpha)+\gamma}, \text{ and} \\ T(\alpha,\gamma) &= \frac{\alpha^2-\alpha(\gamma+2)+\gamma^2+\gamma+1}{\gamma(\gamma-\alpha+1)}. \end{aligned}$$

If $\gamma \leq \gamma_1$, there exists an SPNE in which the players use a non-degenerate mixed strategy in the pre-play communication stage. In the first two rounds of communication of such an SPNE, the players mix between the demanding message ($m = B$ for Player 1, $m = A$ for Player 2) and the conceding message ($m = A$ for Player 1, $m = B$ for Player 2), placing probability $q_1(\alpha,\gamma)$ on their own demanding message. In the third period, Player 1 sends the demand message ($m_3 = B$) with probability $q_2(\alpha,\gamma)$. From the fourth period on, each player sends their demanding message with probability $q(\alpha,\gamma)$.

The first player to send his or her conceding message will end the conversation with an agreement, and that player's less-preferred coordination outcome is then played with certainty by both players. The expected length of the conversation is $T(\alpha,\gamma)$ messages.[5]

Fact 31 *The expected delay in equilibrium, $T(\alpha,\gamma)$, is decreasing in both*

1. *the cost of communication, γ, and*

2. *the alignment of the agencies' interests, $\alpha \in [0,1]$.*

In this equilibrium, coordination is achieved (*i.e.*, an agreement is always reached) with probability 1, it is nonetheless an inefficient SPNE relative to the "immediate concession" and "immediate demand" pure communication equilibria described above, because coordination generally requires more rounds of communication. The probability that the noisy communication SPNE is efficient is the probability that Player 1 concedes in the first message, which occurs in this SPNE with probability $1 - q_1 = \frac{\gamma}{1-\alpha+\gamma}$. The immediate demand SPNE exists if and only if $\gamma \leq \gamma_2$.

When is Successful Coordination Associated with a Unique SPNE? Putting the details above together, there is a unique SPNE in which coordination occurs with probability 1 if and only if

$$\gamma_1 < \gamma \leq \gamma_2,$$

or, equivalently,

$$\alpha < \sqrt{2 \cdot \gamma} \leq 2 - \alpha.$$

In these cases, the unique SPNE that guarantees successful coordination is the ID equilibrium, and Player 1 receives his or her most-preferred outcome in this equilibrium. Note that the range of communication costs γ for which there is a unique

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[5] [**?**], Proposition 2.

successful SPNE is decreasing in $\alpha \in (0,1)$. However, note that Player 1's payoff in this region is

$$2 - \alpha - \gamma,$$

which is decreasing in α. Accordingly, if there is a unique SPNE in which coordination occurs with certainty, Player 1 has *preferences for misalignment* in this region, with his or her equilibrium payoff being maximized by

$$\alpha^*(\gamma) = 2 - \sqrt{2 \cdot \gamma},$$

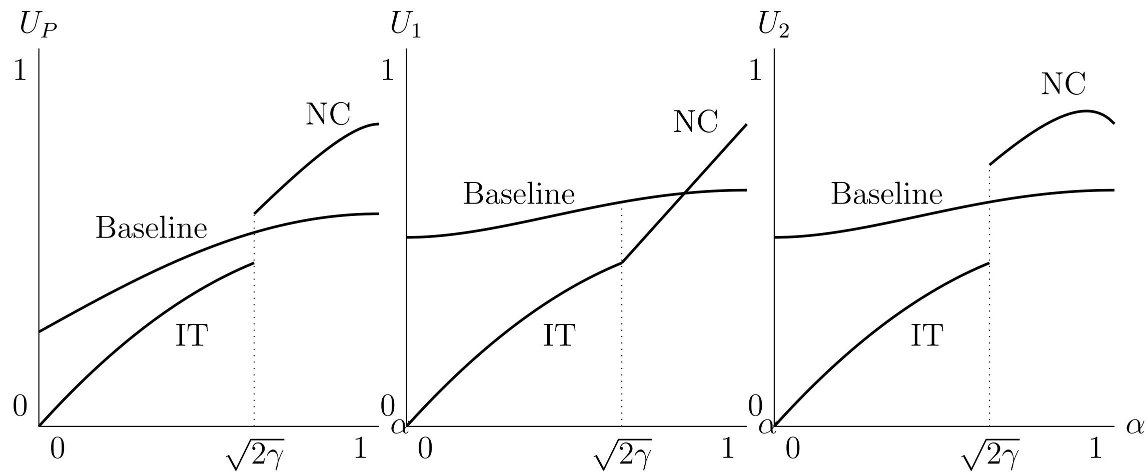
which is, of course, decreasing in γ. This implies that the favored agency (*i.e.*, Agency 1) prefers greater misalignment as communication becomes *less* costly. On the other hand, Agency 2 has a preference for *greater* alignment in this SPNE.

Fact 32 *In equilibrium, the agencies' have opposed induced preferences over the alignment, α.*

Comparing Coordination Approaches. Figure C.5 illustrates the president and the players' equilibrium payoffs in the baseline model and in the pre-play communication extension. First, we can clearly see that equilibrium multiplicity only disappears under pre-play communication when $\gamma > \gamma_2$. Further note that in this region, both the president and the players always prefer to play the baseline game over the pre-play communication game (blue line is always above the *Immediate Termination* line). This implies that pre-play communication does not solve the equilibrium multiplicity problem when the cost of delay is sufficiently small ($\gamma < \gamma_2$), and when it does solve it, both the principal and the players prefers to play the baseline game instead.

Agency 1's payoff in the Noisy Communication equilibrium is

$$(1 - q_1)\alpha + q_1(1 - q_1)(2 - \alpha) + q_1^2(1 - q_2)\alpha + q_1^2 q_2(1 - q)\left(\frac{2 - \alpha}{1 - q^2} + \frac{q\alpha}{1 - q^2}\right) - T\gamma,$$



(a) Principal (b) Agency 1 (c) Agency 2

Figure C.5: Comparison of Payoffs ($\gamma = 0.2$)

which simplifies to

$$\alpha - \gamma.$$

Similarly, Agency 2's payoff in the Noisy Communication equilibrium is

$$(1-q_1)(2-\alpha) + q_1(1-q_1)\alpha + q_1^2(1-q_2)(2-\alpha) + q_1^2 q_2(1-q)\left(\frac{\alpha}{1-q^2} + \frac{q(2-\alpha)}{1-q^2}\right) - T\gamma,$$

which simplifies to

$$\frac{(\alpha-1)\alpha + (\gamma-1)\gamma}{\alpha-\gamma-1},$$

and the Principal's payoff in the Noisy Communication equilibrium is

$$1 - T\gamma.$$

Bibliography

[1] Philippe Aghion and Jean Tirole. Formal and Real Authority in Organizations. *Journal of Political Economy*, 105(1):1–29, 1997.

[2] Per J Agrell and Axel Gautier. Rethinking regulatory capture. In *Recent advances in the analysis of competition policy and regulation*. Edward Elgar Publishing, 2012.

[3] Maarten Allers, Harm Rienks, and Joes de Natris. When are parties punished for serving in a coalition government? *Electoral Studies*, 79:102516, 2022.

[4] Peri Arnold. *Remaking the Presidency: Roosevelt, Taft, and Wilson, 1901-1916*. University Press of Kansas, Lawrence, KS, 2009.

[5] Peri E. Arnold. *Making the Managerial Presidency: Comprehensive Reorganization Planning, 1905-1996*. Univ Press of Kansas, Lawrence, KS, 1998.

[6] Scott Ashworth, Ethan Bueno de Mesquita, and Amanda Friedenberg. Learning About Voter Rationality. *American Journal of Political Science*, 62(1):37–54, 2018.

[7] David Austen-Smith. Information and influence: Lobbying for agendas and votes. *American Journal of Political Science*, 37(3):799–833, 1993.

[8] David Austen-Smith and Jeffrey Banks. Elections, coalitions, and legislative outcomes. *American Political Science Review*, 82(2):405–422, 1988.

[9] Emiel Awad. Persuasive lobbying with allied legislators. *American Journal of Political Science*, 64(4):938–951, 2020.

[10] Steven J. Balla and John R. Wright. Interest Groups, Advisory Committees, and Congressional Control of the Bureaucracy. *American Journal of Political Science*, 45(4):799–812, 2001.

[11] Jeffrey S Banks and Barry R Weingast. The political control of bureaucracies under asymmetric information. *American Journal of Political Science*, pages 509–524, 1992.

[12] David P Baron. A spatial bargaining theory of government formation in parliamentary systems. *American Political Science Review*, 85(1):137–164, 1991.

[13] David P Baron. Comparative dynamics of parliamentary governments. *American political science review*, 92(3):593–609, 1998.

[14] David P Baron and John A Ferejohn. Bargaining in legislatures. *American political science review*, 83(4):1181–1206, 1989.

[15] Anna Bassi. A model of endogenous government formation. *American Journal of Political Science*, 57(4):777–793, 2013.

[16] Anna Bassi. Policy preferences in coalition formation and the stability of minority and surplus governments. *The Journal of Politics*, 79(1):250–268, 2017.

[17] Marco Battaglini. Multiple Referrals and Multidimensional Cheap Talk. *Econometrica*, 70(4):1379–1401, 2002.

[18] Marco Battaglini. Coalition formation in legislative bargaining. *Journal of Political Economy*, 129(11):3206–3258, 2021.

[19] Marco Battaglini, Salvatore Nunnari, and Thomas R Palfrey. Legislative bargaining and the dynamics of public investment. *American Political science review*, 106(2):407–429, 2012.

[20] Michael Becher and Flemming Juul Christiansen. Dissolution threats and legislative bargaining. *American Journal of Political Science*, 59(3):641–655, 2015.

[21] Jonathan Bendor and Terry M. Moe. Agenda Control, Committee Capture and the Dynamics of Institutional Politics. *American Political Science Review*, 80(4):1187–1207, 1986.

[22] Torbjörn Bergman, Svante Ersson, and Johan Hellström. Government formation and breakdown in western and central eastern europe. *Comparative European Politics*, 13:345–375, 2015.

[23] Jan Beyers and Sarah Arras. Who feeds information to regulators? stakeholder diversity in european union regulatory agency consultations. *Journal of Public Policy*, 40(4):573–598, 2020.

[24] Eric Biber. Too Many Things to Do: How to Deal with the Dysfunctions of Multiple-goal Agencies. *Harvard Environmental Law Review*, 33:1–63, 2009.

[25] Peter Bils and Federica Izzo. Ideological infection. 2023.

[26] Peter Bils, Robert J Carroll, and Lawrence S Rothenberg. Strategic avoidance and rulemaking procedures. Technical report, Working Paper. URL: https://www. wallis. rochester. edu/assets/pdf . . . , 2020.

[27] Peter Bils, Robert J Carroll, and Lawrence S Rothenberg. Strategic avoidance and rulemaking procedures. *Journal of Theoretical Politics*, 36(2):156–185, 2024.

[28] Sarah Birch. *Electoral systems and political transformation in post-communist Europe*. Springer, 2003.

[29] David Blackwell. Equivalent comparisons of experiments. *The annals of mathematical statistics*, pages 265–272, 1953.

[30] Frederick Boehmke, Sean Gailmard, and John Patty. Whose Ear to Bend? Information Sources and Venue Choice in Policy Making. *Quarterly Journal of Political Science*, 1(2):139–169, 2006.

[31] Frederick J Boehmke, Sean Gailmard, John Wiggs Patty, et al. Whose ear to bend? information sources and venue choice in policy-making. *Quarterly Journal of Political Science*, 1(2):139–169, 2006.

[32] Keith Bradley. The design of agency interactions. *Colum. L. Rev.*, 111:745, 2011.

[33] Lisa Schultz Bressman. Procedures as Politics in Administrative Law. *Columbia Law Review*, pages 1749–1821, 2007.

[34] Eric C Browne and Mark N Franklin. Aspects of coalition payoffs in european parliamentary democracies. *American Political Science Review*, 67(2):453–469, 1973.

[35] Eric C Browne and John P Frendreis. Allocating coalition payoffs by conventional norm: An assessment of the evidence from cabinet coalition situations. *American Journal of Political Science*, pages 753–768, 1980.

[36] Peter Buisseret and Dan Bernhardt. Dynamics of policymaking: Stepping back to leap forward, stepping forward to keep back. *American Journal of Political Science*, 61(4):820–835, 2017.

[37] Steven Callander. Searching for good policies. *American Political Science Review*, 105(4):643–662, 2011.

[38] Steven Callander. Searching and learning by trial and error. *American Economic Review*, 101(6):2277–2308, 2011.

[39] Steven Callander and Bård Harstad. Experimentation in federal systems. *The Quarterly Journal of Economics*, 130(2):951–1002, 2015.

[40] Steven Callander and Patrick Hummel. Preemptive policy experimentation. *Econometrica*, 82(4):1509–1528, 2014.

[41] Steven Callander, Dana Foarta, and Takuo Sugaya. The dynamics of a policy outcome: Market response and bureaucratic enforcement of a policy change. *American Journal of Political Science*, 2022.

[42] Steven Callander, Dana Foarta, and Takuo Sugaya. Market competition and political influence: An integrated approach. *Econometrica*, 90(6):2723–2753, 2022.

[43] Daniel Carpenter and George A Krause. Transactional Authority and Bureaucratic Politics. *Journal of Public Administration Research and Theory*, 25(1): 5–25, 2014.

[44] Daniel Carpenter and David A Moss. *Preventing regulatory capture: Special interest influence and how to limit it*. Cambridge University Press, 2013.

[45] Daniel Carpenter and Michael M. Ting. Regulatory Errors with Endogenous Agendas. *American Journal of Political Science*, 51(4):835–852, 2007.

[46] Daniel Carpenter and Michael M Ting. Regulatory errors with endogenous agendas. *American Journal of Political Science*, 51(4):835–852, 2007.

[47] Daniel Carpenter, Justin Grimmer, and Eric Lomazoff. Approval regulation and endogenous consumer confidence: Theory and analogies to licensing, safety, and financial regulation. *Regulation & Governance*, 4(4):383–407, 2010.

[48] Daniel P. Carpenter. *The Forging of Bureaucratic Autonomy: Reputations, Networks, and Policy Innovation in Executive Agencies, 1862-1928*. Princeton University Press, Princeton, NJ, 2001.

[49] Daniel P. Carpenter. Groups, the Media, Agency Waiting Costs, and FDA Drug Approval. *American Journal of Political Science*, 46(3):490–505, 2002.

[50] Daniel P Carpenter. Groups, the media, agency waiting costs, and fda drug approval. *American Journal of Political Science*, pages 490–505, 2002.

[51] Daniel P. Carpenter. Protection without Capture: Product Approval by a Politically Responsive, Learning Regulator. *American Political Science Review*, 98(4):613–631, 2004.

[52] Daniel P Carpenter. Protection without capture: Product approval by a politically responsive, learning regulator. *American Political Science Review*, 98(4): 613–631, 2004.

[53] Daniel P Carpenter and George A Krause. Reputation and Public Administration. *Public Administration Review*, 72(1):26–32, 2012.

[54] Christopher Carrigan and Cary Coglianese. The politics of regulation: From new institutionalism to new governance. *Annual Review of Political Science*, 14 (1):107–129, 2011.

[55] Royce Carroll and Gary W Cox. The logic of gamson's law: Pre-election coalitions and portfolio allocations. *American Journal of Political Science*, 51(2): 300–313, 2007.

[56] Alessandro Chiaramonte and Vincenzo Emanuele. Party system volatility, regeneration and de-institutionalization in western europe (1945–2015). *Party Politics*, 23(4):376–388, 2017.

[57] Cary Coglianese. Assessing consensus: The promise and performance of negotiated rulemaking. *Duke Law Journal*, 46(6):1255–1349, 1997.

[58] Cary Coglianese. Empirical analysis and administrative law. *University of Illinois Law Review*, 2002:1111–1139, 2002.

[59] Arnaud Dellis. Legislative informational lobbying. *Journal of Economic Theory*, 208:105595, 2023.

[60] JR DeShazo and Jody Freeman. Public Agencies as Lobbyists. *Columbia Law Review*, 105:2217, 2005.

[61] Daniel Diermeier and Antonio Merlo. Government turnover in parliamentary democracies. *Journal of Economic Theory*, 94(1):46–79, 2000.

[62] Daniel Diermeier and Rebecca Morton. Experiments in majoritarian bargaining. *Social choice and strategic decisions: Essays in honor of Jeffrey S. Banks*, pages 201–226, 2005.

[63] Daniel Diermeier and Randolph T Stevenson. Cabinet terminations and critical events. *American Political Science Review*, 94(3):627–640, 2000.

[64] Daniel Diermeier, Hülya Eraslan, and Antonio Merlo. A structural model of government formation. *Econometrica*, 71(1):27–70, 2003.

[65] Laura Doval and Vasiliki Skreta. Constrained information design. *Mathematics of Operations Research*, 49(1):78–106, 2024.

[66] Andrew J Drummond. Electoral volatility and party decline in western democracies: 1970–1995. *Political studies*, 54(3):628–647, 2006.

[67] Piotr Dworczak and Giorgio Martini. The simple economics of optimal persuasion. *Journal of Political Economy*, 127(5):1993–2048, 2019.

[68] Alejandro Ecker and Thomas M Meyer. Coalition bargaining duration in multiparty democracies. *British Journal of Political Science*, 50(1):261–280, 2020.

[69] Christopher J Ellis and Thomas Groll. Strategic legislative subsidies: Informational lobbying and the cost of policy. *American Political Science Review*, 114 (1):179–205, 2020.

[70] Daniel A Farber and Anne Joseph O'Connell. Agencies as adversaries. *California Law Review*, 105(5):1375–1470, 2017.

[71] Joseph Farrell. Cheap talk, coordination, and entry. *The RAND Journal of Economics*, pages 34–39, 1987.

[72] Joseph Farrell and Matthew Rabin. Cheap Talk. *Journal of Economic Perspectives*, 10:103–118, 1996.

[73] Guillaume Frechette, John H Kagel, and Massimo Morelli. Nominal bargaining power, selection protocol, and discounting in legislative bargaining. *Journal of Public Economics*, 89(8):1497–1517, 2005.

[74] Jody Freeman and Laura I. Langbein. Regulatory negotiation and the legitimacy benefit. *New York University Environmental Law Journal*, 9:60–151, 2000.

[75] Jody Freeman and Jim Rossi. Agency Coordination in Shared Regulatory Space. *Harvard Law Review*, pages 1131–1211, 2012.

[76] Peter Frumkin and Joseph Galaskiewicz. Institutional isomorphism and public sector organizations. *Journal of public administration research and theory*, 14 (3):283–307, 2004.

[77] Lindsey Gailmard. Electoral Accountability and Political Competence. *Journal of Theoretical Politics*, 34(2):236–261, 2022.

[78] Sean Gailmard. Expertise, Subversion, and Bureaucratic Discretion. *Journal of Law, Economics, and Organization*, 18(2):536–555, 2002.

[79] Sean Gailmard and John W. Patty. Slackers and Zealots: Civil Service, Policy Discretion, and Bureaucratic Expertise. *American Journal of Political Science*, 51(4):873–889, 2007.

[80] Sean Gailmard and John W. Patty. Formal Models of Bureaucracy. *Annual Review of Political Science*, 15:353–377, 2012.

[81] Sean Gailmard and John W. Patty. *Learning While Governing: Information, Accountability, and Executive Branch Institutions*. University of Chicago Press, Chicago, IL, 2012.

[82] Sean Gailmard and John W Patty. *Learning while governing: Expertise and accountability in the executive branch*. University of Chicago Press, 2012.

[83] Sean Gailmard and John W. Patty. Stovepiping. *Journal of Theoretical Politics*, 25(3):388–411, 2013.

[84] Sean Gailmard and John W. Patty. Participation, process, & policy: The informational value of politicized judicial review. *Journal of Public Policy*, 37 (3):233–260, 2017.

[85] Sean Gailmard and John W Patty. Participation, process and policy: the informational value of politicised judicial review. *Journal of Public Policy*, 37 (3):233–260, 2017.

[86] Sean Gailmard and John W. Patty. Giving Advice *vs.* Making Decisions: Transparency, Information, and Delegation. *Political Science Research & Methods*, 7 (3):471–488, 2019.

[87] Sean Gailmard and John W Patty. Preventing Prevention. *American Journal of Political Science*, 63(2):342–352, 2019.

[88] Luis Garicano and Richard A Posner. Intelligence failures: An organizational economics perspective. *Journal of Economic Perspectives*, 19(4):151–170, 2005.

[89] Matthew Gentzkow and Emir Kamenica. A rothschild-stiglitz approach to bayesian persuasion. *American Economic Review*, 106(5):597–601, 2016.

[90] Jacob E Gersen. Overlapping and underlapping jurisdiction in administrative law. *The Supreme Court Review*, 2006(1):201–247, 2006.

[91] Matt Golder, Sona N Golder, and David A Siegel. Modeling the institutional foundation of parliamentary government formation. *The Journal of Politics*, 74 (2):427–445, 2012.

[92] Sona N Golder and Jacquelyn A Thomas. Portfolio allocation and the vote of no confidence. *British Journal of Political Science*, 44(1):29–39, 2014.

[93] Sanford C. Gordon and Catherine Hafer. Flexing Muscle: Corporate Political Expenditures as Signals to the Bureaucracy. *American Political Science Review*, 99:245–261, 2005.

[94] Sanford C. Gordon and Catherine Hafer. Corporate Influence and the Regulatory Mandate. *Journal of Politics*, 69(2):298–317, 2007.

[95] Bernard Grofman. The comparative analysis of coalition formation and duration: Distinguishing between-country and within-country effect. *British Journal of Political Science*, 19(2):291–302, 1989.

[96] Bernard Grofman and Peter Van Roozendaal. Toward a theoretical explanation of premature cabinet termination: With application to post-war cabinets in the netherlands. *European Journal of Political Research*, 26(2):155–170, 1994.

[97] John C Harsanyi and Reinhard Selten. *A General Theory of Equilibrium Selection in Games*. The MIT Press, Cambridge, MA, 1988.

[98] William B Heller. Making policy stick: why the government gets what it wants in multiparty parliaments. *American Journal of Political Science*, pages 780–798, 2001.

[99] Johan Hellström and Torbjörn Bergman. Birds of a feather flock together? government duration and cabinet ideological diversity in western europe. In *6th ECPR General Conference, Reykjavik, 25th-27th August, 2011*, 2011.

[100] Emeric Henry and Marco Ottaviani. Research and the approval process: The organization of persuasion. *American Economic Review*, 109(3):911–955, 2019.

[101] Emeric Henry, Marco Loseto, and Marco Ottaviani. Regulation with experimentation: Ex ante approval, ex post withdrawal, and liability. *Management Science*, 68(7):5330–5347, 2022.

[102] Helios Herrera, Ernesto Reuben, and Michael M Ting. Turf wars. *Journal of Public Economics*, 152:143–153, 2017.

[103] Helios Herrera, Ernesto Reuben, and Michael M Ting. Turf wars. *Journal of Public Economics*, 152:143–153, 2017.

[104] Henry B Hogue. *Presidential reorganization authority: History, recent initiatives, and options for congress*. Congressional Research Service, 2012.

[105] Gary E Hollibaugh and Lawrence S Rothenberg. Agency control through the

appointed hierarchy: presidential politicization of unilateral appointees. *Journal of Public Policy*, 44(1):44–66, 2024.

[106] Lin Hu. Essays on political economy. Technical report, Arizona State University, 2014.

[107] John D Huber. *Rationalizing parliament: legislative institutions and party politics in France*. Cambridge University Press, 1996.

[108] Indridi H Indridason. Live for today, hope for tomorrow? rethinking gamson's law. *Working Paper from the Department of Political Science of the University of California*, pages 1–34, 2015.

[109] Alan M Jacobs. The politics of when: Redistribution, investment and policy making for the long term. *British Journal of Political Science*, 38(2):193–220, 2008.

[110] Amal Jamal. Polarization, populism, and brinkmanship. *The Institute for Palestine Studies-USA.*, 2021.

[111] Elena Kagan. Presidential administration. *Harvard Law Review*, pages 2245–2385, 2001.

[112] Emir Kamenica and Matthew Gentzkow. Bayesian persuasion. *American Economic Review*, 101(6):2590–2615, 2011.

[113] Neal Kumar Katyal. Internal separation of powers: checking today's most dangerous branch from within. *YAle lJ*, 115:2314, 2005.

[114] Mark A Kayser and Jochen Rehmert. Coalition prospects and policy change: an application to the environment. *Legislative Studies Quarterly*, 46(1):219–246, 2021.

[115] Mark A Kayser, Matthias Orlowski, and Jochen Rehmert. Coalition inclusion probabilities: a party-strategic measure for predicting policy and politics. *Political Science Research and Methods*, 11(2):328–346, 2023.

[116] Mark Andreas Kayser. Who surfs, who manipulates? the determinants of opportunistic election timing and electorally motivated economic intervention. *American Political Science Review*, 99(1):17–27, 2005.

[117] Gary King, James E Alt, Nancy Elizabeth Burns, and Michael Laver. A unified model of cabinet dissolution in parliamentary democracies. *American Journal of Political Science*, pages 846–871, 1990.

[118] Frédéric Koessler and Vasiliki Skreta. Informed information design. *Journal of Political Economy*, 131(11):3186–3232, 2023.

[119] Anton Kolotilin. Optimal information disclosure: A linear programming approach. *Theoretical Economics*, 13(2):607–635, 2018.

[120] George A Krause and Jungyeon Park. Does coordinated administrative leadership improve us federal agency management of discrimination problems? *Journal of Public Administration Research and Theory*, 33(3):529–545, 2023.

[121] Joan H Krause. Truth, falsity, and fraud: Off-label drug settlements and the future of the civil false claims act. *Food & Drug LJ*, 71:401, 2016.

[122] Svenja Krauss. Stability through control? the influence of coalition agreements on the stability of coalition cabinets. *West European Politics*, 41(6):1282–1304, 2018.

[123] Staffan Kumlin and Peter Esaiasson. Scandal fatigue? scandal elections and satisfaction with democracy in western europe, 1977–2007. *British Journal of Political Science*, 42(2):263–282, 2012.

[124] Jean-Jacques Laffont and Jean Tirole. The Politics of Government Decision-Making: A Theory of Regulatory Capture. *The Quarterly Journal of Economics*, 106(4):1089–1127, 1991.

[125] Michael Laver and Norman Schofield. *Multiparty government: The politics of coalition in Europe*. University of Michigan Press, 1998.

[126] Stéphane Lavertu and David L Weimer. Federal advisory committees, policy expertise, and the approval of drugs and medical devices at the fda. *Journal of Public Administration Research and Theory*, 21(2):211–237, 2011.

[127] David E. Lewis. *Presidents and the Politics of Agency Design*. Stanford University Press, Stanford, CA, 2003.

[128] Brian D Libgober. Strategic proposals, endogenous comments, and bias in rulemaking. *The Journal of Politics*, 82(2):642–656, 2020.

[129] Paul C. Light. *Monitoring Government: Inspectors General and the Search for Accountability*. Brookings Institution Press, Washington, DC, 1993.

[130] Arthur Lupia and Kaare Strøm. Coalition termination and the strategic timing of parliamentary elections. *American Political Science Review*, 89(3):648–665, 1995.

[131] Arthur Lupia and Kaare Strøm. Coalition governance theory: Bargaining, electoral connections and the shadow of the future. *Cabinets and Coalition bargaining: the democratic cycle in western Europ*, 2006.

[132] John F Manning. Constitutional structure and judicial deference to agency interpretations of agency rules. *Colum. L. Rev.*, 96:612, 1996.

[133] Jason Marisam. Duplicative delegations. *Admin. L. Rev.*, 63:181, 2011.

[134] Jason Marisam. Interagency administration. *Ariz. St. LJ*, 45:183, 2013.

[135] Lanny Martin. Public opinion shocks and cabinet termination. *Typescript, Florida State University*, 2000.

[136] Filip Matějka and Alisdair McKay. Rational inattention to discrete choices: A new foundation for the multinomial logit model. *American Economic Review*, 105(1):272–298, 2015.

[137] Nolan McCarty. Complexity, Capacity, and Capture. In *Preventing regulatory capture: Special interest influence and how to limit it*, pages 99–123. Cambridge University Press, New York, NY, 2013.

[138] Nolan McCarty. Complexity, capacity, and capture. *Preventing regulatory capture: Special interest influence and how to limit it*, pages 99–123, 2013.

[139] Nolan McCarty. The regulation and self-regulation of a complex industry. *The Journal of Politics*, 79(4):1220–1236, 2017.

[140] Andrew McClellan. Experimentation and approval mechanisms. *Econometrica*, 90(5):2215–2247, 2022.

[141] Mathew McCubbins and Tom Schwartz. Congressional Oversight Overlooked: Police Patrols versus Fire Alarms. *American Journal of Political Science*, 28: 165–179, 1984.

[142] Emily Hammond Meazell. Presidential control, expertise, and the deference dilemma. *Duke LJ*, 61:1763, 2011.

[143] Carol Mershon. *The costs of coalition*. Stanford University Press, 2002.

[144] Thomas M Meyer, Ulrich Sieberer, and David Schmuck. Rebuilding the coalition ship at sea: how uncertainty and complexity drive the reform of portfolio design in coalition cabinets. *West European Politics*, 47(1):142–163, 2024.

[145] Terry M. Moe. The Politics of Bureaucratic Structure. In John Chubb and Paul E. Peterson, editors, *Can the Government Govern?* Brookings Institution, Washington, DC, 1989.

[146] B Pablo Montagnes and Stephane Wolton. Rule versus discretion: regulatory uncertainty, firm investment, and bureaucratic organization. *The Journal of Politics*, 79(2):457–472, 2017.

[147] Massimo Morelli. Demand competition and policy compromise in legislative bargaining. *American Political Science Review*, 93(4):809–820, 1999.

[148] Hanne Marthe Narud and Henry Valen. Coalition membership and electoral performance. *Cabinets and coalition bargaining: The democratic life cycle in Western Europe*, 2008:369–402, 2008.

[149] Jennifer Nou. Intra-agency coordination. *Harv. L. Rev.*, 129:421, 2015.

[150] NTSB. Aircraft incident report: Auxiliary power unit battery fire, japan airlines boeing 787-8, ja829j, boston, massachusetts, 7 january 2013. Technical report, 2013.

[151] Anne Joseph O'Connell. The Architecture of Smart Intelligence: Structuring and Overseeing Agencies in the Post-9/11 World. *California Law Review*, 94 (6):1655–1744, 2006.

[152] National Commission on Terrorist Attacks. *The 9/11 Commission Report: final Report of the National Commission on Terrorist Attacks Upon the United States (Authorized Edition)*. WW Norton & Company, 2011.

[153] Stefano Pagliari. How can we mitigate capture in financial regulation? 2012.

[154] John W. Patty. Working towards Policy: A Theory of Organizational Implementation and Management. *Journal of Public Administration Research & Theory*, Forthcoming, 2023.

[155] John W. Patty and Elizabeth Maggie Penn. *Social Choice and Legitimacy: The Possibilities of Impossibility.* Cambridge University Press, New York, NY, 2014.

[156] John W Patty and Elizabeth Maggie Penn. Identity and information in organizations. *Journal of Political Institutions and Political Economy*, 1(3):379–416, 2020.

[157] John W Patty and Elizabeth Maggie Penn. Ban the box? information, incentives, and statistical discrimination. *arXiv preprint arXiv:2208.08348*, 2022.

[158] John W Patty and Elizabeth Maggie Penn. Algorithmic fairness and statistical discrimination. *Philosophy Compass*, 18(1):e12891, 2023.

[159] John W. Patty and Ian Turner. Ex Post Review and Expert Policymaking: When Does Oversight Reduce Accountability. *Journal of Politics*, 83(1):23–39, 2021.

[160] Mogens N Pedersen. The dynamics of european party systems: changing patterns of electoral volatility. *European journal of political research*, 7(1):1–26, 1979.

[161] Elizabeth Maggie Penn. A model of farsighted voting. *American Journal of Political Science*, 53(1):36–54, 2009.

[162] Carolina Plescia and Sylvia Kritzinger. When marriage gets hard: Intracoalition conflict and electoral accountability. *Comparative political studies*, 55(1):32–59, 2022.

[163] Luciano Pomatto, Philipp Strack, and Omer Tamuz. The cost of information: The case of constant marginal costs. *American Economic Review*, 113(5):1360–1393, 2023.

[164] Jan Potters and Frans Van Winden. Lobbying and asymmetric information. *Public Choice*, 74:269–292, 1992.

[165] Eleanor Neff Powell and Joshua A Tucker. Revisiting electoral volatility in post-communist countries: New data, new results and new approaches. *British Journal of Political Science*, 44(1):123–147, 2014.

[166] Carlo Prato and Ian R Turner. Institutional foundations of the power to persuade. *Center for Open Science SocArXiv*, (4w9af), 2022.

[167] Matthew Rabin. Cognitive dissonance and social change. *Journal of Economic Behavior and Organization*, 23:177–194, 1994.

[168] Thomas Saalfeld. Institutions, chance and choices: The dynamics of cabinet survival in the parliamentary democracies of western europe (1945-99). 2008.

[169] Charles Sabel, Gary Herrigel, and Peer Hull Kristensen. Regulation under uncertainty: The coevolution of industry and regulation. *Regulation & Governance*, 12(3):371–394, 2018.

[170] Thomas C Schelling. Bargaining, Communication, and Limited War. *Conflict Resolution*, 1(1):19–36, 1957.

[171] Petra Schleiter and Cristina Bucur. Assembly dissolution powers and incumbency advantages in coalition formation. *West European Politics*, pages 1–24, 2023.

[172] Petra Schleiter and Margit Tavits. The electoral benefits of opportunistic election timing. *The Journal of Politics*, 78(3):836–850, 2016.

[173] Keith Schnakenberg. Informational lobbying and legislative voting. *American Journal of Political Science*, 61(1):129–145, 2017.

[174] Keith Schnakenberg and Ian Turner. Signaling with reform: How the threat of corruption prevents informed policy-making. *American Political Science Review*, 113(3):762–777, 2019.

[175] Keith Schnakenberg and Ian Turner. Helping friends or influencing foes: Electoral and policy effects of campaign finance contributions. *American Journal of Political Science*, 65(1):88–100, 2021.

[176] Keith Schnakenberg and Ian Turner. Formal theories of special interest influence. *Working Paper*, 2023.

[177] Michal Shamir and Gideon Rahat. *The Elections in Israel, 2019–2021*. Taylor & Francis, 2022.

[178] Sidney A Shapiro. The complexity of regulatory capture: Diagnosis, causality, and remediation. *Roger Williams UL Rev.*, 17:221, 2012.

[179] Ulrich Sieberer, Thomas M Meyer, Hanna Bäck, Andrea Ceron, Albert Falcó-Gimeno, Isabelle Guinaudeau, Martin Ejnar Hansen, Kristoffer Kolltveit, Tom Louwerse, Wolfgang C Müller, et al. The political dynamics of portfolio design in european democracies. *British Journal of Political Science*, 51(2):772–787, 2021.

[180] Allan Sikk. How unstable? volatility and the genuinely new parties in eastern europe. *European journal of political research*, 44(3):391–412, 2005.

[181] James M Snyder Jr, Michael M Ting, and Stephen Ansolabehere. Legislative bargaining under weighted voting. *American Economic Review*, 95(4):981–1004, 2005.

[182] Florence So. Serious conflicts with benign outcomes? the electoral consequences of conflictual cabinet terminations. *American Political Science Review*, pages 1–15, 2023.

[183] Toi Staff. Poll shows gideon sa'ar on 19 seats, blue and white barely returning to knesset. *The Times of Israel*, page December 20, 2020. Available at: https://www.timesofisrael.com/poll-shows-gideon-saar-shoring-up-support-blue-and-white-bleeding-seats/.

[184] Robert Steinbrook. Science, politics, and federal advisory committees. *New England Journal of Medicine*, 350(14):1454–1460, 2004.

[185] Margit Tavits. The development of stable party support: Electoral dynamics in post-communist europe. *American Journal of political science*, 49(2):283–298, 2005.

[186] Margit Tavits. Party systems in the making: The emergence and success of new parties in new democracies. *British journal of political science*, 38(1):113–133, 2008.

[187] Michael M. Ting. A Theory of Jurisdictional Assignments in Bureaucracies. *American Journal of Political Science*, 46(2):364–378, 2002.

[188] Michael M. Ting. A Strategic Theory of Bureaucratic Redundancy. *American Journal of Political Science*, 47(2):274–292, 2003.

[189] Michael M. Ting. Whistleblowing. *American Political Science Review*, 102: 249–267, 2008.

[190] Michael M Ting. Organizational capacity. *Journal of Law, Economics, and Organization*, 27(2):245–271, 2011.

[191] Ian R Turner. Working Smart and Hard? Agency Effort, Judicial Review, and Policy Precision. *Journal of Theoretical Politics*, 29(1):69–96, 2017.

[192] Ian R Turner. Policy Durability, Agency Capacity, and Executive Unilateralism. *Presidential Studies Quarterly*, 50(1):40–62, 2020.

[193] Wendy E Wagner. Administrative law, filter failure, and information capture. *Duke LJ*, 59:1321, 2009.

[194] Daniel Walther and Johan Hellström. The verdict in the polls: how government stability is affected by popular support. *West European Politics*, 42(3):593–617, 2019.

[195] Paul V Warwick. Dissolvers, disputers, and defectors: the terminators of parliamentary governments. *European Political Science Review*, 4(2):263–281, 2012.

[196] Paul V Warwick and James N Druckman. Portfolio salience and the proportionality of payoffs in coalition governments. *British journal of political Science*, 31(4):627–649, 2001.

[197] Paul V Warwick and James N Druckman. The portfolio allocation paradox: An investigation into the nature of a very strong but puzzling relationship. *European Journal of Political Research*, 45(4):635–665, 2006.

[198] James Q. Wilson. *Bureaucracy.* Basic Books, 2nd edition, 2000.

[199] Karolina Zielińska. The grand coalition government in israel. new faces of the political crisis. 2020.

[200] Rami Zwick, Amnon Rapoport, and John C Howard. Two-person sequential bargaining behavior with exogenous breakdown. *Theory and Decision*, 32(3): 241–268, 1992.