Giving Advice vs. Making Decisions: Transparency, Information, and Delegation*

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Abstract

We generalize standard delegation models to consider policymaking when both information and authority are dispersed among multiple actors. In our theory, the principal may delegate partial authority to a privately-informed agent while also reserving some authority for the principal’s use after observing the agent’s decision. Counterintuitively, the equilibrium amount of authority delegated to the agent is increasing in the preference divergence between the principal and agent. We also show that the amount of authority delegated depends upon whether the agent can observe the principal’s own private information (a condition we refer to as “top-down transparency”): this form of transparency increases the authority that must be delegated to the agent to obtain truthful policymaking. Accordingly, such transparency can result in less-informed policymaking. Nonetheless, the principal will sometimes but not always voluntarily choose such transparency. Finally, we apply the results of the model to the Financial Industry Regulatory Authority (FINRA).

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A *sine qua non* of designing public policy to achieve desired goals is information. Much of the requisite information about policy options and consequences is decentralized, possessed by various actors across multiple layers of hierarchy, in various departments, and outside government entities. Accordingly, a foundational concern in designing successful policy making institutions is eliciting, aggregating, and utilizing relevant information when making policy decisions.

Authority over policy choices, in addition to information about their consequences, may also be dispersed. In the formal or informal arrangements to make a policy choice, multiple individuals may each have authority to render smaller decisions that, cumulatively, result in a policy choice. Inasmuch as these smaller decisions affect the overall choice, they affect all actors involved in a decision process. And inasmuch as the actors have conflicting goals for overall policy choices, they have conflicting preferences over all the smaller decisions culminating in an overall policy choice, regardless of which actors make them.

This description applies not least to policy making processes in bureaucratic agencies, in which multiple agents have varying levels of authority and formal channels to report information to “superiors.” In a strict hierarchy where subordinate agents take no decisions, but funnel information to hierarchical superiors who do, conflicting policy goals between superiors and subordinates mitigate the subordinates’ incentives to faithfully and truthfully share their information (*e.g.*, Crawford and Sobel (1982), Gilligan and Krehbiel (1987), Gailmard and Patty (2012a,b)). In other words, conflict over policy goals creates incentive problems within bureaucratic organizations tasked with aggregating information and making policy decisions (*e.g.*, Hammond and Miller (1985), Hammond and Thomas (1989), Miller (1993), Ting (2002, 2003, 2008, 2011)).

However, decision processes do not need to concentrate all decision authority at “the top” in this way. Instead, authority over smaller decisions can be dispersed among multiple agents, and this in turn can affect their incentives to reveal their information through their choices. In this article we investigate how the design of power- and information-sharing arrangements affect the ultimate informedness of the policy decisions produced by a organization faced with both aggregating dispersed information and making policy decisions.

More specifically, we consider a model of policy making in which decentralized policy-relevant...
information is possessed by two or more individuals, at least one of whom is authorized to make policy decisions that affect all of the individuals. In this setting, we first consider the incentives for these individuals to share their information with one another as a function of the number of and preference similarities between the agents. We then consider the possibility that the individual possessing the authority (the “principal”) to make policy decisions may delegate some portion (or all) of this authority to one or more other individuals (the “agents”) in pursuit of eliciting these agents’ private information. We show that such power-sharing can occur in equilibrium for moderate preference disagreement, but that no power is shared with any agent whose preferences are either sufficiently divergent or sufficiently similar to the principal’s. Finally, we consider the impact of information-sharing by the principal—a practice we refer to as “top-down transparency”—on both the incentive of the agents to reveal their information to, and the degree of power shared by, the principal.¹

As this description suggests, our model is closely related to the now vast literature on delegation (e.g., Holmström (1984), Epstein and O’Halloran (1999), Dessein (2002), Gailmard (2002), Bendor and Meirowitz (2004), Alonso and Matouschek (2008), Gailmard (2009)). In the “standard” delegation model, the principal chooses a set of policies, from which the agent then freely chooses in turn.² In other words, existing models typically presume that exactly one actor will eventually make the final policy choice, and then consider which actor the principal prefers this to be.³ We refer to this aspect of the standard model as “exclusive delegation.”

We extend this model so that more than one actor may (and in equilibrium, often does) contribute meaningfully to a policy choice. We refer to this as “partial delegation,” which we model with the basic framework developed in Galeotti, Ghiglino and Squintani (2013).⁴ Such an approach is

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¹As we make clear below, one practical instantiation of top-down transparency is active, independent, and on-going policymaking by the principal that is observable by the agent. Thus, the effects of this informational arrangement indicated by our theory extend to considerations of the implications of what one might call “active oversight” by the principal, even if not directed in a punitive or auditing fashion at the agent, per se.

²This includes, as a special case, models of delegation as an all-or-nothing choice, i.e., the principal either makes policy on his or her own or grants the agent plenary control over policy.

³By “final policy choice,” we mean a choice of policy that affects all actors’ payoffs.

⁴We extend the Galeotti, Ghiglino and Squintani (2013) model by focusing on institutional design. In this way, this article is also closely related to that of Dewan and Squintani (2012). The principal formal innovations in this article are the allowance for a continuum of partial delegation decisions, and the consideration of the top-down transparency of the policy-making process.
more applicable than models of exclusive delegation to real-world policy making, in which various different agents each unilaterally render policy decisions at various times. In such processes, the principal and agent(s) each exert/impose independent policy effects through these various decisions. Whereas models of exclusive delegation make sense for processes in which legal authority can be delineated and handed over to another actor, our partial delegation framework is more relevant to decision making when “public policy” is (as in its everyday meaning) not a simple unitary decision, but rather the amalgamation of various implementation and administrative decisions made by various actors in, and possibly outside, government. Thus, an important goal of this article is to extend the theory of delegation to these types of situations.

The partial delegation framework allows us to consider a principal’s incentives to delegate a portion of policymaking authority to an agent, with the attendant possibility of learning that agent’s information for later unilateral use by the principal. Models of exclusive delegation consider the possibility of granting control over policy so that the agent has an incentive to utilize its information (Aghion and Tirole (1997), Dessein (2002)), but neglect that the principal may be able to use information so revealed in other aspects of a policy choice. In our setting, that possibility is central. As a result, exclusive delegation, while possible in our model, is almost never optimal.

Partial delegation leads naturally to a focus on top-down transparency: the extent to which the principal should reveal its information to agents. This is typically irrelevant in standard delegation models. First, the principal in these models is typically assumed to have no information that the agent does not also have. Second, if the principal did have such information, she should simply reveal it to the exclusive decision maker because this would result in more informed (hence, better for all actors by assumption) decisions. From a vaguely Weberian perspective, top-down transparency seems not just irrelevant but clearly contrary to the principal’s interest: if knowledge is power, then to share the one is to give away the other. Under partial delegation, top-down transparency is more subtle and, surprisingly, possibly perverse. It can mitigate the incentive for the agent to reveal his private information, in an attempt to manipulate the choices ultimately made by the principal. Thus,

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5 But see Callander (2008), who presents a novel model of expertise in which this “invertibility” of an agent’s information from his or her policy choice is not possible.

6 Specifically, exclusive delegation is optimal within the partial delegation framework only if the agent has exactly the same preferences as the principal.
when power is shared between the principal and the agent in the sense of partial delegation, the ultimate welfare impact of imposing partial transparency of information can be counterintuitive. In a nutshell, *top-down transparency (weakly) increases the minimal level of authority that the principal must grant his or her agent in order to induce that agent to reveal/utilize his or her own private information when making policy.*

1 Delegation & Information in Policymaking

Before turning to the formal apparatus of our model, we describe some of the substantive decision processes in government which can be illuminated in this framework. This is not a substitute for in-depth analysis of these processes; the point of this paper is to lay out a model, which takes quite enough space as it is. Rather, we wish to illustrate some of the real-world issues that make a model of this nature relevant.

Particularly within broad policy areas and across government agencies, the handing-over of policy-making authority has the potential to support truthful and credible information-sharing between agents with differing preferences. When power is handed over only in part—*i.e.*, the principal retains some unilateral authority of his or her own—our theory indicates that a subtle but important consideration in determining the value and incentives flowing from such a delegation depend upon a particular form of transparency of the information held by the principal. That is, our theory illustrates that the degree of authority that must be shared with a subordinate in order to elicit truthful revelation of that subordinate’s information can depend on whether the agent can observe the principal’s own information when the agent is utilizing his or her delegated authority and deciding what policy to implement.7 Furthermore, our theory demonstrates a fundamental trade-off that must be considered when evaluating the desirability of the “top-down transparency” within a hierarchical

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7A ubiquitous concern in governance, transparency unsurprisingly has several connotations, many of which directly relate to accountability and oversight (*e.g.*, Bendor, Taylor and Gaalen (1987), Stasavage (2003), Prat (2005), Fox (2007), Levy (2007), Besley (2011), Hollyer, Rosendorff and Vreeland (2011)). Our conception is more directly tied to information aggregation within organizations and, accordingly, represents a different angle on one component of the informational setup considered by Ting (2008) in considering the welfare impacts of “whistle blowing” provisions/protections in bureaucratic settings. It is also reminiscent of the “bottom-up” dynamics considered by Gailmard and Patty (2013), where the focus is on the control of access to a verifiable form of policy-relevant information similar to the signals and transparency considered in this article.
policymaking institution: when the agent has access to the principal’s information prior to making his or her own policy and/or message choices, the agent’s beliefs about the true state of nature will be more accurate—which is in the principal’s *ex ante* interest—but, somewhat ironically, the agent will have a greater incentive to misrepresent his or her own information when choosing policy so as to manipulate the principal’s own policy decision.

**Information and (Sub)Delegation in the Federal Government.** It is not uncommon for subordinates in the executive branch of the United States Federal Government to be granted unilateral authority with respect to some policy decisions. While this might be explained through simple transactions-cost arguments—for example, time constraints imply that responsibilities must, at least from time-to-time, be shared among policymakers—our theory speaks to an additional potential justification for such delegation. Specifically, delegation of *some* authority to a subordinate can induce that subordinate to reveal his or her private, policy-relevant information so that the principal who delegated the authority to that subordinate might then use the revealed information when the principal makes his or her own policy decisions. Put another way, delegating partial but meaningful unilateral policy authority to a subordinate (or, “power-sharing”) might be required to achieve information aggregation between actors with divergent policy preferences.

**Quasi-public Governance.** While our theory of partial delegation and the notion of top-down transparency is applicable to general policymaking institutions with power- and information-sharing, we think it is particularly relevant to emerging concerns about transparency and responsibility in “quasi-public” governance authorities (*e.g.*, Camara and Gowder (2006)). Examples of quasi-public authorities include the Federal Reserve Board, government corporations such as the United States Postal Service, Fannie Mae & Freddie Mac, public universities, and public utilities. Such entities by definition are themselves the creatures of delegation. More interestingly, however, these entities are typically more independent than executive agencies and even “independent” commissions, insofar

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8Furthermore, such subdelegation of authority has received explicit, even if only partial, countenance from Congress. For example, consider the Presidential Subdelegation Act of 1950 (Pub. L. No. 81-673, 64 Stat. 419).
as they are typically at least somewhat financially self-sufficient.\textsuperscript{9} With this independence comes a non-trivial, even if residual, authority to subdelegate the quasi-public authority’s powers and responsibilities to third-parties both public and private in nature. For example, many quasi-public authorities (\textit{e.g.}, public utilities) typically hold some degree of eminent domain powers that they are charged with using “in the public interest,” but that are deployed at least partially on the basis of cost and feasibility estimates provided by contractors and consultants hired by the quasi-public authority. Thus, quasi-public governance is frequently characterized by the handing over of limited, or partial, authority over public policy implementation to other agents.

Especially to the degree that a quasi-public authority is engaged in implementation of policy through time, the impacts and effects of its policy decisions (and those of the agents with whom the authority has shared its powers) are at best imperfectly known. The outcome of policy implementation in terms of real-world measures such as unemployment, public health, education, and environmental quality is a matter of constant and decentralized (\textit{i.e.}, asymmetric) information collection. Specifically, while any agent of the quasi-public authority may clearly have relevant private information that the quasi-public authority would like to know, the quasi-public authority typically also has its own private information (possibly gleaned from other agents of the authority) that the authority’s agent would itself like to know as well.

Our theory centers on the fact that the actions (policy choices) of the agent may be informative to the authority even when the agent’s preferences are “too divergent” from the authority’s for cheap-talk revelation between the two to credible. Quite intuitively, this distinction—signaling through action as opposed to signaling through cheap-talk—is important/useful only when the quasi-public authority commits (\textit{i.e.}, subdelegates) some unilateral decision-making powers to the agent. Furthermore, the degree to which the agent is aware of the authority’s own preexisting information affects the minimal level of unilateral decision-making power that the quasi-public authority must subdelegate to the agent to secure informative policymaking from the agent. Thus, in the fullest version of our theory (Section 4), we allow the quasi-public authority (whom we refer to as, “the principal”)

\textsuperscript{9}We do not delve into the justifications for creation of such authorities by a sovereign government, but arguably the most common justification centers on the desire of the government to somehow credibly hand power to an independent/politically neutral authority to solve its own commitment problems.
to choose not only how much power to subdelegate to the agent, but also whether to allow the agent access to the authority’s private information when the agent is making its policy decisions. Thus, our results simultaneously capture both theoretical regularities of the optimal design and importance of both power-sharing and information-sharing within hierarchical policymaking organizations. We return to the implications of our theory’s conclusions for quasi-public governance in Section 6.

We now turn to describing the model.

2 The Model

We consider a model of decentralized decision-making with asymmetric and decentralized information. Specifically, every actor \( i \) will ultimately make a unidimensional policy choice, \( y_i \in \mathbb{R} \), and then receive a payoff, \( u_i \), that depends on the policy chosen and a latent state of nature, \( \theta \), which we presume to be a number between 0 and 1. Policy-making is decentralized in the sense that each player’s policy decision is made unilaterally. Information is decentralized in the sense that each individual \( i \) privately observes a partially informative signal about \( \theta \). The “policy-making process” then is a set of sequential choices by the individuals that can allow those who choose later to possibly make inferences about the signals by those who make their choices earlier in the process. The canonical example of two individuals is displayed in Figure 1. Before proceeding to the formal primitives of the model, it is useful to provide an overview of the steps of the model.

The interesting tensions (and strategic incentives) in the model arise from the combination of two facts: first, every individual desires information about the state of nature, \( \theta \), and, second, every individual’s payoff is potentially affected by the choices of all other individuals. Of course, the first fact—that there is uncertainty about a policy-relevant fact—is what makes information aggregation welfare enhancing. The second fact is what potentially induces individual strategic incentives that

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10We set aside issues of collective choice in this article. Including a collectively chosen policy choice represents an obvious extension. In addition to the traditional constraints of time and space, technical concerns also dissuade us from including such an extension in this article. Specifically, incorporating collective choice not only requires that one make modeling choices about the type of collective choice procedures to examine, but also immediately requires that strategic actors condition their vote choice (i.e., their input into the collective choice process) on being pivotal. As is well-known (e.g., Austen-Smith and Banks (1996), Feddersen and Pesendorfer (1996, 1998)), this type of reasoning can quickly become quite complicated. Of interest in such an extension, however, is that there will be situations in which an individual will vote for a policy other than the one he or she would choose on his or her own.
"Nature" Draws State of Nature, $\theta$

Player 1 (the "agent")
Observes $s_1$
Player 1 chooses Policy $x_1$

Player 2 (the "principal")
Observes $s_2$
Player 2 chooses Policy $x_2$

Game Ends
Players Receive Payoffs

Figure 1: Example of Sequential Policymaking Process
undermine the achievement of such aggregation. Information aggregation requires that individuals listen to (i.e., make decision based on) the messages sent by other individuals regarding those individuals’ private information (i.e., signals) about $\theta$. However, when two individuals $i$ and $j$ have different state-dependent policy goals, the supposition that $j$ will treat $i$’s revelation of $i$’s information as truthful (i.e., $j$ will “listen to” $i$’s message) can, in some situations, create an incentive to $i$ to in fact not be truthful. Alleviating this tension is the essentially the “institutional design” goal in this setting. With an institutional arrangement that satisfies this goal, we can understand the limits of information sharing in decision processes where partial delegation is a possibility.

2.1 Formal Primitives

For the majority of our analysis, we focus on a two-player situation in which one individual is the principal and the other is the agent, so that the set of players is denoted by $N = \{P, A\}$. In the baseline model, the principal, $P$, is distinguished from the agent, $A$, in that the principal observes the agent’s policy choice prior to making his or own policy choice. Each of the player $i$’s policy choice is represented by a number and denoted by $y_i \in \mathbb{R}$ for each $i \in N$. The effects of these choices depend on the value of the state of nature, $\theta$, which is represented by a number between 0 and 1. This state of nature is not directly observed by any individual but, prior to making their policy choices, each individual $i$ privately observes a signal, denoted by $s_i \in \{0, 1\}$. That is, each individual observes a binary (e.g., “low/high” or “bad/good”) signal that is correlated with the true state of nature, $\theta$. Details of the distribution of the signals are contained in the appendix, but the key features of the informational environment are that the state of nature $\theta$ is presumed to be uniformly distributed on the unit interval and, given a signal $s_i \in \{0, 1\}$, player $i$’s conditional expected value of $\theta$ is

$$E(\theta|s_i) = \frac{1 + s_i}{3} = \begin{cases} 
\frac{1}{3} & \text{if } s_i = 0, \\
\frac{2}{3} & \text{if } s_i = 1.
\end{cases}$$
More generally, upon observing $m > 0$ signals, $\{s_1, \ldots, s_m\}$, with $k = \sum_{i=1}^{m} s_i$, the conditional expected value and conditional variance of the resulting beliefs are

\[
E(\theta | k, m) = \frac{k + 1}{m + 2}, \quad \text{and} \\
V(\theta | k, m) = \frac{(k + 1)(m - k + 1)}{(m + 2)^2(m + 3)}.
\]

Intuitively, as the proportion of observed signals that equaled 1 (as opposed to equaling to 0) increases, one’s belief about the realized expected value of the state of nature, $\theta$, also increases. In a spatial sense, then, if an individual $i$ observes a signal of 1 ($s_1 = 1$), one thinks that the state of nature (and hence, the optimal policy choice) is “farther to the right” than if $i$ observed a signal equal to 0.

**Policy-making.** Each player $i \in N$ ultimately chooses $y_i \in \mathbb{R}$, with $y = (y_P, y_A)$. The agent, $A$, always chooses his or her policy, $y_A$, prior to the principal making his or her choice, $y_P$. The information available to the agent when choosing $y_A$ depends on whether the policymaking process is characterized by top-down transparency or not. If the process does not have top-down transparency (which we dub the “opaque case”), the agent chooses $y_A$ knowing only his or her private signal, $s_A$. If, on the other hand, the process does have top-down transparency, then $y_A$ is chosen by the agent with knowledge of both his or her private signal, $s_A$, as well as that of the signal of the principal, $s_P$.

Regardless of the top-down transparency of the process, the principal chooses $y_P$ after observing his or her own signal, $s_P$, and the agent’s policy choice, $y_A$. Thus, in neither case does the principal ever observe the agent’s signal directly. Rather, the principal may be able in equilibrium to infer the agent’s signal from the agent’s policy choice, $y_A$.

**Payoffs.** Each player $i \in N$ has a payoff function of the following form:

\[
u_i(y, \theta; \beta) = -\sum_{j \in N} \alpha_j (y_j - \theta - \beta_i)^2,
\]

where $\beta_i \in \mathbb{R}$ denotes the policy preference (or bias) of agent $i$ and $\beta \equiv \{\beta_i\}_{i \in N}$ denotes the profiles of all biases. We assume throughout that these biases are exogenous and common knowledge to all.
of the players.

The payoff function in equation 1 is of the classic “quadratic loss” formulation and standard arguments imply that the optimal policy choice for a an individual $i$ who has observed (or inferred) $m$ signals, $\{s_1, \ldots, s_m\}$, with $k = \sum_{j=1}^{m} s_j$, is:

$$y^*_i(k, m) = \frac{k + 1}{m + 2} + \beta_i.$$  

(2)

2.2 Shared Authority: The “Partial Delegation” Framework

In the baseline model, the parameters $\alpha = (\alpha_P, \alpha_A)$ (where $\alpha_P > 0$, $\alpha_A \geq 0$, and $\alpha_P + \alpha_A = 1$) are also treated as exogenous. These parameters represent the degree of policy-making authority possessed by each player. For each player $i \in \{P, A\}$, the parameter $\alpha_i$ measures the degree to which player $i$’s choice of policy, $y_i$, will affect the payoff of both players. Thus, the decisions of an individual with “greater authority” have greater impact on all players than the choices of an individual with less authority.

While parsimonious, this conception of authority differs from the standard representations adopted in the delegation literature. As discussed in the introduction, most models of delegation either treat delegation as an all-or-nothing decision or, in the case of the “discretionary interval” models (e.g., following the framework defined in Holmström (1984)), as the width of the range of policies that the delegate may choose from. Throughout, we suppose without loss of generality that $\sum_{i \in N} \alpha_i = 1$ and we conceive of $\alpha_i$ as representing the proportion of decisions that $i$ is allowed to make on his or her own.\textsuperscript{11} That is, our “partial delegation” representation can be thought of as an approximation for “multiple delegations” with the caveats that the impacts of the various delegated policy decisions are determined by a common latent state of nature and the total payoff from the various decisions is an additive function of the impacts of the individual decisions.

\textsuperscript{11}Presuming that there are “lots” of decisions to make, we set aside the integer/indivisibility constraints and treat the “unit of $\alpha$” as infinitely divisible. Relaxing this assumption would not alter any of the substantive conclusions but would greatly increase the notational heft of the model’s presentation.
2.3 Sequence of Play: Baseline Game

The policy-making process described above, referred to as the baseline game, proceeds as follows:

1. The decision-making authority for the two players are revealed: $\alpha_P > 0$ and $\alpha_A \geq 0$, with $\alpha_P + \alpha_A = 1$.

2. Nature determines the state of nature $\theta$ and players’ signals, $s = \{s_P, s_A\}$.

3. • OPAQUE CASE. Each player $i \in \{P, A\}$ privately observes his or her signal, $s_i$.
   • TOP-DOWN TRANSPARENT CASE. The agent, $A$, observes his or her signal, $s_A$, and both players observe the principal’s signal, $s_P$.

4. The agent, $A$, sets policy $y_A \in \mathbb{R}$.

5. Principal $P$ observes $y_A$ and sets policy $y_P \in \mathbb{R}$.

6. Game concludes, players receive payoffs.

In the appendix, we present a formal definition of strategies, beliefs, and equilibrium in these games. Now, however, we turn to the analysis of equilibrium behavior.

2.4 Decentralized Authority & Communication

We analyze the equilibrium behavior in the baseline model, first considering the “opaque case,” in which the agent $A$ observes only $s_A$ prior to making his policy choice, $y_A$, and then turning to the case of top-down transparency in which the agent $A$ observes the principal’s information, $s_P$, at the same time $A$ observes his own signal $s_A$, and prior to choosing $y_A$. We then compare the conditions for information aggregation (i.e., truthful policy choice by the agent) in the two settings.

The Opaque Case: Superior’s Information Hidden from Agent. We first suppose that $s_P$ is not observed by $A$. In this case, if the principal believes that $A$ is being truthful, note that agent $A$
effectively has only two possible policy choices:

\[ y_A \in \{ \frac{1}{3} + \beta_A, \frac{2}{3} + \beta_A \}, \]

where “truthful” policy-making by \( A \) involves \( A \) setting policy as follows:

\[
y_A^*(s_A) = \begin{cases} 
\frac{1}{3} + \beta_A & \text{if } s_A = 0, \\
\frac{2}{3} + \beta_A & \text{if } s_A = 1. 
\end{cases}
\] (3)

Thus, if the principal believes that the agent is truthful when choosing \( y_A \)—i.e., that he or she chooses according to (3)—the principal’s optimal behavior as a function of the inferred value of the agent’s signal, \( \tilde{s}_A \), and the principal’s own signal, \( s_P \), is:

\[
y_P^*(\tilde{s}_A, s_P) = \frac{1 + \tilde{s}_A + s_P}{4} + \beta_P. \] (4)

The behavior described in Equation (4) is the basis of the agent’s incentive to possibly set policy insincerely: that is, to not behave as described in Equation (3). Specifically, when choosing \( y_A \), the principal’s behavior described by (4) illustrates that the agent must consider two potentially countervailing incentives. For example, suppose that \( \beta_A > \beta_P \) and \( A \) observes \( s_A = 0 \). In the absence of the principal, \( P \), the agent’s optimal choice is clear: \( y_A^*(0) = \frac{1}{3} + \beta_A \). However, if we include the principal and he or she believes that the agent is setting policy truthfully, then choosing \( \frac{1}{3} + \beta_A \) will result in the principal setting \( y_P \) lower than he or she would if the agent chose \( y_A = \frac{2}{3} + \beta_A \), which would lead the principal to infer that the agent had observed \( s_A = 1 \) instead of \( s_A = 0 \). Because \( \beta_A > \beta_P \), the agent always wants to insert a (sufficiently small) positive bias in the principal’s decision-making, so that, in some circumstances (depending in this setting, as we will see below, on \( \alpha \) and \( \beta \)), the agent will gain more from setting a policy so as to manipulate

\[^{12}\text{We formally demonstrate in the appendix the principal’s beliefs that justify this (Section A.3, Proposition 4), as well as discussing the technical underpinnings of our choice of such beliefs.}\]

\[^{13}\text{The problem is symmetric for } \beta_A < \beta_P \text{ and } s_A = 1.\]

\[^{14}\text{This ubiquitous incentive is the reason that perfect information transmission is possible in the canonical cheap-talk model of Crawford and Sobel (1982) only if } \beta_A = \beta_P.\]
the principal’s choice than the agent will lose from setting policy suboptimally. We now turn to
deriving the conditions under which this does not hold. In other words, we derive the conditions
under which the agent has an incentive to set policy truthfully. These are known as the agent’s
incentive compatibility (IC) conditions.

To keep the presentation succinct, we will maintain the supposition that \( \beta_A > \beta_P \) and accordingly
focus only on the case of \( s_A = 0 \).\(^{15}\) The expected payoff from setting \( y_A \) optimally such that the
principal interprets \( y_A \) as implying that \( A \) received \( s_A = 0 \) is:

\[
U_A(y_A^*(0); \beta, s_A = 0) = -E_{G(0)}[(1 - \alpha_A)(y_P^*(0, s_P) - \theta - \beta_A)^2 + \alpha_A(y_A^*(0) - \theta - \beta_A)^2],
\]

\[
= -[(1 - \alpha_A)(\beta_P - \beta_A)^2],
\]

and the expected payoff from setting \( y_A \) in an attempt to make \( P \) believe that \( A \) observed \( s_A = 1 \)
instead of \( s_A = 0 \), is

\[
U_A(y_A^*(1); \beta, s_A = 0) = -E_{G(0)}[(1 - \alpha_A)(y_P^*(1, s_P) - \theta - \beta_A)^2 + \alpha_A(y_A^*(1) - \theta - \beta_A)^2],
\]

\[
= -[(1 - \alpha_A)(1/4 + \beta_P - \beta_A)^2 + \frac{\alpha_A}{9}].
\]

Comparing \( A \)'s two expected payoffs, the agent’s IC condition is then\(^{17}\)

\[
U_A(y_A = y_A^*(s_A); \beta, s_A) \geq U_A^0(y_A = y_A^*(1 - s_A); \beta, s_A),
\]

\[
|\beta_A - \beta_P| \leq \left( \frac{2}{9} \right) \frac{\alpha_A}{1 - \alpha_A} + \frac{1}{8} \quad (6)
\]

\(^{15}\)It is simple to verify that, if \( \beta_A > \beta_P \) (resp., \( \beta_P > \beta_A \)), the agent always has a strict incentive to behave truthfully
following observing \( s_A = 1 \) (resp., following observing \( s_A = 0 \)).

\(^{16}\)A couple of notes are in order: first, these expressions omit the conditional variance terms for \( \theta \), as these are
invariant to the choice of \( y_A \) and will accordingly cancel in the derivation of the incentive compatibility conditions, and
the expectation operator (the subscript \( G(0) \) denotes that this expectation is conditioned on \( s_A = 0 \)) is integrating out
both \( \theta \) and \( s_P \), neither of which are known by the agent. In the top-down transparency case, below, \( s_P \) will appear in
the same place on the righthand side of the analogous expression, but also be known by the agent and, accordingly, also
appear as an argument on the lefthand side, unlike here.

\(^{17}\)The absolute value on the lefthand side of inequality (6) follows from IC calculations (mirroring those in the text)
for the case when \( \beta_A < \beta_P \). We report the condition in this fashion for completeness.
**Transparent Case: Agent Observes Superior’s Information.** Moving to the top-down transparency case, agent $A$ observes the principal’s information, $s_P$, prior to choosing $y_A$. From an *ex ante* perspective, there are three possible policy choices that agent $A$ will choose with positive probability in equilibrium (because $A$ could observe 0, 1, or 2 successes). These choices are as follows:

\[
y_A = \frac{1}{4} + \beta_A, \\
y_A = \frac{1}{2} + \beta_A, \quad \text{and} \\
y_A = \frac{3}{4} + \beta_A,
\]

where “truthful” policy-making by $A$ involves $A$ setting policy as follows:

\[
y^*_A(s_A, s_P) = \begin{cases} 
\frac{1}{4} + \beta_A & \text{if } s_A + s_P = 0, \\
\frac{1}{2} + \beta_A & \text{if } s_A + s_P = 1, \\
\frac{3}{4} + \beta_A & \text{if } s_A + s_P = 2.
\end{cases}
\]  

(7)

However, once $A$ observes both $s_A$ and $s_P$, the realization of $s_P$—which $A$ is aware that $P$ will also observe and condition his or her beliefs on—effectively reduces $A$’s strategic calculation to two choices.\(^{18}\) Specifically,

\[
y_A \in \{ \frac{1}{4} + \beta_A, \frac{1}{2} + \beta_A \} \quad \text{if } s_P = 0, \quad \text{and} \\
y_A \in \{ \frac{1}{2} + \beta_A, \frac{3}{4} + \beta_A \} \quad \text{if } s_P = 1.
\]

Continuing as in the analysis of the opaque case, the expected payoff from setting $y_A$ optimally

\(^{18}\)The details of this restriction are provided in the appendix (Section A.3, Proposition 4).
such that the principal interprets \( y_A \) as implying that \( A \) received \( s_A = 0 \) is:

\[
\begin{align*}
U_A(y_A^*(0, s_P); \beta, s_P, s_A = 0) &= -E_G(0)[(1 - \alpha_A)(y_P^*(0, s_P) - \theta - \beta_A)^2 + \alpha_A(y_A^*(0, s_P) - \theta - \beta_A)^2], \\
&= -[(1 - \alpha_A)(\beta_P - \beta_A)^2],
\end{align*}
\]

and the expected payoff from setting \( y_A \) as if \( A \) observed \( s_A = 1 \) instead of \( s_A = 0 \) is

\[
\begin{align*}
U_A(y_A^*(1, s_P); \beta, s_P, s_A = 0) &= -E_G(0)[(1 - \alpha_A)(y_P^*(1, s_P) - \theta - \beta_A)^2 + \alpha_A(y_A^*(1, s_P) - \theta - \beta_A)^2], \\
&= -[(1 - \alpha_A)(1/4 + \beta_P - \beta_A)^2 + \alpha_A/16].
\end{align*}
\]

(8)

Note at this point the differences between Equations (8) and (5). In particular, they differ only in their second righthand side terms: in the opaque case, the agent must move policy by \( 1/3 \) (from \( 1/3 + \beta_A \) to \( 2/3 + \beta_A \)) to successfully change the principal’s inference about \( s_A \) but, in the transparent case, the agent need move policy only by \( 1/4 \) (either from \( 1/4 + \beta_A \) to \( 1/2 + \beta_A \) if \( s_P = 0 \) or from \( 1/2 + \beta_A \) to \( 3/4 + \beta_A \) if \( s_P = 1 \)). Thus, **top-down transparency reduces the direct cost \( A \) must pay in order to manipulate \( P \)'s beliefs.** This difference is crucial to distinguishing the cases. Specifically, in the top-down transparency setting, truthful revelation is incentive compatible for \( A \) so long as the following holds:

\[
\begin{align*}
U_A(y_A = y_A^*(s_A, s_P); \beta, s_P, s_A) &\geq U_A(y_A = y_A^*(1 - s_A, s_P); \beta, s_A) \\
|\beta_A - \beta_P| &\leq \frac{1}{8(1 - \alpha_A)}.
\end{align*}
\]

(9)

**Comparing The Opaque and Top-Down Transparency Cases.** The two conditions expressed in inequalities (9) and (6) are identical except for the second additive term on the RHS of each. When the principal’s information is transparent to the agent, the agent does not need to set policy as far away from the true conditional expected value of \( \theta \) in order to manipulate the principal’s beliefs. Put another way, when the principal’s information is opaque to the agent, and the principal

\[\text{\footnotesize Note that these expressions omit the conditional variance terms for } \theta, \text{ which are invariant to the choice of } y_A \text{ and will accordingly cancel in the derivation of the incentive compatibility conditions. Note that this obfuscates the fact that the agent } A \text{ would prefer to observe } P \text{'s information prior to setting } y_A.\]
knows this, the agent can credibly signal that his or her signal was the opposite of what he or she actually observed only by “biasing” his or her own policy choice by $\frac{1}{3}$, as opposed to being able to manipulate in the transparent case through a bias of only $\frac{1}{4}$. This difference implies that attempting to manipulate the principal’s choice is “cheaper” for the agent in the transparent case than in the opaque case, a point that plays a central role in the discussion of endogenous transparency (Section 4).

3 Incorporating Delegation: Endogenous Authority

Having considered the equilibrium behavior for every possible delegation situation (i.e., all $\alpha_P > 0$ and $\alpha_A \geq 0$ with $\alpha_P + \alpha_A = 1$), we are now in a position to consider the principal’s optimal delegation. That is, we now consider an extended model in which the principal, prior to observing his or her own signal, chooses how much authority to delegate to the agent. Formally, $P$ chooses $\alpha_A \in [0, 1]$, retaining $\alpha_P = 1 - \alpha_A$ for himself or herself. The baseline game analyzed above then proceeds as before.

Precisely because agent $A$’s policy decision is observed by the principal prior to $P$’s policy decision, granting positive unilateral authority to $A$ (i.e., $\alpha_A > 0$) can expand the possibility for truthful information-revelation in equilibrium. That is, imbuing the agent’s “message” with real-world policy consequences leads to greater trust between the agent and the principal. In some sense, this is not surprising: the agent’s message is now potentially costly relative to the cheap talk environment examined in the previous section.

Not so obvious, however, are the incentives of the principal in allocating such authority. On one hand, the principal will have a first-order incentive to retain decision-making authority in his or her own hands whenever the agent’s preference bias differs from the principal’s (i.e., $\beta_A \neq \beta_P$). Thus, delegation of a positive degree of decision-making authority to an agent $A$ will occur only to the degree that such delegation is required to support truthful revelation by that agent.

For very small degrees of divergence between an agent and the principal (i.e., small values of $|\beta_P - \beta_A|$), no delegation will occur, as truthful revelation will prevail even without such delegation,
and such delegation necessarily entails some agency loss for the principal.\footnote{Obviously, this presumes that divergence is nonzero. Furthermore, the definition of “small enough” will depend on other characteristics of the situation, including most importantly how many other informative signals the principal will possess in equilibrium.}

However, because the minimal discretionary authority required to elicit truthful revelation from a given agent $A$ to the principal, $P$, is an increasing function of the difference between their preference biases (i.e., $|\beta_A - \beta_P|$), the preference divergence between the principal and agent might be sufficiently extreme to outweigh (from the principal’s standpoint) the increased expected payoff from truthful revelation by the agent. In such situations, the principal’s optimal allocation of decision-making authority grants zero discretion to the agent. Accordingly, the degree of decision-making discretion delegated to an agent will possess a non-monotonic and counterintuituve relationship to the preference alignment between the principal and the agent.

**Sequence of Play: Delegation Game.** The *delegation game* proceeds as follows.

1. Player $P$ assigns decision-making authority $\alpha_i \geq 0$ to each player $i \in \{P, A\}$, with $\alpha_P + \alpha_A = 1$.

2. Nature determines the state of nature $\theta$ and players’ signals, $s = \{s_P, s_A\}$.

3. • **OPAQUE CASE.** Each player $i \in \{P, A\}$ privately observes his or her signal, $s_i \in \{0, 1\}$.

   • **TOP-DOWN TRANSPARENT CASE.** Each player $i \in \{P, A\}$ privately observes his or her signal, $s_i$, and the agent observes the principal’s signal, $s_P$.

4. The agent, $A$, sets policy $y_A \in \mathbb{R}$.

5. Principal $P$ observes $y_A$ and sets policy $y_P \in \mathbb{R}$.

6. Game concludes, both players receive their payoffs.

As in the previous section, we analyze first the opaque case and then turn to the top-down transparency setting.
Endogenous Authority: The Opaque Case. Inequality (6) is satisfied if and only if
\[ \alpha_A \geq \frac{8|\beta_P - \beta_A| - 1}{7/9 + 8|\beta_P - \beta_A|}, \]
so that, for any \( \beta = \{\beta_P, \beta_A\} \), the minimal feasible level of authority that the principal can grant to the agent and secure truthful policymaking in the opaque case is
\[ \alpha^*_{AO}(\beta) = \max \left[ \frac{8|\beta_P - \beta_A| - 1}{7/9 + 8|\beta_P - \beta_A|}, 0 \right]. \] (10)

Thus, \( \alpha^*_{AO}(\beta) \) represents the minimal delegation of authority required to secure truthfulness by agent \( A \) when principal \( P \)’s information is opaque to agent \( A \). Of course, \( \alpha^*_{AO}(\beta) \) is the “cheapest” means for principal \( P \) to secure truthfulness from agent \( A \), but for sufficiently different preferences \( \beta_P \) and \( \beta_A \), it might represent too costly a power sharing arrangement for principal \( P \) in terms of the induced bias of final policy, relative to principal \( P \) simply proceeding on the basis of his or her own signal, \( s_P \). Proposition 5, presented in the appendix, formally describes optimal delegation in the opaque case. For the purposes of presentation, we first turn to the top-down transparency case and then explicitly compare optimal delegation in the two cases.

Endogenous Authority: The Top-Down Transparency Case. Inequality (9) is satisfied so long as
\[ \alpha_A \geq 1 - \frac{1}{8|\beta_P - \beta_A|}. \]
From this it follows that, for any \( \beta = \{\beta_P, \beta_A\} \), the minimal feasible level of authority that the principal can grant to the agent and secure truthful policymaking is
\[ \alpha^*_{AT}(\beta) = \max \left[ 0, 1 - \frac{1}{8|\beta_P - \beta_A|} \right]. \] (11)
Thus, \( \alpha^*_{AT}(\beta) \) is the “least expensive” means by which the principal can incentivize agent \( A \) to apply/reveal his or her private information when the principal’s information is transparent to the agent. As the preferences of the agents diverge, the minimum discretion required to elicit truthful
revelation by agent $A$ increases. Sufficiently divergent preferences implies that principal $P$ would prefer to make policy based only on his or her own information and delegate zero authority to agent $A$. As described earlier, principal $P$ will find it in his or her interest to share decision-making authority with agent $A$ only for an intermediate range of preference divergence. Proposition 6, presented in the appendix, formally describes the optimal delegation strategy for the principal in this setting. Now, however, we present and compare the optimal delegations in the two cases side-by-side. This multifaceted comparison represents one of the two central conclusions of the article: top-down transparency increases the minimal level of authority that the principal must delegate in order to achieve truthful (i.e., “informed”) policymaking from the agent and, concomitantly, can lead the principal to retain exclusive policymaking authority and forego the agent’s expertise/information entirely.

**The Effect of Exogenous Transparency on Delegation.** Propositions 5 and 6 jointly establish that, regardless of the observability of the principal’s information to the agent, there always exists a nonempty set of cases in which the principal will delegate positive authority to the agent in pursuit of truthful reporting of the agent’s information. In addition, the calculations reported above (Equations (10) and (11)) lead immediately to the following result.

**Proposition 1** For any pair of preference biases $\beta = \{\beta_P, \beta_A\}$, if the principal delegates positive authority in equilibrium to the agent in the top-down transparent case, then the principal delegates strictly more authority to the agent than he or she would in equilibrium in the opaque case:

$$\alpha^{*T}_A(\beta) > 0 \Rightarrow \alpha^{*T}_A(\beta) > \alpha^{*O}_A(\beta).$$

**Proof:** Follows immediately from comparison of Propositions 5 and 6 (in the appendix).

Proposition 2 implies an odd, though partial, path through which information *begets* power: an agent with access to the information held by his or her principal faces a lower cost of manipulating that principal’s subsequent policy decisions: the agent can obfuscate his or her own information through less extreme deviations from what the agent would do if he or she held complete authority. Thus,
only by granting the agent more authority can the principal dissuade the agent from misapplying his or her own private information when setting policy. Proposition 1 implies that the situations (i.e., sets of preference biases, \( \beta = \{ \beta_P, \beta_A \} \)) in which the principal will find it optimal to delegate any nontrivial policymaking authority to the agent will differ between the opaque and top-down transparent cases. In fact, these sets of cases (in terms of the preference biases, \( \beta = \{ \beta_P, \beta_A \} \)) are nested, as summarized in the next proposition.

**Proposition 2** For any pair of preference biases \( \beta = \{ \beta_P, \beta_A \} \), if the principal delegates positive authority in equilibrium to the agent in the top-down transparent case, then the principal also delegates positive authority in equilibrium to the agent in the opaque case:

\[
\alpha^*_A(\beta) > 0 \Rightarrow \alpha^*_O(\beta) > 0,
\]

but the converse does not hold: there are pairs of preference biases \( \beta = \{ \beta_P, \beta_A \} \) such that

\[
\alpha^*_O(\beta) > 0 \text{ and } \alpha^*_T(\beta) = 0.
\]

**Proof**: Follows immediately from comparison of Propositions 5 and 6.

Proposition 2 implies that allowing the principal to conceal his or her own information from the agent will never eliminate, and indeed might engender, an incentive to delegate nontrivial, though partial, decision-making authority to the agent. Thus, as we return to below, while top-down transparency will increase the precision and efficiency of the agent’s policy decision, imposition of such transparency can somewhat ironically negate the principal’s incentive to grant the agent any authority at all.

The results regarding endogenous delegation in the two transparency regimes (Propositions 1 and 2) are portrayed in Figure 2. If delegation of positive discretionary authority is required to elicit truthfulness from the message sender, the minimal required level of discretionary authority is always greater when the principal’s information is transparent and observable by the message sender. This conclusion can be understood in a variety of ways, including the fact that ex ante
incentive compatibility is always less restrictive than interim incentive compatibility. In other words, when the message sender is unaware of the principal’s additional information about \( \theta \), he or she is less certain about whether he or she will gain from deviating from truthfulness.

Taken together, Propositions 5 and 6 imply that the set of circumstances in which it is in an informed principal’s interest to delegate discretionary authority in pursuit of eliciting truthful revelation by the message sender is strictly larger when the principal's information is privately held than when this information is observable by the message sender. This conclusion has two important implications for any policy-interested party outside the model (i.e., a third party, such as a voter or legislator) who might seek to impose top-down transparency on a hierarchical policy-making institution arrangement with endogenously delegated discretionary authority similar to that modeled here. Namely,

1. imposing such transparency will reduce the likelihood that the principal will choose to grant any such authority, but

2. if delegation of authority occurs in the transparent environment, the degree of authority that is delegated will be strictly larger than it would have been in the opaque case.
These implications present the foundations of a classic trade-off for third parties charged with delineating/circumscribing the institutional details of a hierarchical policymaking organization where the possibility of sub-delegation is inherent. Space constraints clearly prohibit the explication of a model that would fully incorporate an outsider/third party faced with such choices, so we leave this extension for future work.\footnote{As an aside, note that the tension presented by these two implications suggest that a third-party, $B$, whose preferences were more aligned with those of the agent than with those of the principal (i.e., $|\beta_B - \beta_A| < |\beta_B - \beta_P|$) might nevertheless actively work against attempts to require that the principal reveal his or her information to the subordinate. Specifically, the results indicate that there is a nonempty set of situations (in terms of the preferences, $\beta_P, \beta_A, \beta_B$) such that allowing the principal to maintain the confidentiality of his or her information will lead to a strictly higher level of authority being delegated to the agent.}

We now turn to consider the impact of the transparency of the principal’s information on his or her equilibrium payoffs in this setting in detail. By doing so, we extend the theory to encompass the possibility of endogenously determined top-down transparency.

## 4 Endogenous Top-Down Transparency

The previous subsection considered fixed game forms in which the agent $A$ either could or could not observe $s_P$. We now consider the principal’s preferences over this observability. To do this, we extend the game form so that the principal $P$ can choose whether or not the agent $A$ observes $P$’s signal $s_P$, and then the game proceeds as in the delegation game analyzed above:

**Sequence of Play: Delegation Game with Endogenous Transparency.** The *delegation game with endogenous transparency* proceeds as follows.

1. Player $P$ chooses whether to adopt top-down transparency ($t = T$) or opacity ($t = O$)
2. Player $P$ assigns decision-making authority $\alpha_i \geq 0$ to each player $i \in \{P, A\}$, with $\alpha_P + \alpha_A = 1$.
3. Nature determines the state of nature $\theta$ and players’ signals, $s = \{s_P, s_A\}$.
4. • **Opaque Case** ($t = O$). Each player $i \in \{P, A\}$ privately observes his or her signal, $s_i$.
   • **Top-Down Transparent Case** ($t = T$). Each player $i \in \{P, A\}$ privately observes his or her signal, $s_i$, and the agent observes the principal’s signal, $s_P$.  

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5. The agent, $A$, sets policy $y_A \in \mathbb{R}$.

6. Principal $P$ observes $y_A$ and sets policy $y_P \in \mathbb{R}$.

7. Game concludes, players receive payoffs.

The previous section’s analysis illustrated that top-down transparency increases the amount of authority that the principal needs to share with agent $A$ and simple reflection clearly indicates that such transparency is strictly preferred by the principal only if the principal delegates some authority to agent $A$. In fact, it turns out that the welfare impact of transparency (from the principal’s point of view) is ambiguous: on one hand, the imposition of transparency weakly raises the “delegation price” of eliciting truthfulness. On the other hand, transparency reduces the “variance cost” of the agent’s policy-making by giving him or her access to the same information as the principal. When $|\beta_P - \beta_A| \leq 1/8$, transparency is clearly in the principal’s interest: transparency will effectively allow the principal and agent to communicate truthfully and simultaneously. When $|\beta_P - \beta_A|$ is sufficiently large, however, opacity is clearly in the principal’s interest. The most interesting case of this is in the region between $\frac{3+\sqrt{41}}{48}$ and $\rho^*$ in Figure 2, where the principal voluntarily chooses to shut down (i.e., not delegate so as to elicit) truthful communication when his or her information is transparent, but voluntarily grants significant discretionary authority to elicit truthful communication when his or her information is opaque. Thus, in this region, it is clear that the principal and agent strictly prefer opacity to transparency in these situations. The next proposition formally characterizes the principal’s preference for transparency in the two player setting.$^{22}$

**Proposition 3** In the two-player case in which the principal, $P$, can delegate discretionary authority to agent $A$, the principal prefers that agent $A$ observes the principal’s information, $s_P$, prior to choosing $y_A$ (i.e., transparency is preferred to opacity) whenever

$$
\left(1 - \frac{1}{8|\beta_P - \beta_A|}\right)(\beta_P - \beta_A)^2 \leq \left(\frac{8|\beta_P - \beta_A| - 1}{7/9 + 8|\beta_P - \beta_A|}\right)((\beta_P - \beta_A)^2 + \frac{1}{72}),
$$

$$
|\beta_P - \beta_A| \leq \frac{1}{7}.
$$

$^{22}$The proof of Proposition 3 is omitted, as it follows from simple calculations included in the statement of the proposition.
Thus, in line with the intuition described above, Proposition 3 confirms that the principal prefers transparency from an *ex ante* perspective for sufficiently small differences in biases, including some, but not all, situations in which the principal would prefer to delegate authority to the agent to elicit truthfulness from the agent. Figure 3 summarizes our results.

<table>
<thead>
<tr>
<th>No Authority Delegated</th>
<th>Some Authority Delegated</th>
<th>No Authority Delegated</th>
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<tr>
<td>Information Transparent</td>
<td>Information Opaque</td>
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</tr>
<tr>
<td>Communication Perfect</td>
<td></td>
<td>Zero Communication</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>β _i - β _j</th>
<th>No Authority Delegated</th>
<th>Some Authority Delegated</th>
<th>No Authority Delegated</th>
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<td>1/8</td>
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Figure 3: Summary of Results for Two-Player Settings

Figure 3 illustrates the variety of potential organizational structures that characterize optimal designs by the principal. Communication can be perfect between the agent and principal, though this communication might require delegation of decision-making authority to the agent. In equilibrium, authority is delegated only if communication will be perfect as a result. Similarly, transparency will be chosen by the principal only if the ensuing communication is perfect. However, transparency might not be chosen even though the principal chooses to delegate authority to the agent and the ensuing communication is perfect. Finally, the absence of delegation of authority does not completely characterize the quality of the ensuing communication between agent and the principal. Rather, when authority is not delegated, the design characteristic that completely characterizes the expectations and reality regarding the quality of the ensuing communication is the principal’s choice of transparency. If the principal does not share authority with the agent, then the principal will choose
to make his or her information transparent to the agent if and only if the ensuing communication will be perfect. That is, transparency in the absence of power-sharing occurs only if the principal and agent can credibly communicate with each other through cheap talk.

5 Extension: Allowing for Multiple Agents

Of course, most policy-making organizations are composed of more than two individuals. Once one moves to the more general case of a single principal and $n$ agents, the set of potential transparency arrangements and organizational forms grows quickly. As a result, space precludes a full analysis of such settings. Instead, we briefly discuss two dimensions of interest that emerge when larger hierarchical policymaking institutions are considered and leave a fuller treatment of such an extension for future work.

The first of these concerns the nature and character of top-down transparency. In particular, allowing for multiple agents to make decisions prior to the principal’s ultimate decision opens up the possibility of (nontrivial) sequential policymaking insofar as some agents might be asked to make their decisions prior to other agents, some of whom might be asked to make decisions after observing those earlier decisions, and these decisions might themselves be then observed by yet more agents, and so forth. For example, such structures mimic (bottom-up) “chains of command.” A key insight that emerges once considers such policymaking hierarchies is analogous to (but much richer than) the results reported in this article about the effect of top-down transparency. To the degree that earlier decisions ultimately inform the principal when he or she renders his or her decision, the “intervening agents”—those who make decisions after observing the decisions of some other agents—accordingly possess some of the principal’s information when making their own decisions. Accordingly, these intervening agents will be more tempted to manipulate the principal’s decisions through their own decisions, in line with the comparison of top-down transparency and opacity reported in Proposition 1, above. For example, this immediately implies that, when there are two agents with identical biases reporting in sequence to the principal (e.g., there are two agents, $A_1$ and $A_2$ with $\beta_{A_1} = \beta_{A_2}$, $A_1$ chooses $y_1$, which is observed by $A_2$ and the principal, after which $A_2$
chooses $y_2$, which is then observed by the principal who chooses $y_P$), the optimal delegation will indeed appear hierarchical in the sense that, in equilibrium with endogenous authority, the first agent will have less authority than the second: $\alpha^*_{A_1} \leq \alpha^*_{A_2}$.

The second dimension of interest deals with the maximum number of agents that the principal might be able to (and/or desire to) delegate authority to in order to elicit truthful revelation. While the exact characterization of this quantity is in general quite complicated, due to the fact that it can depend on the exact configuration of the available agents’ preferences biases and whether one allows the principal to require the agents to report sequentially, a fundamental result is that the elicitation of information from an additional agent whose preferences differing from those of the principal becomes increasingly costly—i.e., requires the delegation of (weakly) greater discretionary authority—as the principal elicits information from more agents.\textsuperscript{23} Thus, there are situations in which the principal will grant positive discretionary authority to some, but not all, agents.

In sum, the consideration of a more general framework with multiple agents clearly represents an important area of future research. That said, modeling choices will have to be made in order to both render such an examination tractable and provide hope for clearly stated and “portable” conclusions. The results presented and discussed in this article for the single agent case highlight the variety of dimensions of institutional design that emerge as potentially relevant—and the simple combinatorics of the matter imply that these dimensions will become even more complex as one considers the possibilities in larger policy-making organizations. We now return to the empirical examples discussed at the beginning of the article in order to summarize both the content and implications of our theoretical results.

6 Delegation and Transparency in Financial Regulation

The theoretical discussion in this article has focused on two dimensions of institutional design: power-sharing (i.e., partial delegation) and information-sharing (i.e., top-down transparency). Be-

\textsuperscript{23}The principal source of this tension is analogous to the “congestion effect” discussed in Galeotti, Ghiglino and Squintani (2013): manipulation/insincere policymaking becomes more tempting for any given agent as the principal becomes more informed in the sense of possessing more signals and/or observing more truthful messages/policy decisions.
fore concluding, we now briefly illustrate the applicability of our theory and results within the context of quasi-public governance in the area of modern financial regulation in the United States.

**The Institutional Structure of Financial Regulation in the US.** Created in 2007, the Financial Industry Regulatory Authority (FINRA) is a “self regulatory organization” (SRO) that oversees trading in financial securities in the United States. The notion of an SRO was meant to represent an analogue for the stock exchanges that had emerged over the years as means by which trades and trading practices were regularized and policed through voluntary associations of brokers and traders (the most famous of these, of course, is the New York Stock Exchange) and, in the context of the “over the counter” trading of securities, the authority for the Securities and Exchange Commission (SEC) to recognize such organizations originated with the Maloney Act of 1938.\(^{24}\) Self regulatory organizations effectively possess the powers of the SEC in terms of regulating the day-to-day operations of their members.\(^{25}\) The policymaking authority of FINRA comes in two forms: rulemaking and enforcement. Its rules are subject to approval by the SEC and essentially subject to normal notice and comment requirements: FINRA may specify its own procedures for proposing rules, but these rules then must be forwarded to the SEC for approval, publication in the Federal Register, solicitation of public comment, and revision as appropriate.\(^{26}\) Enforcement is carried out by FINRA according to its own procedures, and generally amounts to licensing/delicensing decisions, and levying fines for fraudulent or negligent behavior.\(^{27}\)

Three analogies between the structure and authority of FINRA and the theoretical framework analyzed in this article are of interest. First, the SEC and FINRA share authority: the SEC “by rule, may abrogate, add to, and delete from...the rules of a self-regulatory organization...as the

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\(^{25}\) It is beyond the scope of this article to discuss the nature of membership in an SRO such as FINRA, but it is not too strong to say that membership is effectively required for any firm operating in the over-the-counter market. In addition, while FINRA effectively exercises federal regulatory authority, the leadership of FINRA (the Board of Governors) is chosen exclusively by the members of FINRA.

\(^{26}\) Rulemaking by FINRA is described in detail in, and governed by, Section 19 of the Exchange Act, as amended.

\(^{27}\) For example, in 2012, FINRA “barred 294 individuals and suspended 549 brokers from association with FINRA-regulated firms, levied fines totaling more than $68 million and ordered $34 million in restitution to harmed investors.” (Source: http://www.finra.org/AboutFINRA/, accessed on September 18, 2013.)
Commission deems necessary or appropriate to insure the fair administration of the self-regulatory organization.\textsuperscript{28} And, of course, the SEC has independent regulatory and enforcement authority beyond that of FINRA. At the same time, under its rules, FINRA may punish individuals and firms, and is required only to notify the SEC of such decisions. Furthermore, these decisions are subject to SEC review only upon appeal.\textsuperscript{29} Thus, as in our model, FINRA and the SEC each effectively have nontrivial partial authority in terms of the regulation of financial markets.\textsuperscript{30}

Second, FINRA and the SEC represent independent sources of information/expertise with respect to the proper balancing of (say) investor protection and firm profitability. Of course, this decentralized information mirrors the theoretical setting examined in this article. Indeed, one of the principal arguments in favor of self-regulatory organizations is their comparative informational advantage, based on the experience, incentives, and expertise’s of their members. Freeman summarizes this by pointing out that legislatures may “deputize nongovernmental actors in the pursuit of public ends because they offer expertise, information, and monitoring capacity that the state lacks.”\textsuperscript{31} Furthermore, the institutional relationship between FINRA, the SEC, and Congress is arguably justified \textit{only} by the presumption that FINRA will at least occasionally use its information in a way that differs from how the SEC would behave on its own. Our theory illustrates a key consideration: the provision of nontrivial rule making and enforcement powers to FINRA may very well be required in order to elicit and leverage its private information and expertise in the regulation of securities markets.\textsuperscript{32} Furthermore, our theory illustrates that such power-sharing is truly required \textit{only when the members of FINRA have different preferences from the SEC commissioners.}

Third, the focus on top-down transparency in this article arguably illuminates a subtle consideration when judging the character and performance of the SEC’s oversight of FINRA. As mentioned above, the SEC has plenary powers over FINRA. That is, the powers of FINRA are ultimately de-
terminated by the SEC. However, many commentators have noted that the SEC rarely takes explicit
actions to direct, supersede, or corral SROs such as FINRA. For example, consider the discussion by
Coffee Jr and Sale (2009)\(^{33}\) and Fisch (2009)\(^{34}\) regarding how the events leading up to and during the
recent financial crisis of 2007–08 illustrate the opacity of the SEC’s (top-down) private information
(e.g., it remains unclear what actions the SEC was considering as the crisis unfolded). Calls for re-
form, including the US Treasury’s “Blueprint for Reform” (US Department of the Treasury (2008)),
have focused on the need to increase coordination of securities regulation. While our theory does not
speak to every dimension of this debate,\(^{35}\) the insights about the impact of top-down transparency on
the incentives of both the agent (FINRA in this case) and the principal (the SEC) suggest that simply
mandating transparency of the SEC’s information (which could be deduced from the SEC’s planned
actions) might ironically lead to either (1) increased delegation of authority to FINRA (a conclusion
that is at odds with those who think FINRA is insufficiently motivated to protect investors) or (2) a
complete removal of FINRA’s regulatory authority (a conclusion that is at odds with those who think
the SEC either ill-equipped or ill-informed to take sole responsibility for day-to-day regulation and
enforcement).

Of course, without more details of the preferences and information held by the various actors
(not to mention a more fine-grained appreciation of the collective choice and action procedures
within both FINRA and the SEC), we can not say for sure what transparency and (sub)delegation
arrangements are “best” in this case. However, the theory presented in this article does illuminate
the importance of certain institutional features when considering the performance of regulators and
quasi-public authorities. More generally, it is important to keep in mind that a regulator who is
publicly active in overseeing and shepherding its own agents (such as SROs) is effectively revealing
its own private information to those agents.\(^{36}\) Accordingly, it is difficult to draw conclusions about
the performance of a regulator (or predict welfare impacts of prompting/directing the regulator to

\(^{33}\)Coffee Jr and Sale (2009), pp. 760-773.
\(^{34}\)Fisch (2009), pp. 117-128.
\(^{35}\)For example, the overlapping and unclear authorities of multiple financial regulators is outside of the scope of the
theory presented in this article.
\(^{36}\)We omit for succinctness the possibility that the regulator might be publicly active in a way that does not reveal its
own information, because such behavior is clearly undesirable from a social standpoint and, at least to us, empirically
implausible.
be more active) without more deeply considering the incentives of those (such as SROs) with whom the regulator shares authority.

7 Conclusion

In this article, we have presented a model of communication and decision-making in policy-making settings characterized by the desirability of aggregating dispersed, policy-relevant information prior to rendering policy choices. Our results speak to a variety of considerations in institutional design involving delegated discretionary authority and transparency. The theory offers several broad conclusions, illustrating how both “top-down” transparency and wider spans of control can hinder “bottom-up” information aggregation and aggravate the incentive compatibility problems flowing from preference divergence between principals and agents. These problems can be mitigated through delegation of discretionary authority to the informational agents, a possibility that raises interesting broader questions of accountability and oversight. Finally, when such delegation occurs, the optimal power-sharing arrangement from the principal’s perspective is a non-monotonic function of the preference divergence between the delegate agent and the principal. This feature can lead to observed power structures in which the principal’s closest (preference-based) “allies” have significantly less (or even zero) power, while other agents with moderately different preferences from the principal are granted significant individual decision-making power.
A Definitions and Proofs

Though the discussion in the body of the article focuses on the two-player case consisting of a principal and an agent, in this appendix we present a general definition of the model that allows for an arbitrary number \( n \) of agents. Thus, the set of players in the game is \( N = \{ P, 1, \ldots, n \} \), and the sequence of play is as follows:

1. Player \( P \) chooses whether to adopt top-down transparency \( (t = T) \) or opacity \( (t = O) \).
2. Player \( P \) assigns decision-making authority \( \alpha_i \geq 0 \) to each player \( i \in N \), with \( \sum_{i \in N} \alpha_i = 1 \).
3. Nature determines the state of nature \( \theta \) and players’ signals, \( s = \{ s_i \}_{i \in N} \).
4. • OPAQUE CASE \( (t = O) \). Each player \( i \in N \) privately observes his or her signal, \( s_i \).
   • TOP-DOWN TRANSPARENT CASE \( (t = T) \). Each player \( i \in N \) privately observes his or her signal, \( s_i \), and the principal’s signal, \( s_P \).
5. Each player \( i \neq P \) sets policy \( y_i \in \mathbb{R} \).
6. Principal \( P \) observes \( y_i \) for each \( i \neq P \) and sets policy \( y_P \in \mathbb{R} \).
7. Game concludes, players receive payoffs.

Payoffs are defined in the body of the article. In this appendix, we provide formal definitions of the informational environment, beliefs, strategies, and equilibrium. Following that, we present proofs of the relevant formal results.

A.1 The Informational Environment

The set of states of nature is denoted by \( \Theta = [0, 1] \), and the state of nature, \( \theta \in \Theta \), is determined according to the Uniform distribution on \([0,1]\). Upon realization of \( \theta \), each individual \( i \in N \)

\[37\text{This assumption greatly simplifies the calculations and allows us to focus on the key institutional and strategic trade-offs. In addition, note that the uniform distribution is a useful baseline, as it maximizes the } \textit{ex ante} \text{ informativeness of each agent’s signal. In other words, this is the case in which information aggregation is most important to all agents from an } \textit{ex ante} \text{ perspective. Accordingly, this baseline amplifies the importance of our results when they indicate that information is not aggregated in equilibrium or that optimal institutional design limits information aggregation.} \]
receives a conditionally independent (and private) signal $s_i \in \{0, 1\}$ according to the following probability mass function:

$$
\Pr[s_i = x|\theta] = \begin{cases} 
1 - \theta & \text{if } x = 0, \\
\theta & \text{if } x = 1.
\end{cases}
$$

After observing a single signal $s_i \in \{0, 1\}$, $i$’s posterior beliefs about $\theta$ are characterized by the following probability density function:

$$
g_i(t|s_i) = \begin{cases} 
2(1 - t) & \text{if } s_i = 0, \\
2(t) & \text{if } s_i = 1.
\end{cases}
$$

More generally, player $i$’s posterior beliefs conditional upon observing $m$ signals $\{s_1, \ldots, s_m\}$ with $k = \sum_{j=1}^{m} s_j$ (i.e., $k$ occurrences of $s = 1$ and $m - k$ occurrences of $s = 0$) is characterized by a Beta$(k + 1, m - k + 1)$ distribution, so that

$$
E(\theta|k, m) = \frac{k + 1}{m + 2}, \text{ and } V(\theta|k, m) = \frac{(k + 1)(m - k + 1)}{(m + 2)^2(m + 3)}.
$$

Accordingly, the optimal policy choice for a player $i \in N$, given $k$ and $m$, is

$$
y^*_i(k, m) = \frac{k + 1}{m + 2} + \beta_i.
$$

A.2 Strategies

Let $\Delta^n = \{a \in [0, 1]^n : \sum a_i \leq 1\}$ denote the set of feasible authority assignments to the $n$ agents other than $P$ (so that the principal’s residual decision-making authority, given $a \in \Delta^n$, is simply $1 - \sum a_i$). A (pure) strategy for the principal, $P$, consists of two mappings, $\sigma_P = (a, z_P)$, where $a \in \Delta^n$ is a feasible assignment of decision-making authorities to each of the $n$ other agents and $z_P : \mathbb{R}^n \to \mathbb{R}$ that chooses a policy for each profile of policy choices for the $n$ other agents. A pure strategy for agent $i \neq P$ is simply a mapping $\sigma_i = z_i : \Delta^n \times \{0, 1\} \to \mathbb{R}$ where $\sigma_i(a, s_i)$ represents the
policy $i$ chooses, conditional on authority assignments $a$ and $i$’s signal, $s_i \in \{0, 1\}$.

### A.3 Beliefs

The beliefs of all players other than the principal are straightforward in our setting: we require them to be consistent with the informational structure defined above and the strategies of all the other players. However, the principal’s beliefs are a bit tricky from a technical standpoint. In particular, the principal has a continuum of information sets (though only a finite subset of these will be observed in a pure strategy equilibrium). We could set this difficulty aside by restricting each agent $i \neq P$ to the (finite) set of sequentially rational policy choices when choosing $y_i$. It follows from Equation (2) that these are

$$y_i \in \{ \frac{1}{3} + \beta_i, \frac{2}{3} + \beta_i \}$$

in the opaque case and

$$y_i \in \{ \frac{1}{4} + \beta_i, \frac{1}{2} + \beta_i, \frac{3}{4} + \beta_i \}$$

in the top-down transparency case.

This assumption, while admittedly *ad hoc*, greatly simplifies presentation. Accordingly, if one is not too interested in the panoply of (potentially pathological) equilibria that can exist in the baseline model, the analysis of the model follows directly with it in place. From a robustness perspective, however, it is desirable to provide an epistemological justification for such an assumption. That is, if one does not want to exogenously restrict the policy choices of any given agent $i \in \{1, \ldots, n\}$ based on $i$’s preference bias, $\beta_i$, it is necessary to show that an equilibrium exists in which every agent $i \in \{1, \ldots, n\}$ will choose a policy

$$y_i \in \{ \frac{1}{3} + \beta_i, \frac{2}{3} + \beta_i \}$$

(12)
in the opaque case and

\[ y_i \in \left\{ \frac{1}{4} + \beta_i, \frac{1}{2} + \beta_i, \frac{3}{4} + \beta_i \right\} \]  

(13)

in the top-down transparency case. We now do so.

Consider any agent \( i \in \{1, \ldots, n\} \) and suppose without loss of generality that \( \beta_i \geq \beta_P \).\(^{38}\) The principal’s beliefs about \( s_i \) upon observing \( y_i \), which we denote by \( h_i(y_i) \in [0, 1] \) with \( h_i(y_i) \) denoting the probability that \( P \) assigns to \( i \) having observed \( s_i = 1 \) (i.e., \( h_i(y_i) = \Pr[s_i = 1|y_i] \)), are then defined as follows:

\[
h_i(y_i) = \begin{cases} 
0 & \text{for } y_i < \frac{2}{3} + \beta_i, \\
1 & \text{for } y_i \geq \frac{2}{3} + \beta_i, \\
0 & \text{for } y_i < \frac{s_P + 2}{4} + \beta_i, \\
1 & \text{for } y_i \geq \frac{s_P + 2}{4} + \beta_i. 
\end{cases}
\]  

(14)

The following proposition is useful in that it justifies our focus in the body of the paper on the choices defined in (12) and (13), above.

**Proposition 4** Suppose that \( \beta_i > \beta_P \) and that the principal’s beliefs satisfy Equation 14. Then the agent’s best response, \( y^*_A \), satisfies the restrictions embodied in (12) in the opaque case and (13) in the top-down transparent case.

**Proof:** Given the principal has beliefs that satisfy (14), agent \( i \)'s expected payoff from choosing policy \( y_i \) after observing \( s_i = 0 \) is then

\[
U_i(y_i|h_i, s_i = 0) = \begin{cases} 
-(\beta_P - \beta_i)^2 - \alpha_i(y_i - \frac{1}{3} - \beta_i)^2 & \text{if } y_i < \frac{2}{3} + \beta_i, \\
-(\beta_P + \frac{1}{4} - \beta_i)^2 - \alpha_i(y_i - \frac{1}{3} - \beta_i)^2 & \text{if } y_i \geq \frac{2}{3} + \beta_i. 
\end{cases}
\]

Note that, except at \( y_i = \frac{2}{3} + \beta_i \), \( U_i(y_i|h_i, s_i = 0) \) varies with \( y_i \) only through the term \( \alpha_i(y_i - \frac{1}{3} - \beta_i)^2 \).

\(^{38}\)The arguments that follow are symmetric for the other case when \( \beta_i < \beta_P \).
Accordingly, it follows that, if $y_i^* < \frac{2}{3} + \beta_i$, then $y_i^* = \frac{1}{3} + \beta_i$ since $\alpha_i(y_i - \frac{1}{3} - \beta_i)^2$ is maximized by this choice and, since $\alpha_i(y_i - \frac{1}{3} - \beta_i)^2$ is decreasing in $y_i$ for $y_i > \frac{1}{3} + \beta_i$, if $y_i^* \geq \frac{2}{3} + \beta_i$, then $y_i^* = \frac{2}{3} + \beta_i$. We omit derivation of the case when $s_i = 1$, as it is symmetric.

Turning to the top-down transparency case, given the principal has beliefs that satisfy (14), agent $i$’s expected payoff from choosing policy $y_i$ after observing $s_i = 0$ (and leaving $s_P$ arbitrary) is

$$U_i(y_i|h_i,s_i = 0,s_P) = \begin{cases} 
-\beta_P - \beta_i)^2 - \alpha_i(y_i - \frac{1+s_P}{4} - \beta_i)^2 \quad &\text{if } y_i < \frac{s_P + 2}{4} + \beta_i, \\
-\beta_P + \frac{1}{5} - \beta_i)^2 - \alpha_i(y_i - \frac{1+s_P}{4} - \beta_i)^2 \quad &\text{if } y_i \geq \frac{s_P + 2}{4} + \beta_i.
\end{cases}$$

The reasoning explained for the opaque case can be applied immediately to this case as well, and leads to the analogous conclusion that if $y_i^* < \frac{s_P + 2}{4} + \beta_i$, then $y_i^* = \frac{1+s_P}{4} + \beta_i$ and if $y_i^* \geq \frac{s_P + 2}{4} + \beta_i$, then $y_i^* = \frac{s_P + 2}{4} + \beta_i$.

Accordingly, the beliefs defined in (14) induce the agent’s best response (regardless of whether the incentive compatibility conditions hold or not) to be restricted to the choices defined in (12) and (13), as was to be shown.

As defined in Section A.4, we consider only those separating equilibria in which the principal holds beliefs consistent with Equation (14). This is partly to focus our analysis so as to get to the main point of the paper (the role of delegation and top-down transparency in eliciting information within decentralized decision-making environments) and partly to purposely sidestep some (technical and arguably quite arcane) epistemological issues. These issues arise whenever $\alpha_i > 0$. In such cases, the principal can not “ignore” $i$’s choice of policy (i.e., treat $y_i$ as uninformative relative to $s_i$, as is the case in the canonical “babbling equilibria” of cheap-talk signaling games), $y_i$, because $i$ has direct preferences over $y_i$ and, hence, if $P$ ignored $i$’s choice, $i$’s optimal behavior would be to choose $y_i$ truthfully. But if $i$ chooses $y_i$ truthfully, perfect Bayesian equilibrium requires that $P$ must infer $s_i$ correctly with probability one, which implies that $P$ can not ignore $y_i$. Finally, if truthful revelation by $i$ is not incentive compatible with the beliefs defined in Equation (14), then it is also not incentive compatible with any belief for $P$ that is consistent with $i$ behaving truthful and $P$ inferring $s_i$ correctly with probability one from these choices. Accordingly, one would either
need to allow $i$ to use a mixed strategy, an approach we do not adopt in this article, or define beliefs $h'$ such that $i$ using a separating strategy (and $P$ inferring $s_i$ correctly from $y_i$ with probability 1) is incentive compatible for $i$ and consistent with $P$’s beliefs.

It turns out that, if one allows such arbitrary off-the-equilibrium-path beliefs, pathological equilibria emerge. In particular and without loss of generality for the purposes of this point, consider the case of a single agent ($n = 1$) and suppose that $\beta_1 > \beta_P$. In such a setting, allow the principal to possess arbitrary beliefs of the form “I believe $s_1 = 0$ unless $y_1 \geq \gamma$, in which case I believe that $s_1 = 1$.” It can be shown that, for any $\alpha_1 > 0$, there is a value $\hat{\gamma}(\alpha_1, \alpha_P, \beta_1)$ such that $\gamma > \hat{\gamma}(\alpha_1, \alpha_P, \beta_1)$ and sequentially rational policy-making by the principal based on those beliefs will make truthful revelation incentive compatible for the agent.39

A.4 Equilibrium

Our notion of equilibrium throughout is perfect Bayesian equilibrium with the refinement on beliefs discussed in Section A.3. Thus, an equilibrium of the baseline game, given a profile of preference biases $\beta = (\beta_P, \beta_1, \ldots, \beta_n)$ and a profile of decision-making authorities $\alpha = (\alpha_P, \alpha_1, \ldots, \alpha_n)$, is the combination of a strategy profile $\sigma^* = (\sigma_p^*, \sigma_1^*, \ldots, \sigma_n^*)$ and a belief for the principal, $h^*$, satisfying the following two requirements:

1. No player $i \in N$ can strictly increase his or her expected payoff, given the strategies of the other players, $\sigma^*_{-i}$ and

2. The principal’s beliefs $h^*$ satisfy the SR refinement (Equation (14))

39This point is made formally in Patty and Penn (2013). We refer to these equilibria as “pathological” because, while they induce perfect information aggregation, in some cases they do so at a net cost to the principal. Specifically, for sufficiently large $\beta_1$, $\hat{\gamma}(\alpha_1, \alpha_P, \beta_1)$ is so large that the principal would receive a strictly higher expected payoff from ignoring the agent. The combination of the primitives of our model and the perfect Bayesian equilibrium requirement that beliefs be correct on the equilibrium path of play forbids such beliefs when $\alpha_1 > 0$: if the principal “ignored” the choice of agent 1, then agent 1’s best response is to be sincere when choosing $y_1$ after observing $s_1$: but this implies that the principal’s beliefs treating $y_1$ as uninformative are incorrect. The (or, perhaps “a”) right model for considering/allowing for such beliefs would allow the principal to choose whether to commit ex ante to not observing $y_1$, for example perhaps by committing to a choice $y_P(s_P)$ prior agent 1’s policy choice.
A.5 Proofs

Proposition 5 Letting $\rho^* \approx 0.201$ denote the first root of $f(x) = 648x^3 - 81x^2 - 2$, in the two-player case in which agent $A$ does not observe the principal’s information, $s_P$, prior to choosing $y_A$, the principal will delegate discretionary authority to the agent as follows:

$$
\alpha_A(\beta) = \begin{cases} 
0 & \text{if } |\beta_P - \beta_A| < \frac{1}{8}, \\
\frac{8|\beta_P - \beta_A| - 1}{7/9 + 8|\beta_P - \beta_A|} & \text{if } |\beta_P - \beta_A| \in \left[\frac{1}{8}, \rho^*\right], \\
0 & \text{if } |\beta_P - \beta_A| > \rho^*.
\end{cases}
$$

Proof: Note that if $|\beta_P - \beta_j| \leq \frac{1}{8}$, then agent $j$ will be truthful regardless of $\alpha_j$, so that the optimal choice for principal $P$ is clear: $\alpha_j = 0$. Thus, presuming that $|\beta_P - \beta_j| > \frac{1}{8}$ (so that eliciting truthful communication requires delegating positive discretionary authority to the agent) and recalling that $\alpha^*_j(\beta) \equiv \max \left[ \frac{8|\beta_P - \beta_j| - 1}{7/9 + 8|\beta_P - \beta_j|}, 0 \right]$ denotes the minimal level of discretionary authority required to elicit truthful revelation from the message sender when the principal is known to be informed but his or her information is opaque to the message sender, the principal’s expected payoff from inducing truthful revelation as cheaply as possible in this setting is

$$
U_P(\alpha^*_j(\beta); \beta) = -\frac{1}{24} - \frac{\alpha^*_j(\beta)}{18} - \alpha^*_j(\beta)(\beta_j - \beta_p)^2,
$$

whereas the expected payoff from delegating zero discretionary authority is

$$
U_P(\alpha_j = 0; \beta) = -\frac{1}{18},
$$

39
so that the delegation of positive discretionary authority is in the principal’s interest only if

\[
\Delta U_P \equiv U_P(\alpha_j^O(\beta); \beta) - U_P(\alpha_j = 0; \beta),
\]

\[
= \frac{1}{18} - \frac{1}{24} - \left( \frac{8|\beta_P - \beta_j| - 1}{7/9 + 8|\beta_P - \beta_j|} \right) \left( \frac{1}{72} + (\beta_j - \beta_P)^2 \right)
\]

\[
= \frac{1}{72} - \left( \frac{8|\beta_P - \beta_j| - 1}{7/9 + 8|\beta_P - \beta_j|} \right) \left( \frac{1}{72} + (\beta_j - \beta_P)^2 \right)
\]

\[
\geq 0
\]

which holds if and only if

\[
|\beta_P - \beta_j| \leq \rho^* \approx 0.201,
\]

as was to be shown.

Proposition 6 In the two-player case in which agent A observes principal P’s information, \( s_P \), prior to choosing \( y_A \), principal P will delegate discretionary authority to agent A as follows:

\[
\alpha_A(\beta) = \begin{cases} 
0 & \text{if } |\beta_P - \beta_A| < \frac{1}{8}, \\
1 - \frac{1}{8|\beta_P - \beta_A|} & \text{if } |\beta_P - \beta_A| \in \left[ \frac{1}{8}, \frac{3+\sqrt{41}}{48} \right], \\
0 & \text{if } |\beta_P - \beta_A| > \frac{3+\sqrt{41}}{48}.
\end{cases}
\]

Proof: Recalling

\[
\alpha_j^{ST}(\beta) = \max \left[ 0, 1 - \frac{1}{8|\beta_P - \beta_j|} \right]
\]

denote the minimal level of discretionary authority required to elicit truthful revelation from the message sender, note first that principal P’s optimal delegation is \( \alpha_j = 0 \) when \( |\beta_P - \beta_j| \leq \frac{1}{8} \), because agent j’s optimal choice is to be truthful even with no discretionary authority in those cases. Thus, presuming that \( |\beta_P - \beta_j| > \frac{1}{8} \), the principal’s expected payoff from inducing truthful revelation as cheaply as possible (i.e., setting j’s discretionary authority equal to \( \alpha_j^{ST}(\beta) \)) is

\[
U_P(\alpha_j^{ST}(\beta); \beta) = -\frac{1}{24} - \left( 1 - \frac{1}{8|\beta_P - \beta_j|} \right) (\beta_j - \beta_P)^2,
\]

40
whereas the expected payoff from delegating zero discretionary authority is

\[ U_P(\alpha_j = 0; \beta) = -\frac{1}{18}, \]

so that the delegation of positive discretionary authority is in the principal’s interest only if

\[ U_P(\alpha^*_j(\beta); \beta) - U_P(\alpha_j = 0; \beta) = \frac{1}{72} \left( 1 - \frac{1}{8|\beta_p - \beta_j|} \right) (\beta_j - \beta_p)^2, \]  

which is positive only if

\[ |\beta_p - \beta_j| \leq \frac{1}{48} \left( 3 + \sqrt{41} \right) \approx 0.196, \]

so that the principal will delegate positive discretionary authority equal to \( \alpha^{**}(\beta) \) if and only if

\[ |\beta_p - \beta_j| \in \left( \frac{1}{8}, \frac{3 + \sqrt{41}}{48} \right), \]

as was to be shown.

References


